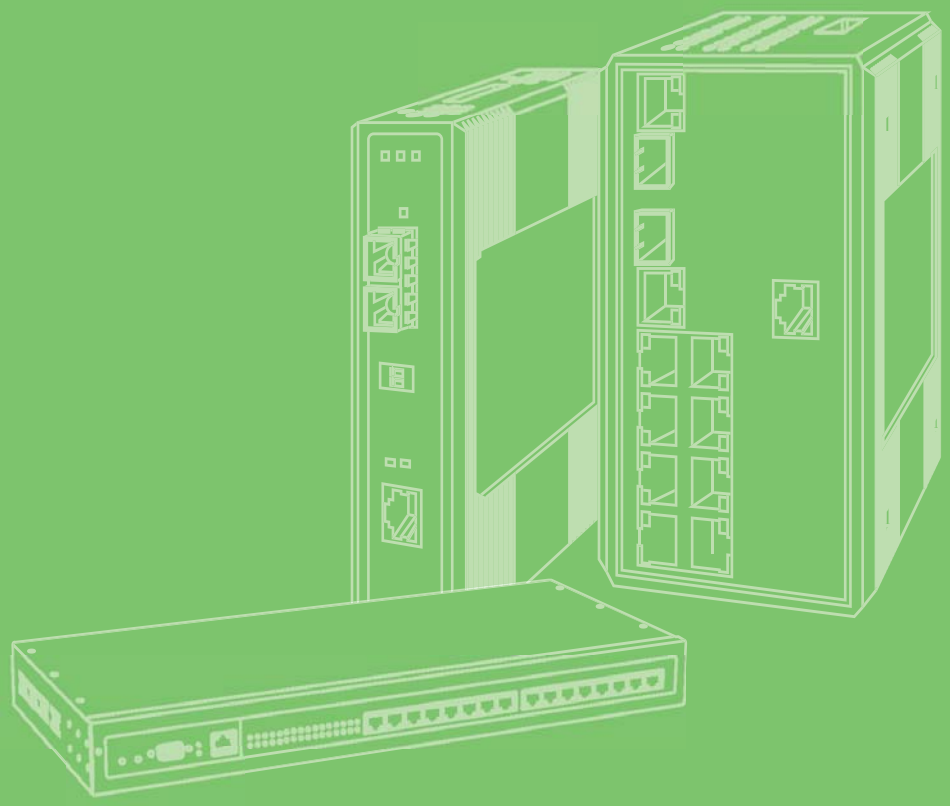
User Manual



EKI-9228G Series

16xRJ45 + 4xSFP + 8xCombo Port Full Gigabit L2 Managed Switch

ADVANTECH

Enabling an Intelligent Planet

Copyright

Acknowledgements

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Product Warranty (5 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for five years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any on screen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Part No. XXXXXXXXXX Edition 1

Printed in Taiwan September 2016

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

Note: This equipment has been tested and 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.

FCC Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FM

This equipment has passed the FM certification. According to the National Fire Protection Association, work sites are classified into different classes, divisions and groups, based on hazard considerations. This equipment is compliant with the specifications of Class I, Division 2, Groups A, B, C and D indoor hazards.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Warnings, Cautions and Notes

Warning! *Warnings indicate conditions, which if not observed, can cause personal injury!*

Caution! *Cautions are included to help you avoid damaging hardware or losing data. e.g.*

There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Note! *Notes provide optional additional information.*

Document Feedback

To assist us in making improvements to this manual, we would welcome comments and constructive criticism. Please send all such - in writing to: support@advantech.com

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- 1 x Full Managed Ethernet Switch
- 3 x Terminal Blocks
- 1 x Startup Manual

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
15. The power cord or plug is damaged.
16. Liquid has penetrated into the equipment.
17. The equipment has been exposed to moisture.
18. The equipment does not work well, or you cannot get it to work according to the user's manual.
19. The equipment has been dropped and damaged.
20. The equipment has obvious signs of breakage.
21. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
22. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
23. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Wichtige Sicherheishinweise

1. Bitte lesen sie Sich diese Hinweise sorgfältig durch.
2. Heben Sie diese Anleitung für den späteren Gebrauch auf.
3. Vor jedem Reinigen ist das Gerät vom Stromnetz zu trennen. Verwenden Sie Keine Flüssig-oder Aerosolreiniger. Am besten dient ein angefeuchtetes Tuch zur Reinigung.
4. Die NetzanschluBsteckdose soll nahe dem Gerät angebracht und leicht zugänglich sein.
5. Das Gerät ist vor Feuchtigkeit zu schützen.
6. Bei der Aufstellung des Gerätes ist auf sicheren Stand zu achten. Ein Kippen oder Fallen könnte Verletzungen hervorrufen.
7. Die Belüftungsöffnungen dienen zur Luftzirkulation die das Gerät vor überhitzung schützt. Sorgen Sie dafür, daB diese Öffnungen nicht abgedeckt werden.
8. Beachten Sie beim. AnschluB an das Stromnetz die AnschluBwerte.
9. Verlegen Sie die NetzanschluBleitung so, daB niemand darüber fallen kann. Es sollte auch nichts auf der Leitung abgestellt werden.
10. Alle Hinweise und Warnungen die sich am Geräten befinden sind zu beachten.
11. Wird das Gerät über einen längeren Zeitraum nicht benutzt, sollten Sie es vom Stromnetz trennen. Somit wird im Falle einer Überspannung eine Beschädigung vermieden.
12. Durch die Lüftungsöffnungen dürfen niemals Gegenstände oder Flüssigkeiten in das Gerät gelangen. Dies könnte einen Brand bzw. elektrischen Schlag auslösen.
13. Öffnen Sie niemals das Gerät. Das Gerät darf aus Gründen der elektrischen Sicherheit nur von authorisiertem Servicepersonal geöffnet werden.
14. Wenn folgende Situationen auftreten ist das Gerät vom Stromnetz zu trennen und von einer qualifizierten Servicestelle zu überprüfen:
15. Netzkabel oder Netzstecker sind beschädigt.
16. Flüssigkeit ist in das Gerät eingedrungen.
17. Das Gerät war Feuchtigkeit ausgesetzt.
18. Wenn das Gerät nicht der Bedienungsanleitung entsprechend funktioniert oder Sie mit Hilfe dieser Anleitung keine Verbesserung erzielen.
19. Das Gerät ist gefallen und/oder das Gehäuse ist beschädigt.
20. Wenn das Gerät deutliche Anzeichen eines Defektes aufweist.
21. VOSICHT: Explisionsgefahr bei unsachgemaben Austausch der Batterie.Ersatz nur durch densellben order einem vom Hersteller empfohlene-mahnlichen Typ. Entsorgung gebrauchter Batterien navh Angaben des Herstellers.
22. ACHTUNG: Es besteht die Explosionsgefahr, falls die Batterie auf nicht fachmännische Weise gewechselt wird. Verfangen Sie die Batterie nur gleicher oder entsprechender Type, wie vom Hersteller empfohlen. Entsorgen Sie Batterien nach Anweisung des Herstellers.
23. Der arbeitsplatzbezogene Schalldruckpegel nach DIN 45 635 Teil 1000 beträgt 70dB(A) oder weiger.

Haftungsausschluss: Die Bedienungsanleitungen wurden entsprechend der IEC-704-1 erstellt. Advantech lehnt jegliche Verantwortung für die Richtigkeit der in diesem Zusammenhang getätigten Aussagen ab.

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
- Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Contents

Chapter 1

Product Overview

1.1 Supported Models

EKI-9228G-8CMI	EKI-9228G-8COI

1.2 Specifications

Specifications	Description	
Interface	I/O Port	■ 16 x 10/100/1000BaseT(X), 8 x 1000Base-SX/LX/LHX/XD/ZX/EZX, or 4 x 100/1000Base-X SFP Port
	Power Connector	■ 3-pin removable screw terminal (power) ■ 4-pin removable screw terminal (relay)
Physical	Enclosure	Aluminum extrusion
	Protection Class	IP30
	Installation	1U 19" Rack mount
	Dimensions (W x H x D)	442 x 44 x 352 mm (17.4" x 1.73" x 13.85")
LED Display	System LED	SYS, Power 1, Power 2, CFG, ALM
	Port LED	Speed, Link, Activity
Environment	Operating Temperature	-40 ~ 85°C (-40 ~ 185°F)
	Storage Temperature	-40 ~ 85°C (-40 ~ 185°F)
	Ambient Relative Humidity	10 ~ 95% (non-condensing)
Switch Properties	MAC Address	16K-entry
Power	Power Consumption	■ EKI-9228G-8CMI:19.21 W @ 48V ■ EKI-9228G-8COI:19.24 W @ 110V_{AC}
	Power Input	■ EKI-9228G-8CMI: 48V_{DC} ■ EKI-9228G-8COI: 90~264AC/88~370V_{DC}
Certifications	Safety	■ UL 61010
	EMI	■ CE FCC EN55022 Class A
	EMS	■ EN 61000-4-2 ■ EN 61000-4-3 ■ EN 61000-4-4 ■ EN 61000-4-5 ■ EN 61000-4-6 ■ EN 61000-4-8
	Shock	IEC 61373 Cat 1 Class B
	Freefall	IEC 60068-2-32
	Vibration	IEC 60068-2-6

1.3 Hardware Views

1.3.1 Front View

The following view applies to EKI-9228G-8CMI and EKI-9228G-8COI.

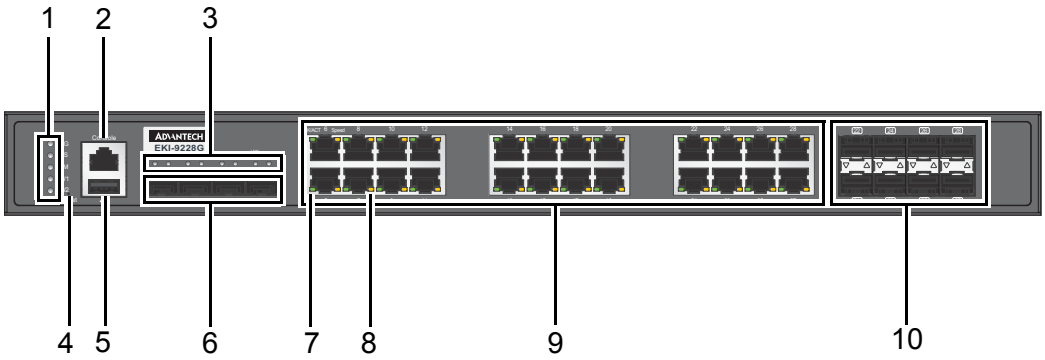


Figure 1.1 Front View

No.	Item	Description
1	System LED panel	See “System LED Panel” on page 4 for further details.
2	Console port	RJ45 port to access the managed switch's software.
3	SFP LEDs	SFP link activity LEDs, see “System LED Panel” on page 4.
4	Reset button	Button allows for system soft reset (3 sec.) or factory default reset (5 sec.).
5	USB port	4-pin (female) port for FW backup access.
6	ETH port	1000Base-X SFP Port x 4.
7	LNK/ACT LED	Link activity LED.
8	SPEED LED	Speed LED.
9	ETH port	10/100/1000BaseT(X) x 16 (X-coding).
10	ETH port	100/1000Base-SX/LX/LHX/XD/ZX/EZX x 8.

1.3.2 Rear View

The following view applies to EKI-9228G-8CMI and EKI-9228G-8COI.

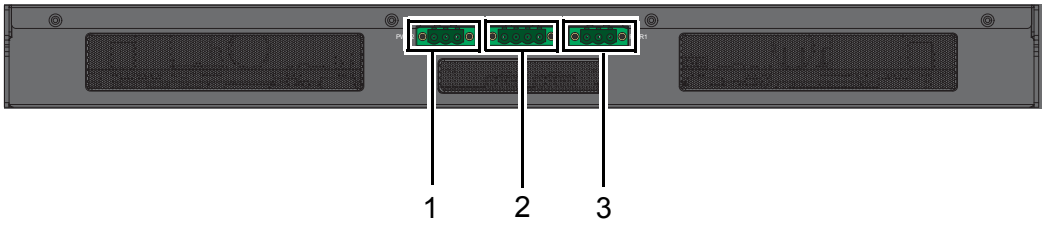


Figure 1.2 Front View

No.	Item	Description
1	Terminal block PWR2	Connect cabling for power.
2	Terminal block	Connect cabling for alarms.
3	Terminal block PWR1	Connect cabling for power.

1.3.2.1 System LED Panel

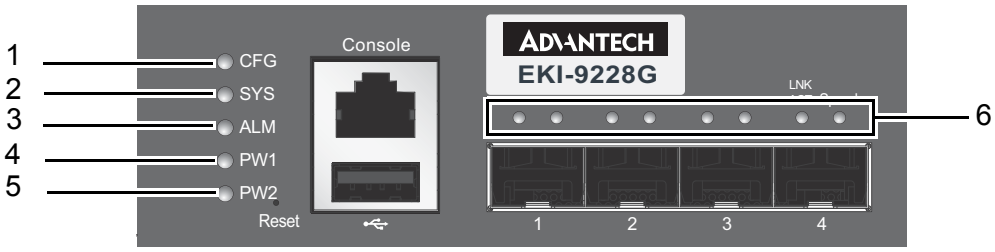


Figure 1.3 System LED Panel

No.	LED Name	LED Color	Description
1	CFG	Yellow on	TBD
		Blink yellow (1Hz)	Configuration changed, but unsaved.
		Blink yellow (3Hz)	TBD
		Blink yellow (5Hz)	TBD
		Off	Configuration saved.
2	SYS	Green on	When the EKI switch system ready.
		Blink green (1Hz)	When EKI switch system starts up.
		Blink green (3Hz)	TBD
		Blink green (5Hz)	TBD
		Off	Power on processing in uboot mode.
3	ALM	Red on	Defined major policies are detected.
		Blink red (1Hz)	Defined minor policies are detected.
		Blink red (3Hz)	TBD
		Blink red (5Hz)	TBD
		Off	Power off or system alarm is cleared or masked.
4	PWR1	Green on	Power is being supplied to power input PWR1.
		Off	Power is not being supplied to power input PWR2.
	PWR1	Green on	Power is being supplied to power input PWR1.
5	PWR2	Green on	Power is being supplied to power input PWR2.
		Off	Power is not being supplied to power input PWR1.
6	DATA	Green on	Link 1G
		Blink green	ACT 1G
		Amber on	Link 10/100MB
		Blink amber	ACT 10/100MB
		Off	Link down

Chapter 2

Switch Installation

2.1 Warnings

Warning: Before working on equipment that is connected to power lines, remove any jewelry (including rings, necklaces, and watches). Metal objects can heat up when

connected to power and ground, which can cause serious burns or weld the metal object to the terminals.

Caution! *Exposure to chemicals can degrade the sealing properties of materials used in the sealed relay device.*

Caution! *It is not recommended to work on the system or connect or disconnect cables during periods of lightning activity.*

Caution! *Before performing any of the following procedures, disconnect the power source from the DC circuit.*

Caution! *Read the installation instructions before connecting the system to its power source.*

Caution! *The device must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor.*

Caution! *This unit may have more than one power supply connection. All connections must be removed to de-energize the unit.*

Caution! *The installation, replacement, or service of the device must be Only be performed by trained and qualified personnel.*

Caution! *Ultimate disposal of this product should be handled according to local and national regulations*

Caution! *To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 70°C (158°F).*

Caution! *If the switch is to be installed in a hazardous location, ensure that the DC power source is located away from the vicinity of the switch.*

Caution! *The installation of the equipment must comply with all national and local electrical codes.*

Caution! *Explosion Hazard-The area must be known to be nonhazardous before servicing or replacing any components.*

Warning! *Airflow around the switch must be unrestricted. To prevent the switch from overheating, there must be the following minimum clearances:*

- Top and bottom: 2.0 in. (50.8 mm)
- Sides: 2.0 in. (50.8 mm)
- Front: 2.0 in. (50.8 mm)

2.2 Installation Guidelines

The following guidelines are provided to optimize the device performance. Review the guidelines before installing the device.

- Make sure cabling is away from sources of electrical noise. Radios, power lines, and fluorescent lighting fixtures can interference with the device performance.
- Make sure the cabling is positioned away from equipment that can damage the cables.
- Operating environment is within the ranges listed range, see “Specifications” on page 2.
- Relative humidity around the switch does not exceed 95 percent (non condensing).
- Altitude at the installation site is not higher than 10,000 feet.
- In 10/100 and 10/100/1000 fixed port devices, the cable length from the switch to connected devices can not exceed 100 meters (328 feet).
- Make sure airflow around the switch and respective vents is unrestricted. Without proper airflow the switch can overheat. To prevent performance degradation and damage to the switch, make sure there is clearance at the top and bottom and around the exhaust vents.

2.3 Environment and Enclosure Guidelines

Review these environmental and enclosure guidelines before installation:

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 9842 ft (3 km) without derating.

This equipment is considered Group 1, Class A industrial equipment, according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame-spread rating of 5VA, V2, V1, V0 (or equivalent) if nonmetallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication might contain additional information regarding specific enclosure-type ratings that are required to comply with certain product safety certifications.

2.3.1 Connecting Hardware

These instructions explain how to find a proper location for your Modbus Gateways, and how to connect to the network, hook up the power cable, and connect to the EKI-9228G Series.

2.4 Verifying Switch Operation

Before installing the device in a rack or on a wall, power on the switch to verify that the switch passes the power-on self-test (POST). To connect the cabling to the power source see “Power Supply Installation” on page 14.

At startup (POST), the System LED blinks green, while the remaining LEDs are a solid green. Once the switch passes POST self-test, the System LED turns green. The other LEDs turn off and return to their operating status. If the switch fails POST, the System LED switches to an amber state.

After a successful self-test, power down the switch and disconnect the power cabling.

The switch is now ready for installation at its final location.

2.5 Installing the Switch

2.5.1 Rack-Mounting

1. Align the rack mount brackets with the holes on the switch.
2. Secure the rack mount brackets with the provided screws.

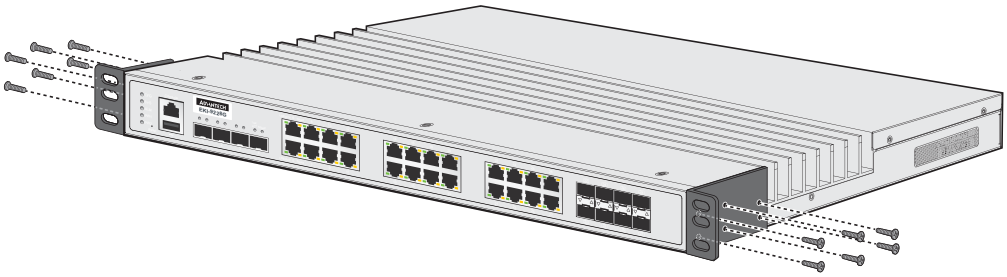


Figure 2.1 Installing the Rack Mount Brackets

3. Align the switch with the posts on the rack cabinet.
4. Secure the switch.

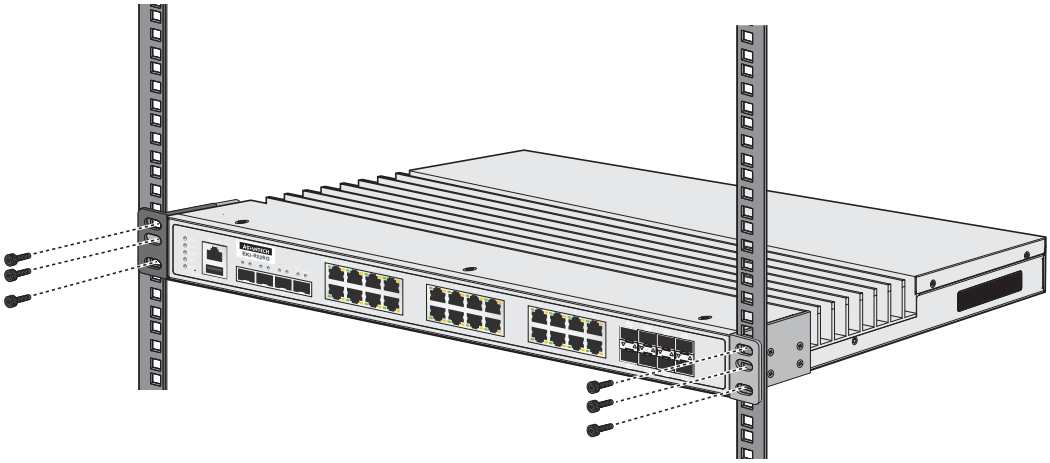


Figure 2.2 Installing the Switch

2.6 Installing and Removing SFP Modules

Up to two fiber optic ports are available (depends on model) for use in the switch. Refer to the technical specifications for details.

The Gigabit Ethernet ports on the switch are 100/1000Base SFP Fiber ports, which require using the 100M or 1G mini-GBIC fiber transceivers to work properly. Advantech provides completed transceiver models for different distance requirements.

The concept behind the LC port and cable is quite straightforward. Suppose that you are connecting devices I and II; contrary to electrical signals, optical signals do not require a circuit in order to transmit data. Consequently, one of the optical lines is used to transmit data from device I to device II, and the other optical line is used transmit data from device II to device I, for full-duplex transmission.

Remember to connect the Tx (transmit) port of device I to the Rx (receive) port of device II, and the Rx (receive) port of device I to the Tx (transmit) port of device II. If you make your own cable, we suggest labeling the two sides of the same line with the same letter (A-to-A and B-to-B, or A1-to-A2 and B1-to-B2).

2.6.1 Installing SFP Modules

To connect the fiber transceiver and LC cable, use the following guidelines:

1. Remove the dust plug from the fiber optic slot chosen for the SFP transceiver.

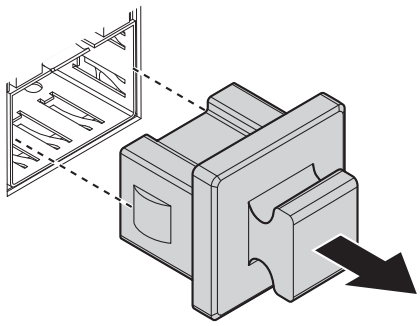


Figure 2.3 Removing the Dust Plug from an SFP Slot

Note! *Do not remove the dust plug from the SFP slot if you are not installing the transceiver at this time. The dust plug protects hardware from dust contamination.*

2. Position the SFP transceiver with the handle on top, see the following figure.
3. Locate the triangular marking in the slot and align it with the bottom of the transceiver.
4. Insert the SFP transceiver into the slot until it clicks into place.
5. Make sure the module is seated correctly before sliding the module into the slot. A click sounds when it is locked in place.

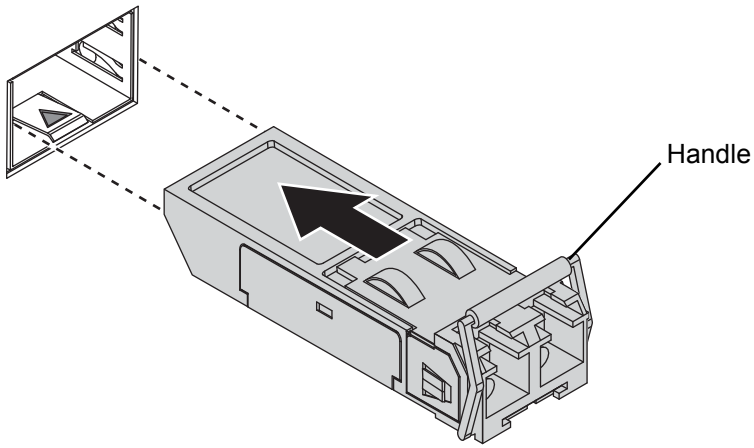


Figure 2.4 Installing an SFP Transceiver

Note! *If you are attaching fiber optic cables to the transceiver, continue with the following step. Otherwise, repeat the previous steps to install the remaining SFP transceivers in the device.*

6. Remove the protective plug from the SFP transceiver.

Note! *Do not remove the dust plug from the transceiver if you are not installing the fiber optic cable at this time. The dust plug protects hardware from dust contamination.*

7. Insert the fiber cable into the transceiver. The connector snaps into place and locks.

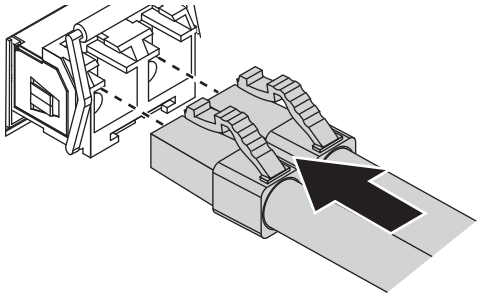


Figure 2.5 Attaching a Fiber Optic Cable to a Transceiver

8. Repeat the previous procedures to install any additional SFP transceivers in the switch.

The fiber port is now setup.

2.6.2 Removing SFP Modules

To disconnect an LC connector, use the following guidelines:

1. Press down and hold the locking clips on the upper side of the optic cable.
2. Pull the optic cable out to release it from the transceiver.

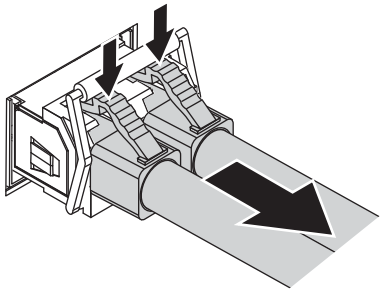


Figure 2.6 Removing a Fiber Optic Cable to a Transceiver

3. Hold the handle on the transceiver and pull the transceiver out of the slot.

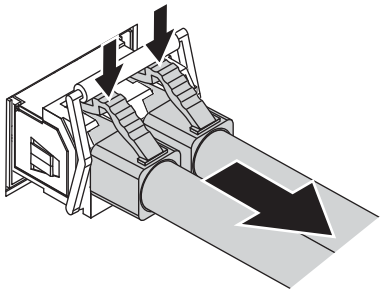


Figure 2.7 Removing an SFP Transceiver

Note! *Replace the dust plug on the slot if you are not installing a transceiver. The dust plug protects hardware from dust contamination.*

2.7 Connecting the Switch to Ethernet Ports

2.7.1 RJ45 Ethernet Cable Wiring

For RJ45 connectors, data-quality, twisted pair cabling (rated CAT5 or better) is recommended. The connector bodies on the RJ45 Ethernet ports are metallic and connected to the GND terminal. For best performance, use shielded cabling. Shielded cabling may be used to provide further protection.

Straight-thru Cable Wiring		Cross-over Cable Wiring	
Pin 1	Pin 1	Pin 1	Pin 3
Pin 2	Pin 2	Pin 2	Pin 6
Pin 3	Pin 3	Pin 3	Pin 1
Pin 6	Pin 6	Pin 6	Pin 2

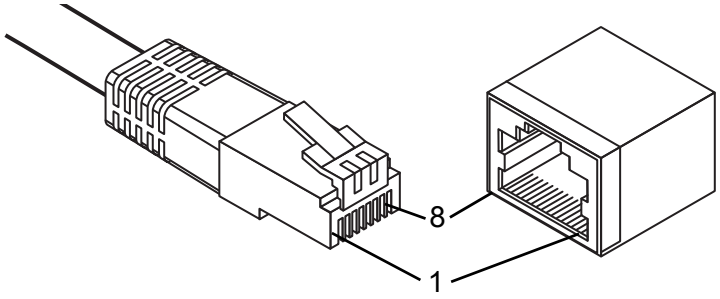


Figure 2.8 Ethernet Plug & Connector Pin Position

Maximum cable length: 100 meters (328 ft.) for 10/100/1000BaseT.

2.8 Connecting the Switch to Console Port

The industrial switch supports a secondary means of management. By connecting the RJ45 to RS232 serial cable between a COM port on your PC (9-pin D-sub female) and the switch's RJ45 (RJ45) port, a wired connection for management can be established.

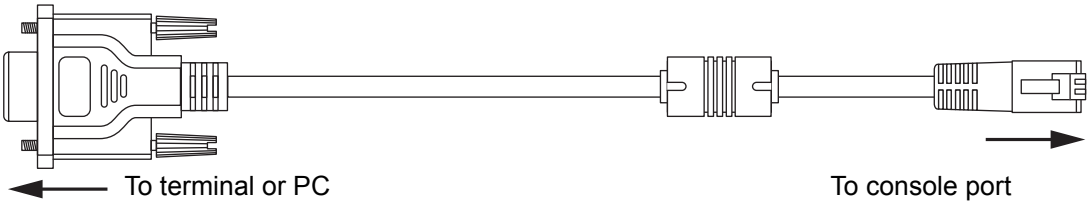


Figure 2.9 Serial Console Cable

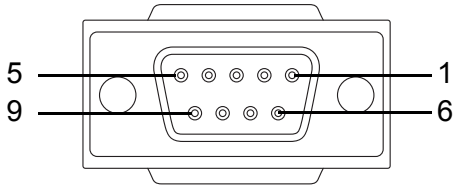


Figure 2.10 DB 9 Pin Position

DB9 Connector	RJ45 Connector
NC	1 Orange/White
NC	2 Orange
2	3 Green/White
NC	4 Blue
5	5 Blue/White
3	6 Green
NC	7 Brown/White
NC	8 Brown

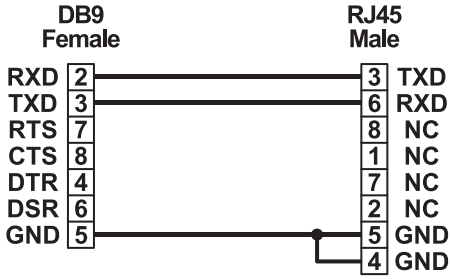


Figure 2.11 Pin Assignment

2.9 Power Supply Installation

2.9.1 Overview

Warning! *Power down and disconnect the power cord before servicing or wiring the switch.*

Caution! *Do not disconnect modules or cabling unless the power is first switched off.*

The device only supports the voltage outlined in the type plate. Do not use any other power components except those specifically designated for the switch device.

Caution! *Disconnect the power cord before installation or cable wiring.*

The switches can be powered using the same DC source used to power other devices. A DC voltage range of 12 to 48 VDC (Non PoE) or 48 VDC (PoE) must be applied between the V1+ terminal and the V1- terminal (PW1), see the following illustrations. A Class 2 power supply is required to maintain a UL60950 panel listing. The chassis ground screw terminal should be tied to the panel or chassis ground. A

redundant power configuration is supported through a secondary power supply unit to reduce network down time as a result of power loss.

Dual power inputs are supported and allow you to connect a backup power source.

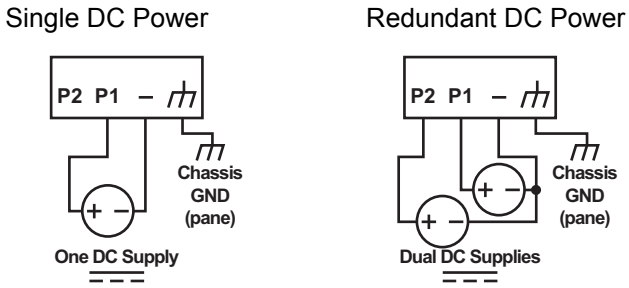


Figure 2.12 Power Wiring for EKI-9228G Series

2.9.2 Considerations

Take into consideration the following guidelines before wiring the device:

- The Terminal Block (CN1) is suitable for 12-24 AWG (3.31 - 0.205 mm^2). Torque value 7 lb-in.
- The cross sectional area of the earthing conductors shall be at least 3.31 mm^2.
- Calculate the maximum possible current for each power and common wire. Make sure the power draw is within limits of local electrical code regulations.
- For best practices, route wiring for power and devices on separate paths.
- Do not bundle together wiring with similar electrical characteristics.
- Make sure to separate input and output wiring.
- Label all wiring and cabling to the various devices for more effective management and servicing.

Note! *Routing communications and power wiring through the same conduit may cause signal interference. To avoid interference and signal degradation, route power and communications wires through separate conduits.*

2.9.3 Grounding the Device

Caution! *Do not disconnect modules or cabling unless the power is first switched off.*

The device only supports the voltage outlined in the type plate. Do not use any other power components except those specifically designated for the switch device.

Caution! *Before connecting the device properly ground the device. Lack of a proper grounding setup may result in a safety risk and could be hazardous.*

Caution! *Do not service equipment or cables during periods of lightning activity.*

Caution! *Do not service any components unless qualified and authorized to do so.*

Caution! *Do not block air ventilation holes.*

2.9.4 Wiring a Relay Contact

The following section details the wiring of the relay output. The terminal block on the EKI-9228G Series is wired and then installed onto the terminal receptor located on the EKI-9228G Series.

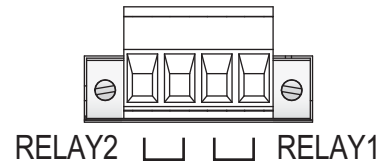


Figure 2.13 Terminal Receptor: Relay Contact

The terminal receptor includes a total of four pins: two for PWR1 and two for PWR2.

2.9.5 Wiring the Power Inputs

Caution! *Do not disconnect modules or cabling unless the power is first switched off.*

The device only supports the voltage outlined in the type plate. Do not use any other power components except those specifically designated for the switch device.The temperature rating of the Input Connection Cable must be higher than 90° C.

Warning! *Power down and disconnect the power cord before servicing or wiring the switch.*

There are two power inputs for normal and redundant power configurations. The power input 2 is used for wiring a redundant power configuration. See the following for terminal block connector views.

Figure 2.14 Terminal Receptor: Power Input Contacts

To wire the power inputs:

Make sure the power is not connected to the switch or the power converter before proceeding.

1. Insert a small flat-bladed screwdriver in the V1+/V1- wire-clamp screws, and loosen the screws.
2. Insert the negative/positive DC wires into the V+/V- terminals of PW1. If setting up power redundancy, connect PW2 in the same manner.
3. Tighten the wire-clamp screws to secure the DC wires in place.

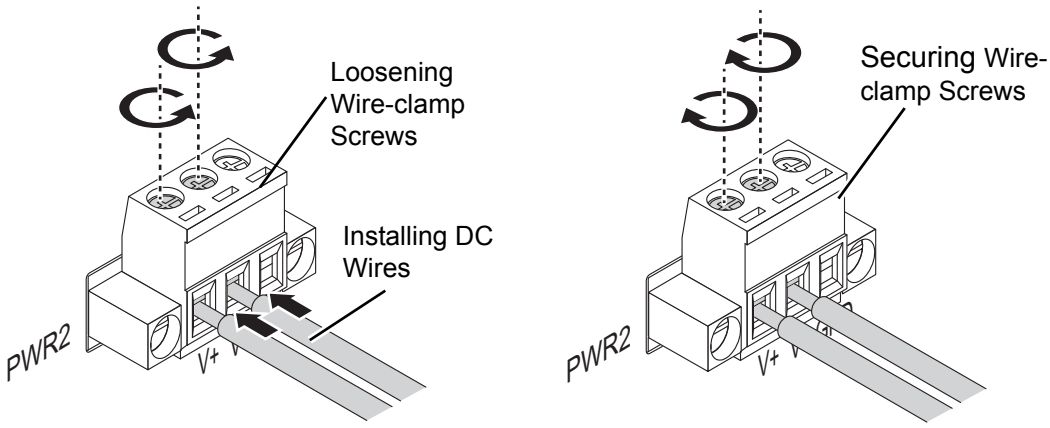


Figure 2.15 Installing DC Wires in a Terminal Block

2.10 Reset Button

Reset configuration to factory default:

Press and hold Reset button for 5 seconds.

System reboot:

Press and hold Reset button for 3 seconds.

Note! *Do NOT power off the Ethernet switch when loading default settings.*

Chapter 3

Configuration Utility

3.1 First Time Setup

3.1.1 Overview

The Industrial Ethernet Managed Switch is a configurable device that facilitates the interconnection of Ethernet devices on an Ethernet network. This includes computers, operator interfaces, I/O, controllers, RTUs, PLCs, other switches/hubs or any device that supports the standard IEEE 802.3 protocol.

This switch has all the capabilities of a store and forward Ethernet switch plus advanced management features such as SNMP, RSTP and port mirroring. This manual details how to configure the various management parameters in this easy to use switch.

3.1.2 Introduction

To take full advantage of all the features and resources available from the switch, it must be configured for your network.

The switch implements Rapid Spanning Tree Protocol (RSTP) and Simple Network Management Protocol (SNMP) to provide most of the services offered by the switch. Rapid Spanning Tree Protocol allows managed switches to communicate with each other to ensure that there exists only one active route between each pair of network nodes and provides automatic failover to the next available redundant route. A brief explanation of how RSTP works is given in the Spanning Tree section.

The switch is capable of communicating with other SNMP capable devices on the network to exchange management information. This statistical/derived information from the network is saved in the Management Information Base (MIB) of the switch. The MIB is divided into several different information storage groups. These groups will be elaborated in detail in the Management and SNMP information section of this document. The switch implements Internet Group Management Protocol (IGMP) to optimize the flow of multicast traffic on your network.

The switch supports both port-based and tag-based Virtual LANs for flexible integration with VLAN-aware networks with support for VLAN-unaware devices.

3.1.3 Administrative Interface Access

There are several administrative interfaces to the switch:

1. A graphical web interface accessible via the switch's built-in web server. Both HTTP and secure HTTPS with SSL are supported.

   Note! *This is the recommended method for managing the switch.*

2. A terminal interface via the RS232/USB port or over the network using telnet or Secure Shell (SSH).
3. An SNMP interface can be used to read/write many settings.
4. Command Line Interface (CLI) can be used to read/write most settings. Initial setup must be done using an Ethernet connection (recommended) or the serial port.

3.1.4 Using the Graphical (Web) Interface

The graphical interface is provided via a web server in the switch and can be accessed via a web browser such as Opera, Mozilla, or Internet Explorer.

Note! *JavaScript must be supported and enabled in your browser for the graphical interface to work correctly.*

HTTP and HTTPS (secure HTTP) are supported for access to the web server. By default, both protocols are enabled. Either or both may be disabled to secure the switch. (See the Remote Access Security topic in this section.)

To access the graphical interface, enter a URL like HTTP://192.168.1.1 in your browser's address bar. Replace “http” with “https” to use secure http and replace “192.168.1.1” with your switch's IP address if you've changed it from the factory default.

The web server in the switch uses a signed security certificate. When you access the server via https, you may see a warning dialog indicating that the certificate was signed by an unknown authority. This is expected and to avoid this message in the future you can choose to install the certificate on your computer.

Note! *This manual describes and depicts the web user interface in detail. The terminal interface is not specifically shown but is basically the same.*

3.1.5 Configuring the Switch for Network Access

To control and monitor the switch via the network, it must be configured with basic network settings, including an IP address and subnet mask. Refer to the quick start guide in Section 1 for how to initially access your switch.

To configure the switch for network access, select [Add Menu Address Here] to reach the System Settings menu. The settings in this menu control the switch's general network configuration.

- DHCP Enabled/Disabled: The switch can automatically obtain an IP address from a server using the Dynamic Host Configuration Protocol (DHCP). This can speed up initial set up, as the network administrator does not have to find an open IP address.
- IP Address and subnet mask configuration: The IP address for the switch can be changed to a user-defined address along with a customized subnet mask to separate subnets.

Note! *Advanced users can set the IP address to 0.0.0.0 to disable the use of an IP address for additional security. However, any features requiring an IP address (i.e., web interface, etc.) will no longer be available.*

- Default Gateway Selection: A Gateway Address is chosen to be the address of a router that connects two different networks. This can be an IP address or a Fully Qualified Domain Name (FQDN) such as “domainname.org”.
- NTP Server: The IP address or domain name of an NTP (Network Time Protocol) server from which the switch may retrieve the current time at startup. Please note that using a domain name requires that at least one domain name server be configured.

3.1.6 Configuring the Ethernet Ports

The switch comes with default port settings that should allow you to connect to the Ethernet Ports with out any necessary configuration. Should there be a need to change the name of the ports, negotiation settings or flow control settings, you can do this in the Port Configuration menu. Access this menu by selecting Setup from the Main menu, and then selecting Main Settings.

- Port Name: Each port in the managed switch can be identified with a custom name. Specify a name for each port here.
- Admin: Ports can be enabled or disabled in the managed switch. For ports that are disabled, they are virtually non-existent (not visible in terms of switch operation or spanning tree algorithm). Choose to enable or disable a port by selecting Enabled or Disabled, respectively.
- Negotiation: All copper ports and gigabit fiber ports in the managed switch are capable of auto negotiation such that the fastest bandwidth is selected. Choose to enable auto-negotiation or use fixed settings. 100Mbps Fiber ports are Fixed speed only.
- Speed/Duplex/Flow Control: The managed switch accepts three local area network Ethernet Standards. The first standard, 10BASE-T, runs 10Mbps with twisted pair Ethernet cable between network interfaces. The second local area network standard is 100BASE-T, which runs at 100Mbps over the same twisted pair Ethernet cable. Lastly, there is 100BASE-F, which enables fast Ethernet (100Mbps) over fiber.

These options are available:

- 10h–10 Mbps, Half Duplex
- 10f –10 Mbps, Full Duplex
- 100h–100 Mbps, Half Duplex
- 100f –100 Mbps, Full Duplex
- 1000f–1000 Mbps, Full Duplex

On managed switches with gigabit combination ports, those ports with have two rows, a standard row of check boxes and a row labeled “SFP” with radio buttons. The SFP setting independently sets the speed at which a transceiver will operate if one is plugged in. Otherwise, the switch will use the fixed Ethernet port and the corresponding settings for it.

Note! *When 100f is selected for the SFP of a gigabit combination port, the corresponding fixed Ethernet jack will be disabled unless it is changed back to 1000F.*

3.2 Command Line Interface Configuration

3.2.1 Introduction to Command-Line Interface (CLI)

The command-line interface (CLI) is constructed with an eye toward automation of CLI-based configuration. The interaction is modeled on that used in many Internet protocols such as Telnet, FTP, and SMTP. After each command is entered and processed, the switch will issue a reply that consists of a numeric status code and a human-readable explanation of the status.

The general format of commands is:

section parameter [value]

where:

– section is used to group parameters.

– parameter will specify the parameter within the section. For example, the network section will have parameters for DHCP, IP address, subnet mask, and default gateway.
– value is the new value of the parameter. If value is omitted, the current value is displayed.

Please note that new values will not take effect until explicitly committed.

Sections and parameter names are case sensitive (e.g., “Network” is not the same as “network”).

Note! *Any commands in the CLI Commands section of this chapter, with the exception of the global commands, must be prefaced with the name of the section they are in. For example, to change the IP address of the switch, you would type:*

network address <newIP>

3.2.2 Accessing the CLI

To access the CLI interface, establish Ethernet or serial connectivity to the switch.

To connect by Ethernet, open a command prompt window and type:

telnet <switchip> (where <switchip> is the IP address of the switch)

At the login prompt, type “cli” for the username and “admin” for the password. The switch will respond with “Managed switch configuration CLI ready”.

3.3 Web Browser Configuration

The switch has an HTML based user interface embedded in the flash memory. The interface offers an easy to use means to manage basic and advanced switch functions. The interface allows for local or remote switch configuration anywhere on the network. The interface is designed for use with [Internet Explorer (6.0), Chrome, Firefox].

3.3.1 Preparing for Web Configuration

The interface requires the installation and connection of the switch to the existing network. A PC also connected to the network is required to connect to the switch and access the interface through a web browser. Use this networking information:

- IP address: 192.168.1.1
- Subnet mask: 255.255.255.0
- Default gateway: 192.168.1.254
- User name: admin
- Password: admin

3.3.2 System Login

Once the switch is installed and connected, power on the switch. The following information guides you through the logging in process.

1. Launch your web browser on the PC.
2. In the browser’s address bar, type the switch’s default IP address (192.168.1.1).

The login screen displays.

3. Enter the user default name and password (admin / admin).
4. Click **OK** on the login screen to log in.

The main interface displays.

Chapter 4

Managing Switch

4.1 Log In

To access the login window, connect the device to the network, see “Connecting the Ethernet Media” on page 16. Once the switch is installed and connected, power on the switch see the following procedures to log into your switch.

When the switch is first installed, the default network configuration is set to DHCP enabled. You will need to make sure your network environment supports the switch setup before connecting it to the network.

1. Launch your web browser on a computer.
2. In the browser’s address bar type in the switch’s default IP address (192.168.1.1). The login screen displays.
3. Enter the default user name and password (admin/admin) to log into the management interface. You can change the default password after you have successfully logged in.
4. Click **Login** to enter the management interface.

Figure 4.1 Login Screen

4.2 Recommended Practices

One of the easiest things to do to help increase the security posture of the network infrastructure is to implement a policy and standard for secure management. This practice is an easy way to maintain a healthy and secure network.

After you have performed the basic configurations on your switches, the following is a recommendation which is considered best practice policy.

4.2.1 Changing Default Password

In keeping with good management and security practices, it is recommended that you change the default password as soon as the device is functioning and setup correctly. The following details the necessary steps to change the default password.

To change the password:

1. Navigate to **System** > **Users** > **Accounts**.
2. From the User Name menu, select the Admin (default) account and click **Edit**.
3. In the **User Name** field, enter admin for this account. It is not necessary to change the user name, however, a change in the default settings increases the security settings.

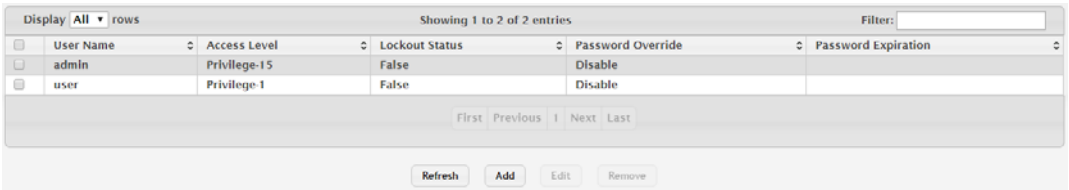


Figure 4.2 System > Users > Accounts

4. In the **Password** field, type in the new password. Re-type the same password in the **Confirm** field.
5. Click **Submit** to change the current account settings.

Figure 4.3 Changing a Default Password

After saving all the desired settings, perform a system save (**Save Configuration**). The changes are saved.

4.3 System

4.3.1 AAA

4.3.1.1 Authentication List

Use the Authentication List Configuration page to view and configure the authentication lists used for management access and port-based (IEEE 802.1X) access to the system. An authentication list specifies which authentication method(s) to use to validate the credentials of a user who attempts to access the device. Several authentication lists are preconfigured on the system. These are default lists, and they cannot be deleted.Additionally, the List Name and Access Type settings for the default lists cannot be changed.

To access this page, click **System** > **AAA** > **Authentication List**.

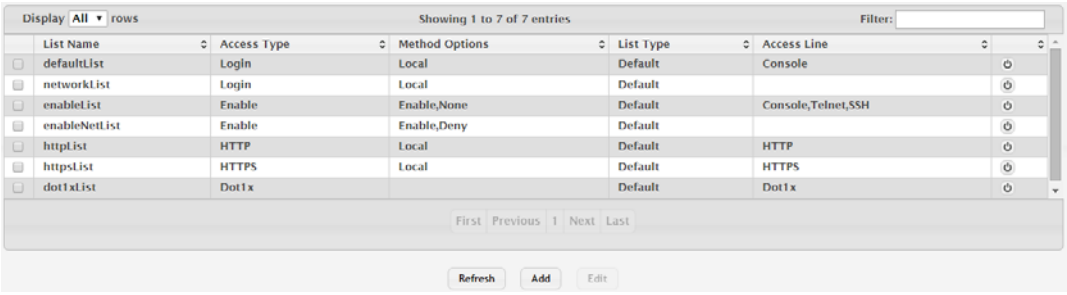


Figure 4.4 System > AAA > Authentication List

The following table describes the items in the previous figure.

Item	Description
List Name	The name of the authentication list. This field can be configured only when adding a new authentication list.

Item	Description
Access Type	The way the user accesses the system. This field can be configured only when adding a new authentication list, and only the Login and Enable access types can be selected. The access types are as follows: ■ Login: User EXEC-level management access to the command-line interface (CLI) by using a console connection or a telnet or SSH session. Access at this level has a limited number of CLI commands available to view or configure the system. ■ Enable: Privileged EXEC-level management access to the CLI by using a console connection or a telnet or SSH session. In Privileged EXEC mode, read-write users have access to all CLI commands. ■ HTTP: Management-level access to the web-based user interface by using HTTP. ■ Dot1x: Port-based access to the network through a switch port that is controlled by IEEE 802.1X.
Method Options	The method(s) used to authenticate a user who attempts to access the management interface or network. The possible methods are as follows: ■ IAS: Uses the local Internal Authentication Server (IAS) database for 802.1X port-based authentication. ■ Deny: Denies authentication. ■ Enable: Uses the locally configured Enable password to verify the user's credentials. ■ Line: Uses the locally configured Line password to verify the user's credentials. ■ Local: Uses the ID and password in the Local User database to verify the user's credentials. ■ Radius: Sends the user's ID and password to the configured Radius server to verify the user's credentials. ■ TACACS: Sends the user's ID and password to the configured TACACS server to verify the user's credentials. ■ None: No authentication is used.
List Type	The type of list, which is one of the following: ■ Default: The list is preconfigured on the system. This type of list cannot be deleted, and only the Method Options are configurable. ■ Configured: The list has been added by a user.
Access Line	The access method(s) that use the list for authentication. The settings for this field are configured on the Authentication Selection page.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new authentication list. See the following procedure.
Edit	Click **Edit** to edit the selected entries.

To add a new authentication list:

Click **System** > **AAA** > **Authentication List** > **Add**.

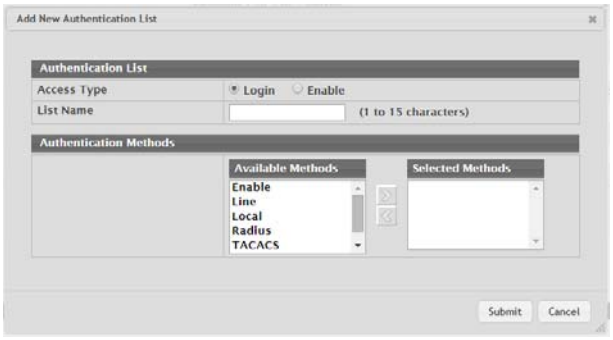


Figure 4.5 System > AAA > Authentication List > Add

The following table describes the items in the previous figure.

Item	Description
Authentication Methods	
Available Methods	The authentication methods that can be used for the authentication list. Not all authentication methods are available for all lists. To set the authentication method, select the method in the Available Methods field and click the right arrow to move it into the Selected Methods field.
Selected Methods	The authentication methods currently configured for the list. When multiple methods are in this field, the order in which the methods are listed is the order in which the methods will be used to authenticate a user. If the user fails to be authenticated using the first method, the device attempts to verify the user's credentials by using the next method in the list. No authentication methods can be added after None. To remove a method from this field, select it and click the left arrow to return it to the Available Methods area.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.3.1.2 Authentication Selection

Use the Authentication List Selection page to associate an authentication list with each CLI-based access method (Console, Telnet, and SSH). Each access method has the following two authentication lists associated with it:

- Login: The authentication list to use for User EXEC-level management access to the CLI. Access at this level has a limited number of CLI commands available to view or configure the system. The options available in this menu include the default Login authentication lists as well as any user-configured Login lists.
- Enable: The authentication list to use for Privileged EXEC-level management access to the CLI. In Privileged EXEC mode, read-write users have access to all CLI commands. The options available in this menu include the default Enable authentication lists as well as any user-configured Enable lists.

To access this page, click **System** > **AAA** > **Authentication Selection**.

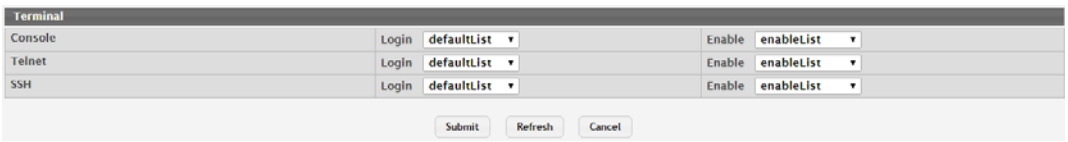


Figure 4.6 System > AAA > Authentication Selection

The following table describes the items in the previous figure.

Item	Description
Terminal	
Console	The Login authentication list and the Enable authentication list to apply to users who attempt to access the CLI by using a connection to the console port.
Telnet	The Login authentication list and the Enable authentication list to apply to users who attempt to access the CLI by using a Telnet session.
SSH	The Login authentication list and the Enable authentication list to apply to users who attempt to access the CLI by using a secure shell (SSH) session.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.1.3 Accounting List

Use the Accounting List Configuration page to view and configure the accounting lists for users who access the command-line interface (CLI) to manage and monitor the device. Accounting lists are used to record user activity on the device. The device is preconfigured with accounting lists. These are default lists, and they cannot be deleted. Additionally, the List Name and Accounting Type settings for the default lists cannot be changed.

To access this page, click **System** > **AAA** > **Accounting List**.

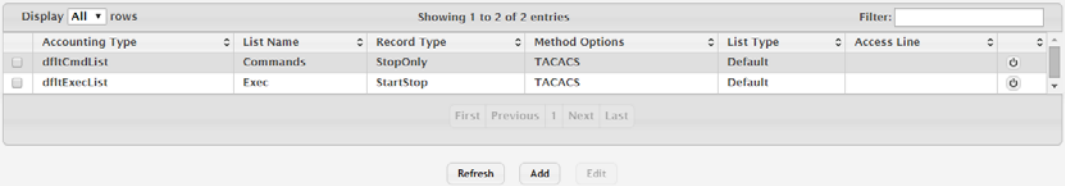


Figure 4.7 System > AAA > Accounting List

The following table describes the items in the previous figure.

Item	Description
Accounting Type	The type of accounting list, which is one of the following: ■ Command: Each CLI command executed by the user, along with the time the command was executed, is recorded and sent to an external AAA server. ■ Exec: User login and logout times are recorded and sent to an external AAA server.
List Name	The name of the accounting list. This field can be configured only when adding a new accounting list.
Record Type	Indicates when to record and send information about the user activity: ■ StartStop: Accounting notifications are sent at the beginning and at the end of an exec session or a user-executed command. User activity does not wait for the accounting notification to be recorded at the AAA server. ■ StopOnly: Accounting notifications are sent at the end of an exec session or a user-executed command.

Item	Description
Method Options	The method(s) used to record user activity. The possible methods are as follows: ■ TACACS+: Accounting notifications are sent to the configured TACACS+ server. ■ Radius: Accounting notifications are sent to the configured RADIUS server.
List Type	The type of accounting list, which is one of the following: ■ Default: The list is preconfigured on the system. This type of list cannot be deleted, and only the Method Options and Record Type settings are configurable. ■ Configured: The list has been added by a user.
Access Line	The access method(s) that use the list for accounting user activity. The settings for this field are configured on the Accounting Selection page.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new accounting list.
Edit	Click **Edit** to edit the selected entries.

To add a new accounting list:

Click **System** > **AAA** > **Accounting List** > **Add**.

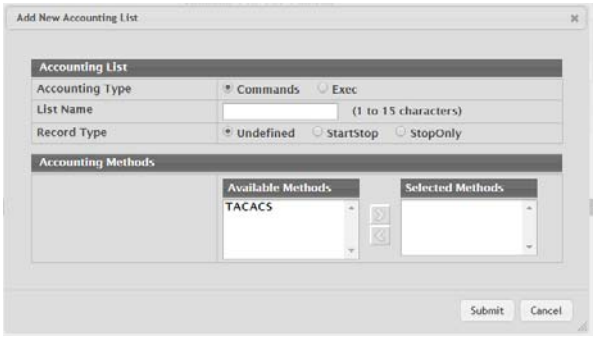


Figure 4.8 System > AAA > Accounting List > Add

The following table describes the items in the previous figure.

Item	Description
Accounting Methods	
Available Methods	The accounting methods that can be used for the accounting list. To set the accounting method, select the method in the Available Methods field and click the right arrow to move it into the Selected Methods field.
Selected Methods	The accounting methods currently configured for the list. When multiple methods are in this field, the order in which the methods are listed is the order in which the methods will be used. If the device is unable to send accounting notifications by using the first method, the device attempts to send notifications by using the second method. To remove a method from this field, select it and click the left arrow to return it to the Available Methods area.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.3.1.4 Accounting Selection

Use the Accounting List Selection page to associate an accounting list with each access method. For each access method, the following two accounting lists are associated:

- Exec: The accounting list to record user login and logout times.
- Commands: The accounting list to record which actions a user takes on the system, such as page views or configuration changes. This list also records the time when the action occurred. For Terminal access methods, this list records the CLI commands a user executes and when each command is issued.

To access this page, click **System** > **AAA** > **Accounting Selection**.

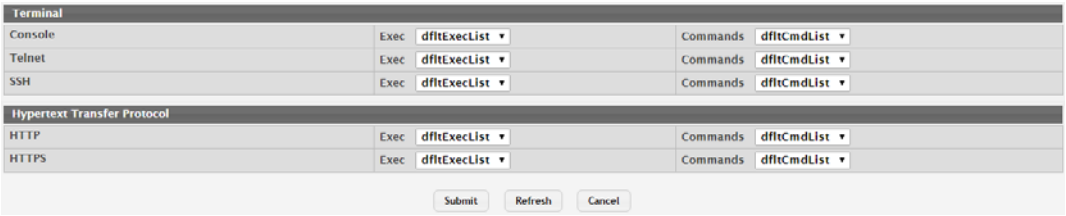


Figure 4.9 System > AAA > Accounting Selection

The following table describes the items in the previous figure.

Item	Description
Terminal	The access methods in this section are CLI-based. ■ Console: The Exec accounting list and the Commands accounting list to apply to users who access the CLI by using a connection to the console port. ■ Telnet: The Exec accounting list and the Commands accounting list to apply to users who access the CLI by using a Telnet session. ■ SSH: The Exec accounting list and the Commands accounting list to apply to users who access the CLI by using a secure shell (SSH) session.
Hypertext Transfer Protocol	The access methods in this section are through a web browser. ■ HTTP: The Exec accounting list and the Commands accounting list to apply to users who access the web-based management interface by using HTTP. ■ HTTPS: The Exec accounting list and the Commands accounting list to apply to users who access the web-based management interface by using secure HTTP (HTTPS).
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.2 Advanced Configuration

4.3.2.1 DHCP Server

Global

Use the DHCP Server Global Configuration page to configure DHCP global parameters.

To access this page, click **System** > **Advanced Configuration** > **DHCP Server** > **Global**.

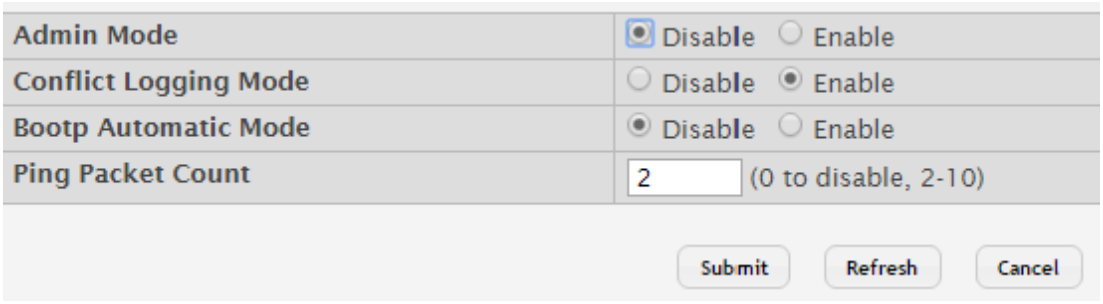


Figure 4.10 System > Advanced Configuration > DHCP Server > Global

The following table describes the items in the previous figure.

Item	Description
Admin Mode	Enables or disables the DHCP server administrative mode. When enabled, the device can be configured to automatically allocate TCP/IP configurations for clients.
Conflict Logging Mode	Enables or disables the logging mode for IP address conflicts. When enabled, the system stores information IP address conflicts that are detected by the DHCP server.
Bootp Automatic Mode	Enables or disables the BOOTP automatic mode. When enabled, the DHCP server supports the allocation of automatic addresses for BOOTP clients. When disabled the DHCP server supports only static addresses for BOOTP clients.
Ping Packet Count	The number of packets the server sends to a pool address to check for duplication as part of a ping operation. If the server receives a response to the ping, the address is considered to be in conflict and is removed from the pool.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

Excluded Addresses

Use the DHCP Server Excluded Addresses page to view and configure the IP addresses the DHCP server should not assign to clients.

To access this page, click **System** > **Advanced Configuration** > **DHCP Server** > **Excluded Addresses**.

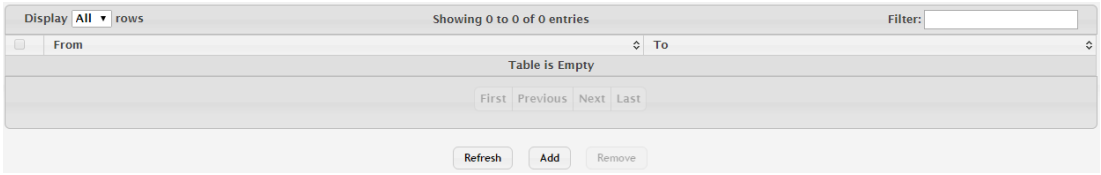


Figure 4.11 System > Advanced Configuration > DHCP Server > Excluded Addresses

The following table describes the items in the previous figure.

Item	Description
From	The IP address to exclude. In a range of addresses, this value is the lowest address to exclude.

Item	Description
To	The highest address to exclude in a range of addresses. If the excluded address is not part of a range, this field shows the same value as the From field. When adding a single IP address to exclude, you can enter the same address specified in the From field or leave the field with the default value.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new excluded address.
Remove	Click **Remove** to remove the selected entries.

To add a new excluded address:

Click **System** > **Advanced Configuration** > **DHCP Server** > **Excluded Addresses** > **Add**.

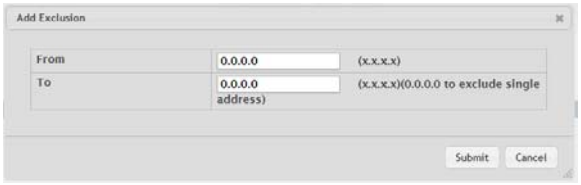


Figure 4.12 System > Advanced Configuration > DHCP Server > Excluded Addresses > Add

The following table describes the items in the previous figure.

Item	Description
From	The IP address to exclude. In a range of addresses, this value is the lowest address to exclude.
To	The highest address to exclude in a range of addresses. If the excluded address is not part of a range, this field shows the same value as the From field. When adding a single IP address to exclude, you can enter the same address specified in the From field or leave the field with the default value.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Pool Summary

Use the DHCP Server Pool Summary page to view the currently configured DHCP server pools and to add and remove pools. A DHCP server pool is a set of network configuration information available to DHCP clients that request the information.

To access this page, click **System** > **Advanced Configuration** > **DHCP Server** > **Pool Summary**.

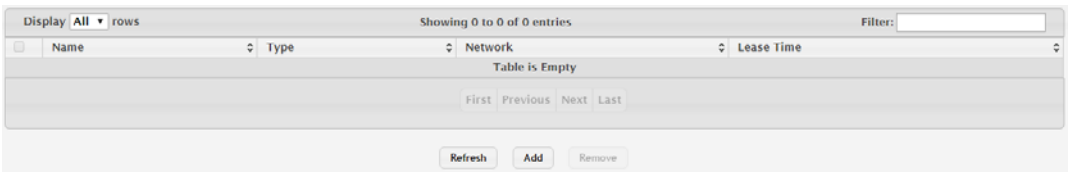


Figure 4.13 System > Advanced Configuration > DHCP Server > Pool Summary

The following table describes the items in the previous figure.

Item	Description
Name	The name that identifies the DHCP server pool.

Item	Description
Type	The type of binding for the pool. The options are: ■ Manual: The DHCP server assigns a specific IP address to the client based on the client's MAC address. This type is also known as Static. ■ Dynamic: The DHCP server can assign the client any available IP address within the pool. This type is also known as Automatic. ■ Undefined: The pool has been created by using the CLI, but the pool information has not been configured.
Network	For a Manual pool, indicates the host IP address to assign the client. For a Dynamic pool, indicates the network base address.
Lease Time	The amount of time the information the DHCP server allocates is valid.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new DHCP server pool.
Remove	Click **Remove** to remove the selected entries.

To add a new DHCP server pool:

Click **System** > **Advanced Configuration** > **DHCP Server** > **Pool Summary** > **Add**.

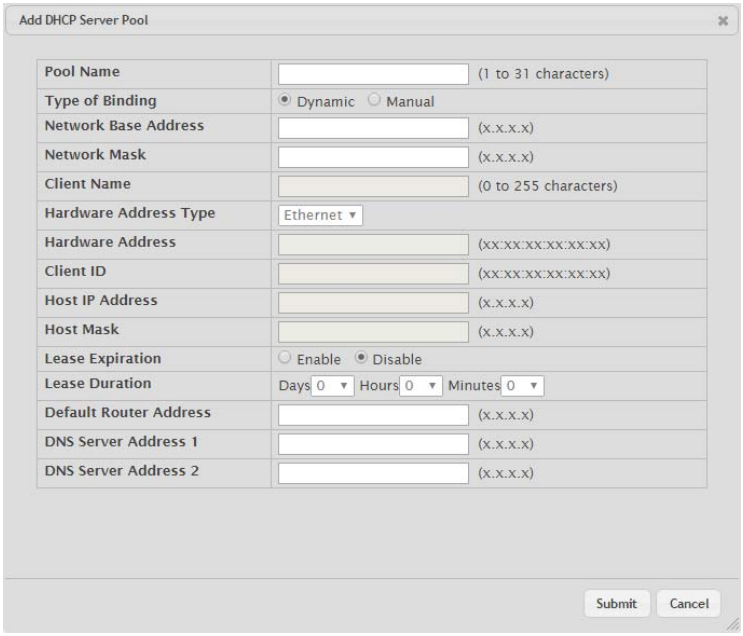


Figure 4.14 System > Advanced Configuration > DHCP Server > Pool Summary > Add

The following table describes the items in the previous figure.

Item	Description
Name	The name that identifies the DHCP server pool.
Type of Binding	The type of binding for the pool. The options are: ■ Manual ■ Dynamic The binding type you select determines the fields that are available to configure.
Network Base Address	The network portion of the IP address. A DHCP client can be offered any available IP address within the defined network as long as it has not been configured as an excluded address (for dynamic pools only).

Item	Description
Network Mask	The subnet mask associated with the Network Base Address that separates the network bits from the host bits (for dynamic pools only).
Client Name	The system name of the client. The Client Name should not include the domain name. The function is only available for Manual pools.
Hardware Address Type	The protocol type (Ethernet or IEEE 802) used by the client's hardware platform. This value is used in response to requests from BOOTP clients. The function is only available for Manual pools.
Hardware Address	The MAC address of the client. The function is only available for Manual pools.
Client ID	The value some DHCP clients send in the Client Identifier field of DHCP messages. This value is typically identical to the Hardware Address value. In some systems, such as Microsoft DHCP clients, the client identifier is required instead of the hardware address. If the client's DHCP request includes the client identifier, the Client ID field on the DHCP server must contain the same value, and the Hardware Address Type field must be set to the appropriate value. Otherwise, the DHCP server will not respond to the client's request. The function is only available for Manual pools.
Host IP Address	The IP address to offer the client. The function is only available for Manual pools.
Host Mask	The subnet mask to offer the client. The function is only available for Manual pools.
Lease Expiration Mode	Indicates whether the information the server provides to the client should expire. ■ Enable: Allows the lease to expire. If you select this option, you can specify the amount of time the lease is valid in the Lease Duration field. ■ Disable: Sets an infinite lease time. For Dynamic bindings, an infinite lease time implies a lease period of 60 days. For a Manual binding, an infinite lease period never expires.
Lease Duration	The number of Days, Hours, and Minutes the lease is valid. This field cannot be configured if the Lease Expiration Mode is disabled.
Default Router Address	The IP address of the router to which the client should send traffic. The default router should be in the same subnet as the client. To add additional default routers, use the DHCP Server Pool Configuration page.
DNS Server Address	The IP addresses of up to two DNS servers the client should use to resolve host names into IP addresses. To add additional DNS servers, use the DHCP Server Pool Configuration page.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Pool Configuration

Use the DHCP Server Pool Configuration page to edit pool settings or to configure additional settings for existing manual and dynamic pools. The additional settings on this page are considered advanced parameters because they are not typically used or configured. The fields that can be configured depend on the Type of Binding that is selected. The fields that do not apply to the selected binding type are disabled.

To access this page, click **System** > **Advanced Configuration** > **DHCP Server** > **Pool Configuration**.

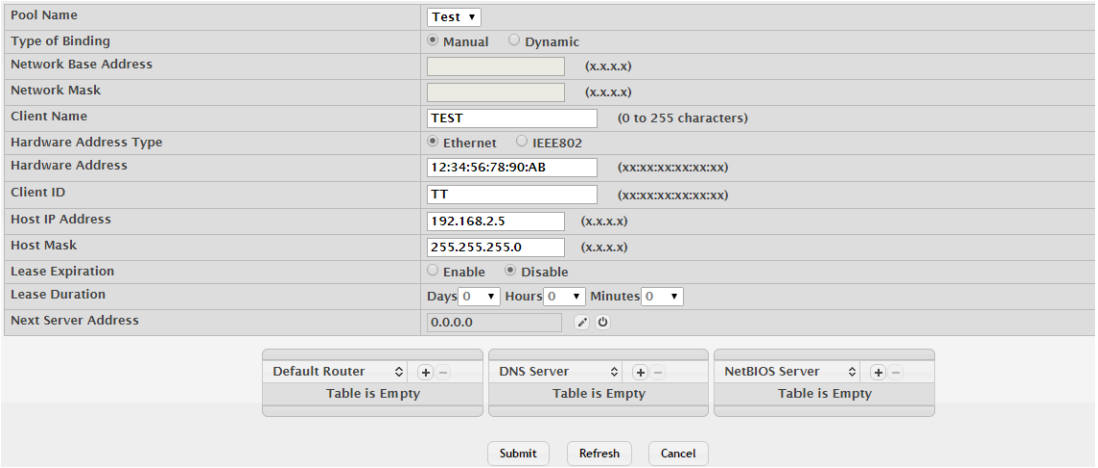


Figure 4.15 System > Advanced Configuration > DHCP Server > Pool Configuration

The following table describes the items in the previous figure.

Item	Description
Pool Name	Select the pool to configure. The menu includes all pools that have been configured on the device.
Type of Binding	The type of binding for the pool. The options are: ■ Manual: The DHCP server assigns a specific IP address to the client based on the client's MAC address. This type is also known as Static. ■ Dynamic: The DHCP server can assign the client any available IP address within the pool. This type is also known as Automatic.
Network Base Address	The network portion of the IP address. A DHCP client can be offered any available IP address within the defined network as long as it has not been configured as an excluded address (for dynamic pools only).
Network Mask	The subnet mask associated with the Network Base Address that separates the network bits from the host bits (for dynamic pools only).
Client Name	The system name of the client. The Client Name should not include the domain name. This field is optional.
Hardware Address Type	The protocol type (Ethernet or IEEE 802) used by the client's hardware platform. This value is used in response to requests from BOOTP clients (for manual pools only).
Hardware Address	The MAC address of the client (for manual pools only).
Client ID	The value some DHCP clients send in the Client Identifier field of DHCP messages. This value is typically identical to the Hardware Address value. In some systems, such as Microsoft DHCP clients, the client identifier is required instead of the hardware address. If the client's DHCP request includes the client identifier, the Client ID field on the DHCP server must contain the same value, and the Hardware Address Type field must be set to the appropriate value. Otherwise, the DHCP server will not respond to the client's request (for manual pools only).
Host IP Address	The IP address to offer the client (for manual pools only).
Host Mask	For manual bindings, this field specifies the subnet mask to be statically assigned to a DHCP client. You can enter a value in Host Mask or Prefix Length to specify the subnet mask, but do not enter a value in both fields.

Item	Description
Lease Expiration	Indicates whether the information the server provides to the client should expire. ■ Enable: Allows the lease to expire. If you select this option, you can specify the amount of time the lease is valid in the Lease Duration field. ■ Disable: Sets an infinite lease time. For Dynamic bindings, an infinite lease time implies a lease period of 60 days. For a Manual binding, an infinite lease period never expires.
Lease Duration	The number of Days, Hours, and Minutes the lease is valid. This field cannot be configured if the Lease Expiration is disabled.
Next Server Address	The IP address of the next server the client should contact in the boot process. For example, the client might be required to contact a TFTP server to download a new image file. To configure this field, click button in the row. To reset the field to the default value, click the Reset icon in the row. To configure settings for one or more default routers, DNS servers, or NetBIOS servers that can be used by the client(s) in the pool, use the buttons available in the appropriate table to perform the following tasks: ■ To add an entry to the server list, click button and enter the IP address of the server to add. ■ To edit the address of a configured server, click button associated with the entry to edit and update the address. ■ To delete an entry from the list, click button associated with the entry to remove. ■ To delete all entries from the list, click button in the heading row.
Default Router	Lists the IP address of each router to which the client(s) in the pool should send traffic. The default router should be in the same subnet as the client.
DNS Server	Lists the IP address of each DNS server the client(s) in the pool can contact to perform address resolution.
NetBIOS Server	Lists the IP address of each NetBIOS Windows Internet Naming Service (WINS) name server that is available for the selected pool.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

Pool Options

Use the DHCP Server Pool Options page to configure additional DHCP pool options, including vendor-defined options. DHCP options are collections of data with type codes that indicate how the options should be used. When a client broadcasts a request for information, the request includes the option codes that correspond to the information the client wants the DHCP server to supply.

To access this page, click **System** > **Advanced Configuration** > **DHCP Server** > **Pool Options**.

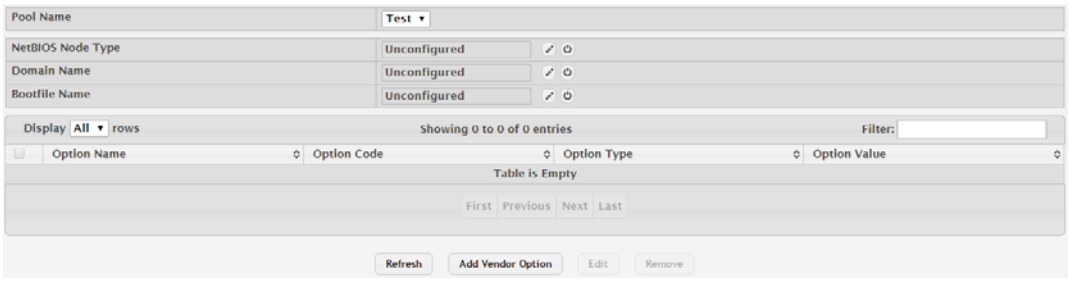


Figure 4.16 System > Advanced Configuration > DHCP Server > Pool Options

The following table describes the items in the previous figure.

Item	Description
Pool Name	Select the pool to configure. The menu includes all pools that have been configured on the device.
NetBIOS Node Type	The method the client should use to resolve NetBIOS names to IP addresses. To configure this field, click the Edit icon in the row. To reset the field to the default value, click the Reset icon in the row. The options are: ■ B-Node Broadcast: Broadcast only ■ P-Node Peer-to-Peer: NetBIOS name server only ■ M-Node Mixed: Broadcast, then NetBIOS name server ■ H-Node Hybrid: NetBIOS name server, then broadcast
Domain Name	The default domain name to configure for all clients in the selected pool.
Bootfile Name	The name of the default boot image that the client should attempt to download from a specified boot server.
Option Name	Identifies whether the entry is a fixed option or a vendor-defined option (Vendor).
Option Code	The number that uniquely identifies the option.
Option Type	The type of data to associate with the Option Code, which can be one of the following: ■ ASCII ■ HEX ■ IP Address
Option Value	The data associated with the Option Code. When adding or editing a vendor option, the field(s) available for configuring the value depend on the selected Option Type. If the value you configure contains characters that are not allowed by the selected Option Type, the configuration cannot be applied.
Refresh	Click **Refresh** to update the screen.
Add Vendor Option	Click **Add Vendor Option** to add a new vendor option.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new vendor option:

Click **System** > **Advanced Configuration** > **DHCP Server** > **Pool Options** > **Add Vendor Option**.

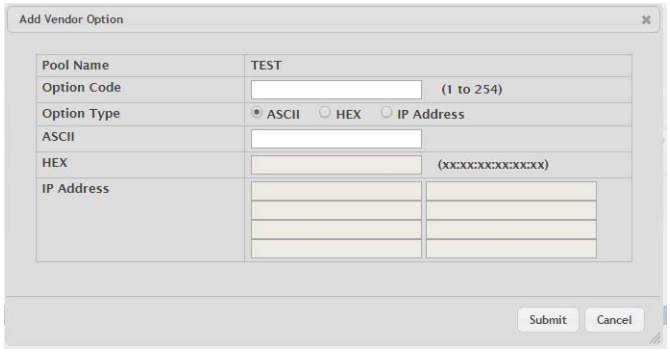


Figure 4.17 System > Advanced Configuration > DHCP Server > Pool Options > Add Vendor Option

The following table describes the items in the previous figure.

Item	Description
Option Code	The number that uniquely identifies the option.
Option Type	The type of data to associate with the Option Code, which can be one of the following: ■ ASCII ■ HEX ■ IP Address
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

To edit a new vendor option:

Click **System** > **Advanced Configuration** > **DHCP Server** > **Pool Options** > **Configure Vendor Option**.

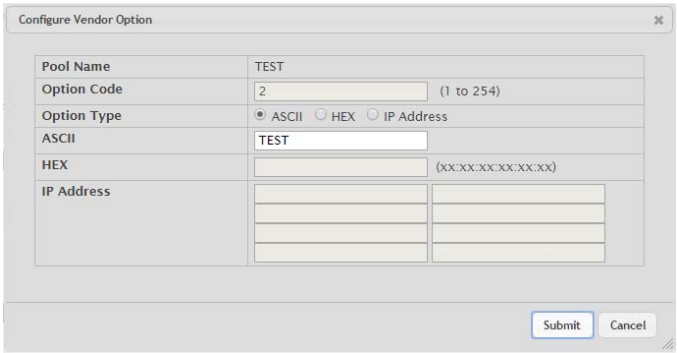


Figure 4.18 System > Advanced Configuration > DHCP Server > Pool Options > Configure Vendor Option

The following table describes the items in the previous figure.

Item	Description
Option Code	The number that uniquely identifies the option.
Option Type	The type of data to associate with the Option Code, which can be one of the following: ■ ASCII ■ HEX ■ IP Address

Item	Description
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Bindings

Use the DHCP Server Bindings page to view information about the IP address bindings in the DHCP server database.

To access this page, click **System** > **Advanced Configuration** > **DHCP Server** > **Bindings**.

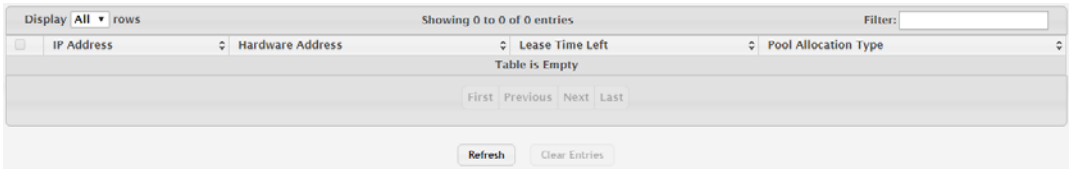


Figure 4.19 System > Advanced Configuration > DHCP Server > Bindings

The following table describes the items in the previous figure.

Item	Description
IP Address	The IP Address of the DHCP client.
Hardware Address	The MAC address of the DHCP client.
Lease Time Left	The amount of time left until the lease expires in days, hours, and minutes.
Pool Allocation Type	The type of binding used: ■ Dynamic: The address was allocated dynamically from a pool that includes a range of IP addresses. ■ Manual: A static IP address was assigned based on the MAC address of the client. ■ Inactive: The pool is not in use.
Refresh	Click **Refresh** to update the screen.
Clear Entries	Click **Clear** Entries to remove a selected entry.

Statistics

The DHCP Server Statistics page displays the DHCP server statistics for the device, including information about the bindings and DHCP messages. The values on this page indicate the various counts that have accumulated since they were last cleared.

To access this page, click **System** > **Advanced Configuration** > **DHCP Server** > **Statistics**.

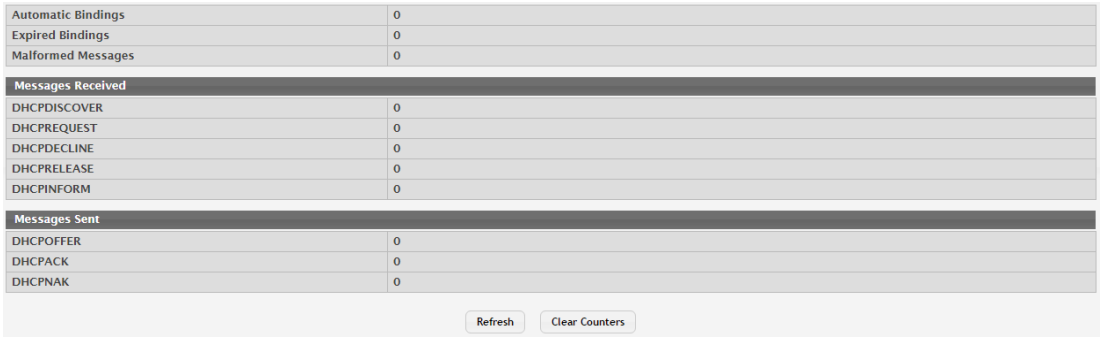


Figure 4.20 System > Advanced Configuration > DHCP Server > Statistics

The following table describes the items in the previous figure.

Item	Description
Automatic Bindings	The total number of IP addresses from all address pools with automatic bindings that the DHCP server has assigned to DHCP clients.
Expired Bindings	The number of IP addresses that the DHCP server has assigned to DHCP clients that have exceeded the configured lease time.
Malformed Messages	The number of messages received from one or more DHCP clients that were improperly formatted.
Messages Received	
DHCPDISCOVER	The number of DHCP discovery messages the DHCP server has received. A DHCP client broadcasts this type of message to discover available DHCP servers.
DHCPREQUEST	The number of DHCP request messages the DHCP server has received. A DHCP client broadcasts this type of message in response to a DHCP offer message it received from a DHCP server.
DHCPDECLINE	The number of DHCP decline messages the DHCP server has received from clients. A client sends a decline message if the DHCP client detects that the IP address offered by the DHCP server is already in use on the network. The server then marks the address as unavailable.
DHCPRELEASE	The number of DHCP release messages the DHCP server has received from clients. This type of message indicates that a client no longer needs the assigned address.
DHCPINFORM	The number of DHCP inform messages the DHCP server has received from clients. A client uses this type of message to obtain DHCP options.
Messages Sent	
DHCPOFFER	The number of DHCP offer messages the DHCP server has sent to DHCP clients in response to DHCP discovery messages it has received.
DHCPACK	The number of DHCP acknowledgement messages the DHCP server has sent to DHCP clients in response to DHCP request messages it has received. The server sends this message after the client has accepted the offer from this particular server. The DHCP acknowledgement message includes information about the lease time and any other configuration information that the DHCP client has requested.
DHCPNAK	The number of negative DHCP acknowledgement messages the DHCP server has sent to DHCP clients. A server might send this type of message if the client requests an IP address that is already in use or if the server refuses to renew the lease.
Refresh	Click **Refresh** to update the screen.
Clear Counters	Click **Clear Counters** to reset all counters to zero.

Conflicts

Use the DHCP Server Conflicts Information page to view information on hosts that have address conflicts; i.e., when the same IP address is assigned to two or more devices on the network.

To access this page, click **System** > **Advanced Configuration** > **DHCP Server** > **Conflicts**.

Figure 4.21 System > Advanced Configuration > DHCP Server > Conflicts

The following table describes the items in the previous figure.

Item	Description
IP Address	The IP address that has been detected as a duplicate.
Detection Method	The method used to detect the conflict, which is one of the following: ■ Gratuitous ARP: The DHCP client detected the conflict by broadcasting an ARP request to the address specified in the DHCP offer message sent by the server. If the client receives a reply to the ARP request, it declines the offer and reports the conflict. ■ Ping: The server detected the conflict by sending an ICMP echo message (ping) to the IP address before offering it to the DHCP client. If the server receives a response to the ping, the address is considered to be in conflict and is removed from the pool. ■ Host Declined: The server received a DHCPDECLINE message from the host. A DHCPDECLINE message indicates that the host has discovered that the IP address is already in use on the network.
Detection Time	The time when the conflict was detected in days, hours, minutes and seconds since the system was last reset (i.e., system up time).
Refresh	Click **Refresh** to update the screen.
Clear Entries	Click **Clear Entries** to clear all of the address conflict entries.

4.3.2.2 DNS

You can use these pages to configure information about DNS servers the network uses and how the switch/ router operates as a DNS client.

Global

Use the DNS Global Configuration page to configure global DNS settings and to view DNS client status information.

To access this page, click **System** > **Advanced Configuration** > **DNS** > **Configuration**.

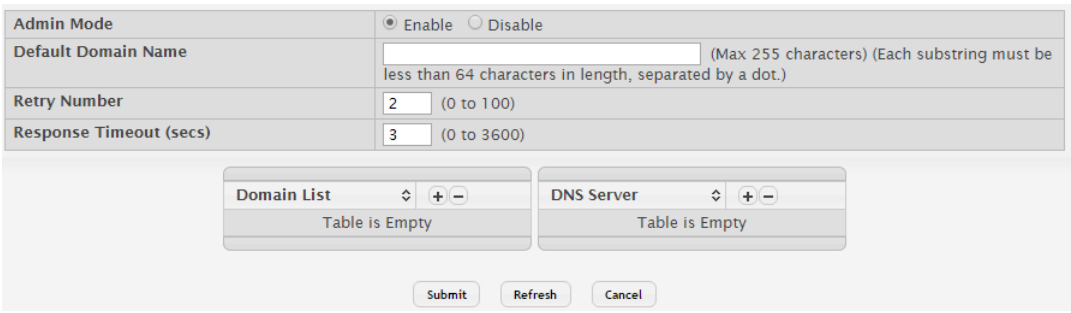


Figure 4.22 System > Advanced Configuration > DNS > Configuration

The following table describes the items in the previous figure.

Item	Description
Admin Mode	The administrative mode of the DNS client.
Default Domain Name	The default domain name for the DNS client to use to complete unqualified host names. Domain names are typically composed of a series of labels concatenated with dots. After a default domain name is configured, if you enter a host name and do not include the domain name information, the default domain name is automatically appended to the host name.
Retry Number	The number of times the DNS client should attempt to send DNS queries to a DNS server on the network.
Response Timeout (secs)	The number of seconds the DNS client should wait for a response to a DNS query.
Domain List	The list of domain names that have been added to the DNS client's domain list. If a DNS query that includes the default domain name is not resolved, the DNS client attempts to use the domain names in this list to extend the hostname into a fully-qualified domain name. The DNS client uses the entries in the order that they appear in the list.
DNS Server	A unique IPv4 or IPv6 address used to identify a DNS server. The order in which you add servers determines the precedence of the server. The DNS server that you add first has the highest precedence and will be used before other DNS servers that you add.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

IP Mapping

Use the DNS IP Mapping page to configure DNS host names for hosts on the network and to view dynamic DNS entries. The host names are associated with IPv4 or IPv6 addresses on the network, which are statically assigned to particular hosts.

To access this page, click **System** > **Advanced Configuration** > **DNS** > **IP Mapping**.

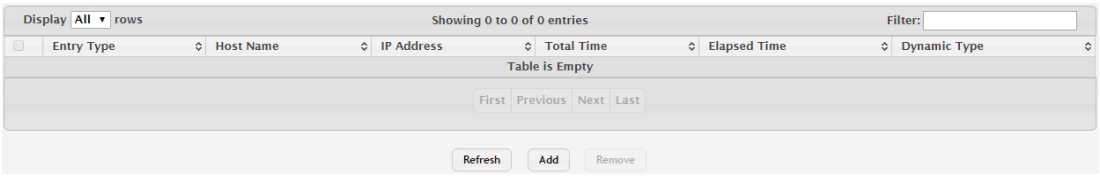


Figure 4.23 System > Advanced Configuration > DNS > IP Mapping

The following table describes the items in the previous figure.

Item	Description
Entry Type	Type of DNS entry: ■ Static: An entry that has been manually configured on the device. ■ Dynamic: An entry that the device has learned by using a configured DNS server to resolve a hostname.
Host Name	The name that identifies the system. For Static entries, specify the Host Name after you click Add. A host name can contain up to 255 characters if it contains multiple levels in the domain hierarchy, but each level (the portion preceding a period) can contain a maximum of 63 characters. If the host name you specify is a single level (does not contain any periods), the maximum number of allowed characters is 63.

Item	Description
IP Address	The IPv4 or IPv6 address associated with the configured Host Name. For Static entries, specify the IP Address after you click Add. You can specify either an IPv4 or an IPv6 address.
Total Time	The number of seconds that the entry will remain in the table. The function is only available for Dynamic entries.
Elapsed Time	The number of seconds that have passed since the entry was added to the table. When the Elapsed Time reaches the Total Time, the entry times out and is removed from the table. The function is only available for Dynamic entries.
Dynamic Type	The type of address in the entry, for example IP or (less common) X.121. The function is only available for Dynamic entries.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new DNS entry.
Remove	Click **Remove** to remove the selected entries.

To add a new DNS entry:

Click **System** > **Advanced Configuration** > **DNS** > **IP Mapping** > **Add**.

Figure 4.24 System > Advanced Configuration > DNS > IP Mapping > Add

The following table describes the items in the previous figure.

Item	Description
Host Name	The name that identifies the system. For Static entries, specify the Host Name after you click **Add**. A host name can contain up to 255 characters if it contains multiple levels in the domain hierarchy, but each level (the portion preceding a period) can contain a maximum of 63 characters. If the host name you specify is a single level (does not contain any periods), the maximum number of allowed characters is 63.
IP Address	The IPv4 or IPv6 address associated with the configured Host Name. For Static entries, specify the IP Address after you click **Add**. You can specify either an IPv4 or an IPv6 address.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Source Interface Configuration

Use the DNS Source Interface Configuration page to specify the physical or logical interface to use as the DNS client source interface. When an IP address is configured on the source interface, this address is used for all DNS communications between the local DNS client and the remote DNS server. The IP address of the designated source interface is used in the IP header of DNS management protocol packets. This allows security devices, such as firewalls, to identify all source packets coming from a specific device.

To access this page, click **System** > **Advanced Configuration** > **DNS** > **Source Interface Configuration**.

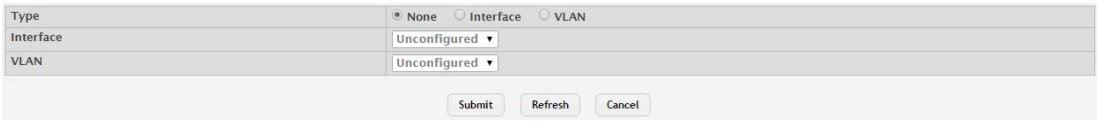


Figure 4.25 System > Advanced Configuration > DNS > Source Interface Configuration

The following table describes the items in the previous figure.

Item	Description
Type	The type of interface to use as the source interface: ■ None: The primary IP address of the originating (outbound) interface is used as the source address. ■ Interface: The primary IP address of a physical port is used as the source address. ■ VLAN: The primary IP address of a VLAN routing interface is used as the source address.
Interface	When the selected Type is Interface, select the physical port to use as the source interface.
VLAN	When the selected Type is VLAN, select the VLAN to use as the source interface. The menu contains only the VLAN IDs for VLAN routing interfaces.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.2.3 Email Alerts

With the Email alerting feature, log messages can be sent to one or more Email addresses. You must configure information about the network Simple Mail Transport Protocol SMTP) server for Email to be successfully sent from the switch.

The pages available from the Email Alerting folder allow you to configure information about what type of log message are sent via Email and to what address(es) the messages are delivered by Email.

Global

Use the Email Alert Global Configuration page to configure the common settings for log messages emailed by the switch.

To access this page, click **System** > **Advanced Configuration** > **Email Alerts** > **Global**.

Figure 4.26 System > Advanced Configuration > Email Alerts > Global

The following table describes the items in the previous figure.

Item	Description
Admin Mode	Sets the administrative mode of the feature. ■ Enable: The device can send email alerts to the configured SMTP server. ■ Disable: The device will not send email alerts.
From Address	Specifies the email address of the sender (the switch).

Item	Description
Log Duration (Minutes)	Determines how frequently the non critical messages are sent to the SMTP server.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

Test

Use the Email Alert Test page to verify that the Email alert settings are configured properly. After you specify the settings on this page and click **Submit**, the device will use the configured SMTP server to send an Email to the configured Email addresses.

To access this page, click **System** > **Advanced Configuration** > **Email Alerts** > **Test**.

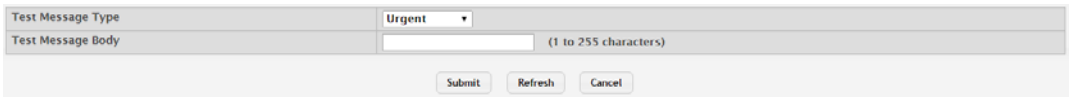


Figure 4.27 System > Advanced Configuration > Email Alerts > Test

The following table describes the items in the previous figure.

Item	Description
Test Message Type	Specifies the type of message to test for email alert functionality.
Test Message Body	Specifies the text contained in the body of the email alert test message.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

Server

Use the Email Alert Server Configuration page to configure information about up to three SMTP (mail) servers on the network that can handle Email alerts sent from the switch.

To access this page, click **System** > **Advanced Configuration** > **Email Alerts** > **Server**.

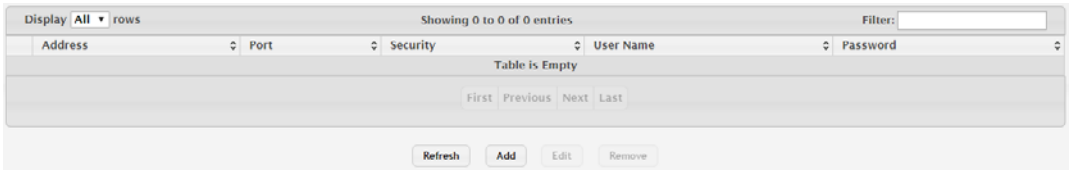


Figure 4.28 System > Advanced Configuration > Email Alerts > Server

The following table describes the items in the previous figure.

Item	Description
Address	Shows the IPv4/IPv6 address or host name of the SMTP server that handles email alerts that the device sends.
Port	Specifies the TCP port that email alerts are sent to on the SMTP server.
Security	Specifies the type of authentication to use with the mail server, which can be TLSv1 (SMTP over SSL) or None (no authentication is required).
User Name	If the Security is TLSv1, this field specifies the user name required to access the mail server.

Item	Description
Password	If the Security is TLSv1, this field specifies the password associated with the configured user name for mail server access. When adding or editing the server, you must retype the password to confirm that it is entered correctly.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new Email server.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new Email server:

Click **System** > **Advanced Configuration** > **Email Alerts** > **Server** > **Add**.

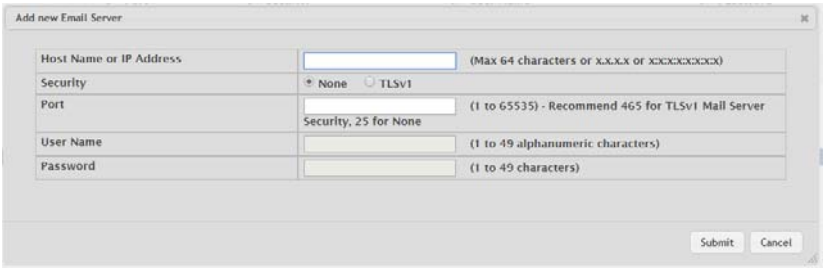


Figure 4.29 System > Advanced Configuration > Email Alerts > Server > Add

The following table describes the items in the previous figure.

Item	Description
Security	Specifies the type of authentication to use with the mail server, which can be TLSv1 (SMTP over SSL) or None (no authentication is required).
Port	Specifies the TCP port that Email alerts are sent to on the SMTP server.
User Name	If the Security is TLSv1, this field specifies the user name required to access the mail server.
Password	If the Security is TLSv1, this field specifies the password associated with the configured user name for mail server access. When adding or editing the server, you must retype the password to confirm that it is entered correctly.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Statistics

Use the Email Alert Statistics page to view information about Email alerts sent from the switch.

To access this page, click **System** > **Advanced Configuration** > **Email Alerts** > **Statistics**.

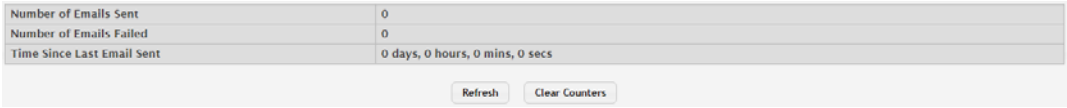


Figure 4.30 System > Advanced Configuration > Email Alerts > Statistics

The following table describes the items in the previous figure.

Item	Description
Number of Emails Sent	The number of email alerts that were successfully sent since the counters were cleared or the system was reset.

Item	Description
Number of Emails Failed	The number of email alerts that failed to be sent since the counters were cleared or system was reset.
Time Since Last Email Sent	The amount of time in days, hours, minutes, and seconds that has passed since the last email alert was successfully sent.
Refresh	Click **Refresh** to update the screen.
Clear Counters	Click **Clear Counters** to reset all counters to zero.

Subject

Use the Email Alert Subject Configuration page to configure the subject line of the Email alert messages sent from the switch.

To access this page, click **System** > **Advanced Configuration** > **Email Alerts** > **Subject**.

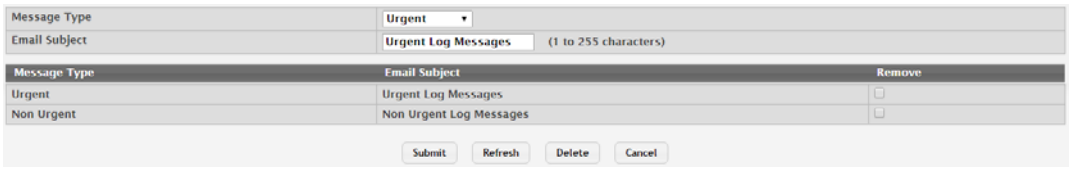


Figure 4.31 System > Advanced Configuration > Email Alerts > Subject

The following table describes the items in the previous figure.

Item	Description
Message Type	Select the message type with the subject to edit.
Email Subject	Specify the text to be displayed in the subject of the email alert message for the selected message type.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Delete	Click **Delete** to delete the selected message type.
Cancel	Click **Cancel** to restore default value.

Address

Use the Email Alert To Address Configuration page to configure the Email addresses to which alert messages sent.

To access this page, click **System** > **Advanced Configuration** > **Email Alerts** > **Address**.

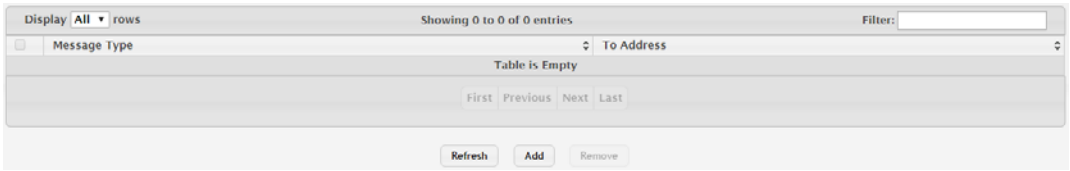


Figure 4.32 System > Advanced Configuration > Email Alerts > Address

The following table describes the items in the previous figure.

Item	Description
Message Type	Specifies whether to send urgent, non urgent, or both types of email alert message to the associated address.
To Address	The valid email address of an email alert recipient.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new email alert to address.
Remove	Click **Remove** to remove the selected entries.

To add a new Email alert to address:

Click **System** > **Advanced Configuration** > **Email Alerts** > **Address** > **Add**.

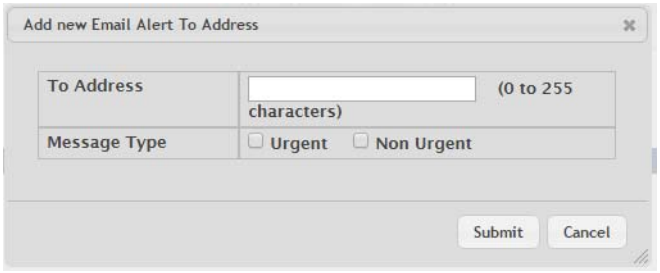


Figure 4.33 System > Advanced Configuration > Email Alerts > Address > Add

The following table describes the items in the previous figure.

Item	Description
To Address	The valid Email address of an Email alert recipient.
Message Type	Specifies whether to send urgent, non urgent, or both types of Email alert message to the associated address.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.3.2.4 ISDP

The Industry Standard Discovery Protocol (ISDP) is a proprietary Layer 2 network protocol which inter-operates with Cisco devices running the Cisco Discovery Protocol (CDP). ISDP is used to share information between neighboring devices. FAST-PATH software participates in the CDP protocol and is able to both discover and be discovered by other CDP supporting devices.

Global

Use the ISDP Global Configuration page to configure global settings for the Industry Standard Discovery Protocol (ISDP) feature. ISDP is a proprietary Layer 2 network protocol that interoperates with the Cisco Discovery Protocol (CDP). ISDP is used to share information between neighboring devices (routers, bridges, access servers, and switches).

To access this page, click **System** > **Advanced Configuration** > **ISDP** > **Global**.

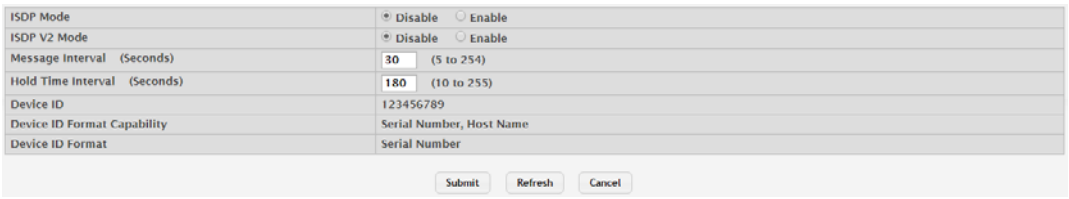


Figure 4.34 System > Advanced Configuration > ISDP > Global

The following table describes the items in the previous figure.

Item	Description
ISDP Mode	The administrative mode of ISDP on the device. When the mode is enabled, the device sends ISDP announcements out of each ISDP-enabled network interface that has a link partner.
ISDP V2 Mode	The administrative mode of ISDP version 2 on the device. When the mode is enabled, the device sends ISDPv2 announcements out of each ISDP-enabled network interface that has a link partner.
Message Interval (Seconds)	The number of seconds to wait between ISDP packet transmissions.

Item	Description
Hold Time Interval (Seconds)	The number of seconds the neighbor device should consider the information it receives in an ISDP packet to be valid.
Device ID	The identification information the device advertises to its neighbors in the ISDP packets.
Device ID Format Capability	The possible formats that the device can use for identification purposes.
Device ID Format	The current format of the device ID.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

Cache Table

Use the ISDP Cache Table page to view information about other devices the switch has discovered through the ISDP.

To access this page, click **System** > **Advanced Configuration** > **ISDP** > **Cache Table**.

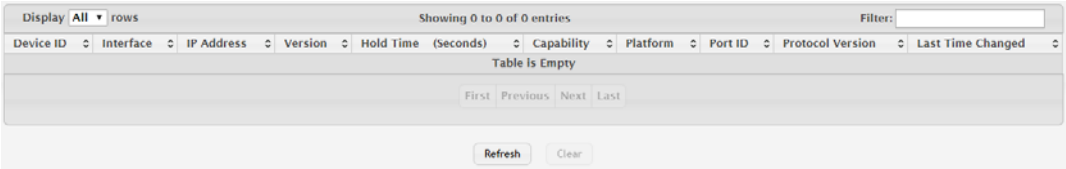


Figure 4.35 System > Advanced Configuration > ISDP > Cache Table

The following table describes the items in the previous figure.

Item	Description
Device ID	The ID of the neighbor device as advertised in the ISDP message. The ID could be a host name, serial number, product name, MAC address, or some other type of information that identifies the neighbor device.
Interface	The local interface that is connected to the neighbor. The ISDP message was received on this interface.
IP Address	The (first) network-layer address reported in the address TLV of the most recently received ISDP message from the neighbor.
Version	The firmware version running on the neighbor device, as advertised in the ISDP message.
Hold Time	The number of seconds the information received in an ISDP packet is considered valid. The timer restarts each time a new ISDP packet is received from the neighbor. If the value reaches 0, the device is considered to be disconnected, and the entry ages out.
Capability	The functional capabilities advertised by the neighbor. For example, a neighbor might advertise itself as a switch, router, or host.
Platform	The hardware platform information advertised by the neighbor. The neighbor's ISDP packet might included information such as the name of the manufacturer or product model.
Port ID	The port on the neighbor device from which the ISDP packet was sent. This is the port that is directly connected to the local interface identified in the Interface field.
Protocol Version	The protocol version of the ISDP packet sent by the neighbor.
Last Time Changed	The amount of time that has passed since the entry was last modified.
Refresh	Click **Refresh** to update the screen.
Clear	Click **Clear** to remove the selected entry.

Interface

Use the ISDP Interface Configuration page to configure the ISDP settings for each interface.

To access this page, click **System** > **Advanced Configuration** > **ISDP** > **Interface**.

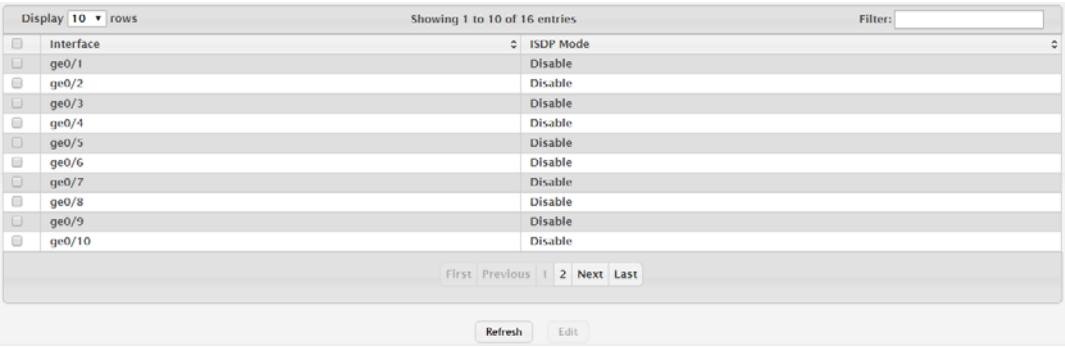


Figure 4.36 System > Advanced Configuration > ISDP > Interface

The following table describes the items in the previous figure.

Item	Description
Interface	The interface on which ISDP can be enabled or disabled. In the Edit ISDP Mode window, this field identifies the interfaces that are being configured.
ISDP Mode	The administrative mode of ISDP on the interface. When ISDP is enabled globally and on an interface, the interface periodically sends ISDP messages to its directly connected link partner.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

Statistics

The ISDP Statistics page displays statistical information about the ISDP packets sent and received by the device. The transmit statistics provide information about the ISDP packets sent by all ISDP-enabled interfaces. The receive statistics provide information about the ISDP packets received from neighbor devices connected to ISDP-enabled interfaces.

To access this page, click **System** > **Advanced Configuration** > **ISDP** > **Statistics**.

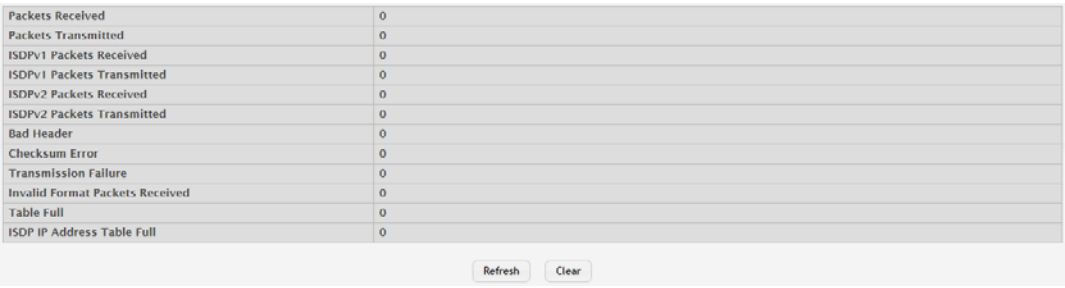


Figure 4.37 System > Advanced Configuration > ISDP > Statistics

The following table describes the items in the previous figure.

Item	Description
Packets Received	The total number of ISDP packets received by the device.
Packets Transmitted	The total number of ISDP packets transmitted by the device.
ISDPv1 Packets Received	The total number of ISDP version 1 packets received by the device.

Item	Description
ISDPv1 Packets Transmitted	The total number of ISDP version 1 packets transmitted by the device.
ISDPv2 Packets Received	The total number of ISDP version 2 packets received by the device.
ISDPv2 Packets Transmitted	The total number of ISDP version 2 packets transmitted by the device.
Bad Header	The total number of ISDP packets received with bad headers.
Checksum Error	The total number of ISDP packets received with checksum errors.
Transmission Failure	The total number of ISDP packets that the device attempted to transmit but failed to do so.
Invalid Format Packets Received	The total number of ISDP packets received with an invalid ISDP packet format.
Table Full	The number of times a neighbor entry was not added to the ISDP cache table because the local database was full.
ISDP IP Address Table Full	The number of times the IP address of a neighbor could not be added to the neighbor entry because the IP address table was full.
Refresh	Click **Refresh** to update the screen.
Clear	Click **Clear** to reset all statistic to zero.

4.3.2.5 Link Dependency

The link dependency feature provides the ability to enable or disable one or more ports based on the link state of one or more different ports. With link dependency enabled on a port, the link state of that port is dependent on the link state of another port. For example, if port A is dependent on port B and the switch detects a link loss on port B, the switch automatically brings down the link on port A. When the link is restored to port B, the switch automatically restores the link to port A.

Group

Use the Link Dependency Group Status page to configure link dependency groups. Link dependency allows the link status of one interface to be dependent on the link status of another interface. Link state groups define the interface link dependency.

To access this page, click **System** > **Advanced Configuration** > **Link Dependency** > **Group**.

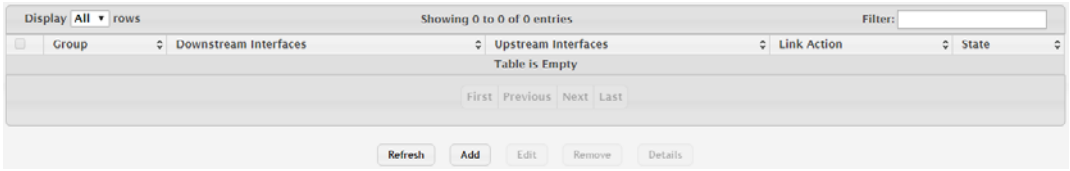


Figure 4.38 System > Advanced Configuration > Link Dependency > Group

The following table describes the items in the previous figure.

Item	Description
Group	The unique link dependency group identifier.
Downstream Interfaces	The set of interfaces dependent on other interfaces.
Upstream Interfaces	The set of interfaces that other interfaces are dependent on.

Item	Description
Link Action	The action performed on downstream interfaces when the upstream interfaces are down, which can be one of the following: ■ Up: Downstream interfaces are up when upstream interfaces are down. ■ Down: Downstream interfaces go down when upstream interfaces are down.
State	The group state, which can be one of the following: ■ Up: Link action is up and no upstream interfaces have their link up, or link action is down and there are upstream interfaces that have their link up. ■ Down: Link is down when the above conditions are not true.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new group.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.
Details	Click **Detail** to open the Group Entry Details window.

To add a new group:

Click **System** > **Advanced Configuration** > **Link Dependency** > **Group** > **Add**.

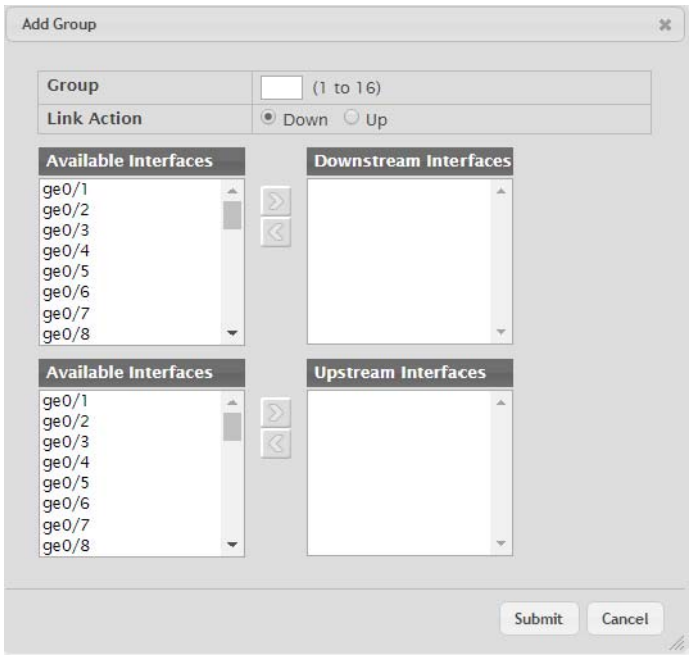


Figure 4.39 System > Advanced Configuration > Link Dependency > Group > Add

The following table describes the items in the previous figure.

Item	Description
Available Interfaces	The interfaces that can be added to the group. An interface defined as an upstream interface cannot be defined as a downstream interface in the same link state group or in a different group. Similarly, an interface defined as a downstream interface cannot be defined as an upstream interface. To move an interface between the Available Interfaces and Downstream Interfaces or Upstream Interfaces fields, click the interface (or CTRL + click to select multiple interfaces), and then click the appropriate arrow to move the selected interfaces to the desired field.

Item	Description
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.3.2.6 Protection

Denial of Service

Use the Denial of Service (DoS) Configuration page to configure DoS control. FAST-PATH SMB software provides support for classifying and blocking specific types of DoS attacks. You can configure your system to monitor and block these types of attacks:

To access this page, click **System** > **Advanced Configuration** > **Protection** > **Denial of Service**.

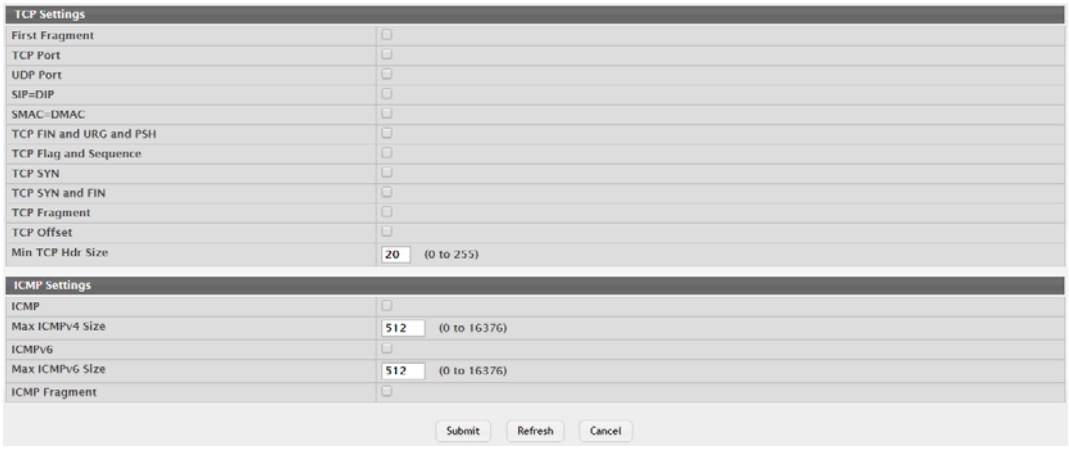


Figure 4.40 System > Advanced Configuration > Protection > Denial of Service

The following table describes the items in the previous figure.

Item	Description
TCP Settings	
First Fragment	Enable this option to allow the device to drop packets that have a TCP header smaller than the value configured in the Min TCP Hdr Size field.
TCP Port	Enable this option to allow the device to drop packets that have the TCP source port equal to the TCP destination port.
UDP Port	Enable this option to allow the device to drop packets that have the UDP source port equal to the UDP destination port.
SIP=DIP	Enable this option to allow the device to drop packets that have a source IP address equal to the destination IP address.
SMAC=DMAC	Enable this option to allow the device to drop packets that have a source MAC address equal to the destination MAC address.
TCP FIN and URG and PSH	Enable this option to allow the device to drop packets that have TCP Flags FIN, URG, and PSH set and a TCP Sequence Number equal to 0.
TCP Flag and Sequence	Enable this option to allow the device to drop packets that have TCP control flags set to 0 and the TCP sequence number set to 0.
TCP SYN	Enable this option to allow the device to drop packets that have TCP Flags SYN set.
TCP SYN and FIN	Enable this option to allow the device to drop packets that have TCP Flags SYN and FIN set.

Item	Description
TCP Fragment	Enable this option to allow the device to drop packets that have a TCP payload where the IP payload length minus the IP header size is less than the minimum allowed TCP header size.
TCP Offset	Enable this option to allow the device to drop packets that have a TCP header Offset set to 1.
Min TCP Hdr Size	The minimum TCP header size allowed. If First Fragment DoS prevention is enabled, the device will drop packets that have a TCP header smaller than this configured value.
ICMP Settings	
ICMP	Enable this option to allow the device to drop ICMP packets that have a type set to ECHO_REQ (ping) and a payload size greater than the ICMP payload size configured in the Max ICMPv4 Size field.
Max ICMPv4 Size	The maximum allowed ICMPv4 packet size. If ICMP DoS prevention is enabled, the device will drop ICMPv4 ping packets that have a size greater then this configured maximum ICMPv4 packet size.
ICMPv6	Enable this option to allow the device to drop ICMP packets that have a type set to ECHO_REQ (ping) and a payload size greater than the ICMP payload size configured in the Max ICMPv6 Size field.
Max ICMPv6 Size	The maximum allowed IPv6 ICMP packet size. If ICMP DoS prevention is enabled, the switch will drop IPv6 ICMP ping packets that have a size greater than this configured maximum ICMPv6 packet size.
ICMP Fragment	Enable this option to allow the device to drop fragmented ICMP packets.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.2.7 sFlow

Agent

The sFlow Agent Summary page shows information about the sFlow agent on the device. sFlow is an industry standard technology for monitoring high-speed switched and routed networks. The sFlow agent can monitor network traffic on each port and generate sFlow data to send to a centralized sFlow receiver (also known as a collector).

To access this page, click **System** > **Advanced Configuration** > **sFlow** > **Agent**.

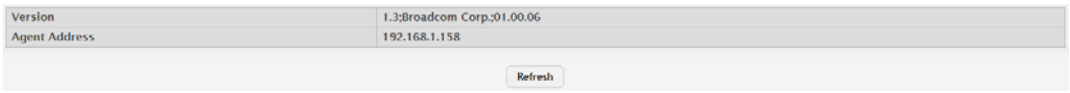


Figure 4.41 System > Advanced Configuration > sFlow > Agent

The following table describes the items in the previous figure.

Item	Description
Version	Identifies the version and implementation of the sFlow agent. The version string has the following structure: MIB Version; Organization; Software Version.
Agent Address	The IP address associated with the sFlow agent.
Refresh	Click **Refresh** to update the screen.

Receiver

Use the sFlow Receiver Configuration page to view and to edit the sFlow receiver settings. The sFlow receiver collects and analyzes information sent by the sFlow

agent on the device. The sFlow agent can send packet sampling data to multiple sFlow receivers on the network.

To access this page, click **System** > **Advanced Configuration** > **sFlow** > **Receiver**.

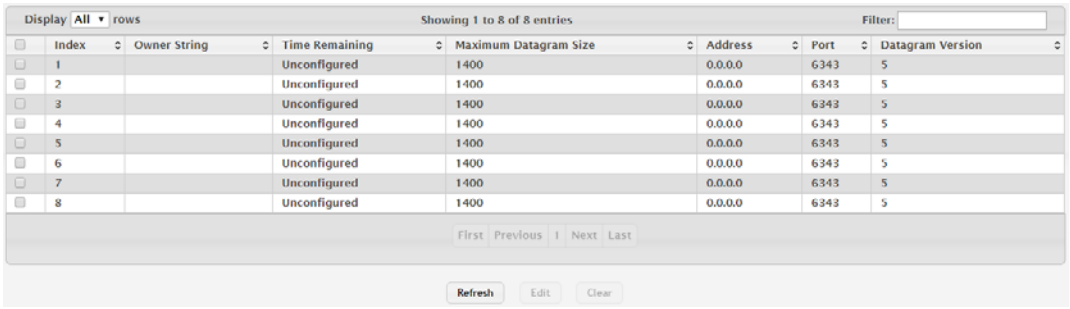


Figure 4.42 System > Advanced Configuration > sFlow > Receiver

The following table describes the items in the previous figure.

Item	Description
Index	The receiver for which data is displayed or configured.
Owner String	The entity making use of this sFlow receiver table entry. If this field is blank, the entry is currently unclaimed.
Time Remaining	The time (in seconds) remaining before the sampler is released and stops sampling. A value of 0 essentiality means the receiver is not configured. When configuring the sFlow receiver settings, you must select the Timeout Mode option before you can configure a Timeout Value.
Maximum Datagram Size	The maximum number of data bytes that can be sent in a single sample datagram. The receiver should also be set to this value to avoid fragmentation of the sFlow datagrams.
Address	The IP address of the sFlow receiver.
Port	The destination UDP port for sFlow datagrams.
Datagram Version	The version of sFlow datagrams that the sFlow agent should send to the sFlow receiver.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.
Clear	Click **Clear** to clear the selected entry.

Poller

Use the sFlow Poller Configuration page to add, remove, or edit a counter poller instance on a port (data source). Configuring a poller instance allows the sFlow agent to perform periodic counter sampling on a specified port and efficiently export counters to an sFlow receiver.

To access this page, click **System** > **Advanced Configuration** > **sFlow** > **Poller**.

Figure 4.43 System > Advanced Configuration > sFlow > Poller

The following table describes the items in the previous figure.

Item	Description
Poller Data Source	The sFlowDataSource for this sFlow poller. The sFlow agent supports physical ports as sFlow data sources.
Receiver Index	The sFlowReceiver for this sFlow counter poller. The specified Receiver Index must be associated with an active sFlow receiver. If a receiver expires, all pollers associated with the receiver will also expire.
Poller Interval	The maximum number of seconds between successive samples of the counters associated with this data source. A sampling interval of 0 disables counter sampling.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new poller data.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new poller data:

Click **System** > **Advanced Configuration** > **sFlow** > **Poller** > **Add**.

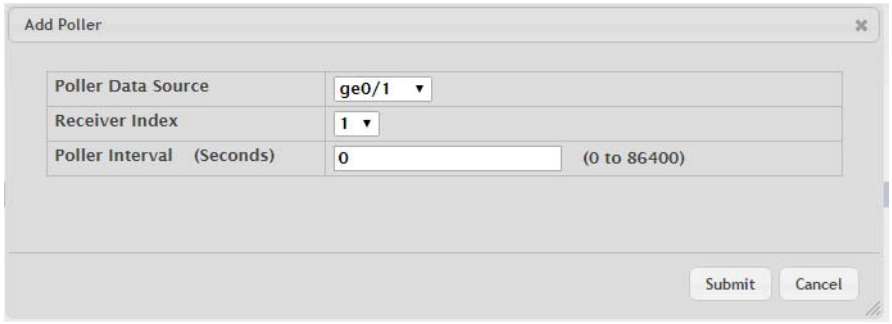


Figure 4.44 System > Advanced Configuration > sFlow > Poller > Add

The following table describes the items in the previous figure.

Item	Description
Poller Data Source	The sFlowDataSource for this sFlow poller. The sFlow agent supports physical ports as sFlow data sources.
Receiver Index	The sFlowReceiver for this sFlow counter poller. The specified Receiver Index must be associated with an active sFlow receiver. If a receiver expires, all pollers associated with the receiver will also expire.
Poller Interval (Seconds)	The maximum number of seconds between successive samples of the counters associated with this data source. A sampling interval of 0 disables counter sampling.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Sampler

Use the sFlow Sampler Configuration page to add, remove, or edit an sFlow sampler instance on a port (data source). Configuring a sampler instance allows the sFlow agent to perform statistical packet-based sampling of switched or routed packet flows. Packet flow sampling creates a steady, but random, stream of sFlow datagrams that are sent to the sFlow receiver.

To access this page, click **System** > **Advanced Configuration** > **sFlow** > **Sampler**.

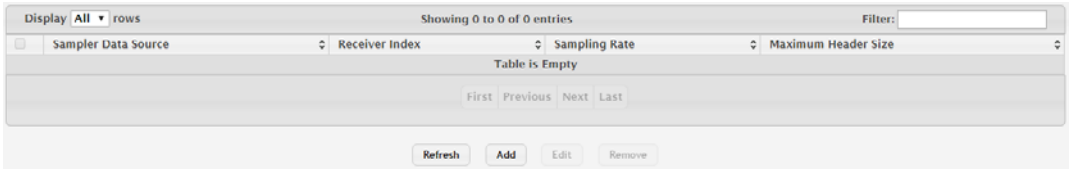


Figure 4.45 System > Advanced Configuration > sFlow > Sampler

The following table describes the items in the previous figure.

Item	Description
Sampler Data Source	The sFlowDataSource for this sFlow sampler. The sFlow agent supports physical ports as sFlow data sources.
Receiver Index	The sFlowReceiver for this sFlow sampler. The specified Receiver Index must be associated with an active sFlow receiver. If a receiver expires, all samplers associated with the receiver will also expire.
Sampling Rate	The statistical sampling rate for packet sampling from this source. A sampling rate of 0 disables sampling.
Maximum Header Size	The maximum number of bytes that should be copied from a sampled packet.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new sampler data.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new sampler data:

Click **System** > **Advanced Configuration** > **sFlow** > **Sampler** > **Add**.

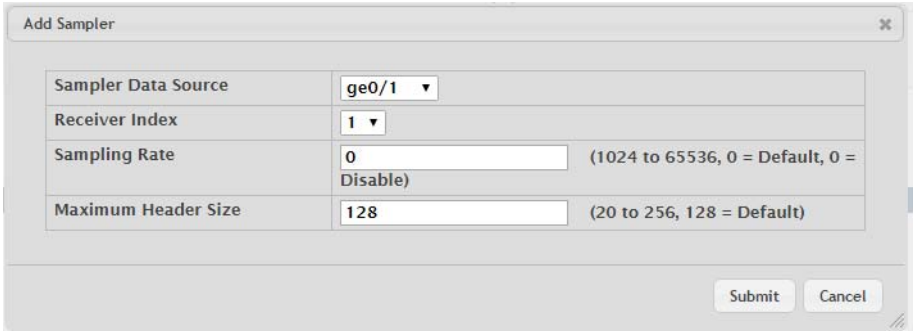


Figure 4.46 System > Advanced Configuration > sFlow > Sampler > Add

The following table describes the items in the previous figure.

Item	Description
Sampler Data Source	The sFlowDataSource for this sFlow sampler. The sFlow agent supports physical ports as sFlow data sources.
Receiver Index	The sFlowReceiver for this sFlow sampler. The specified Receiver Index must be associated with an active sFlow receiver. If a receiver expires, all samplers associated with the receiver will also expire.
Sampling Rate	The statistical sampling rate for packet sampling from this source. A sampling rate of 0 disables sampling.
Maximum Header Size	The maximum number of bytes that should be copied from a sampled packet.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Source Interface Configuration

Use the sFlow Source Interface Configuration page to specify the physical or logical interface to use as the sFlow client source interface. When an IP address is configured on the source interface, this address is used for all sFlow communications between the local sFlow client and the remote sFlow server. The IP address of the designated source interface is used in the IP header of sFlow management protocol packets. This allows security devices, such as firewalls, to identify all source packets coming from a specific device.

To access this page, click **System** > **Advanced Configuration** > **sFlow** > **Source Interface Configuration**.

Figure 4.47 System > Advanced Configuration > sFlow > Source Interface Configuration

The following table describes the items in the previous figure.

Item	Description
Type	The type of interface to use as the source interface: ■ None: The primary IP address of the originating (outbound) interface is used as the source address. ■ Interface: The primary IP address of a physical port is used as the source address. ■ VLAN: The primary IP address of a VLAN routing interface is used as the source address.
Interface	When the selected Type is Interface, select the physical port to use as the source interface.
VLAN ID	When the selected Type is VLAN, select the VLAN to use as the source interface. The menu contains only the VLAN IDs for VLAN routing interfaces.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.2.8 SNMP

Community

Access rights are managed by defining communities on the SNMPv1, 2 Community page. When the community names are changed, access rights are also changed. SNMP Communities are defined only for SNMP v1 and SNMP v2.

Use the SNMP Community Configuration page to enable SNMP and Authentication notifications.

To access this page, click **System** > **Advanced Configuration** > **SNMP** > **Community**.

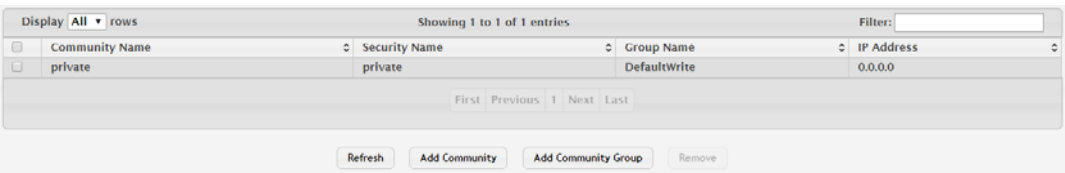


Figure 4.48 System > Advanced Configuration > SNMP > Community

The following table describes the items in the previous figure.

Item	Description
Community Name	Community name used in SNMPv1/v2 packets. This is configured in the client and identifies the access the user may connect with.
Security Name	Identifies the security entry that associates communities and Groups for a specific access type.
Group Name	Identifies the group associated with this community entry.
IP Address	Specifies the IP address that can connect with this community.
Refresh	Click **Refresh** to update the screen.
Add Community	Click **Add Community** to add a new SNMP community.
Add Community Group	Click **Add Community Group** to add a new SNMP community group.
Remove	Click **Remove** to remove the selected entries.

To add a new SNMP community:

Click **System** > **Advanced Configuration** > **SNMP** > **Community** > **Add Community**.

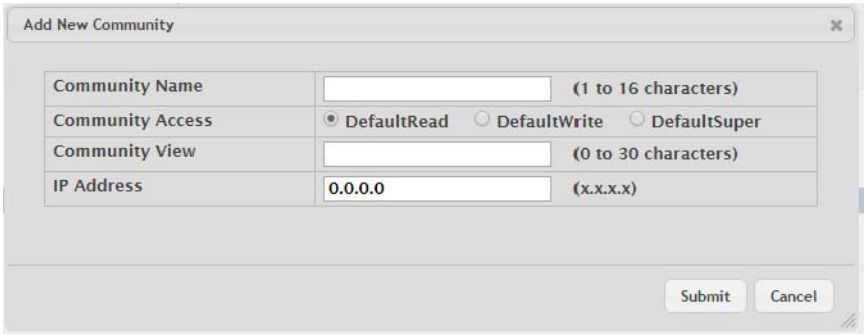


Figure 4.49 System > Advanced Configuration > SNMP > Community > Add Community

The following table describes the items in the previous figure.

Item	Description
Community Name	Community name used in SNMPv1/v2 packets. This is configured in the client and identifies the access the user may connect with.
Community Access	Specifies the access control policy for the community.
Community View	Specifies the community view for the community. If the value is empty, then no access is granted.
IP Address	Specifies the IP address that can connect with this community.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

To add a new SNMP community group:

Click **System** > **Advanced Configuration** > **SNMP** > **Community** > **Add Community Group**.

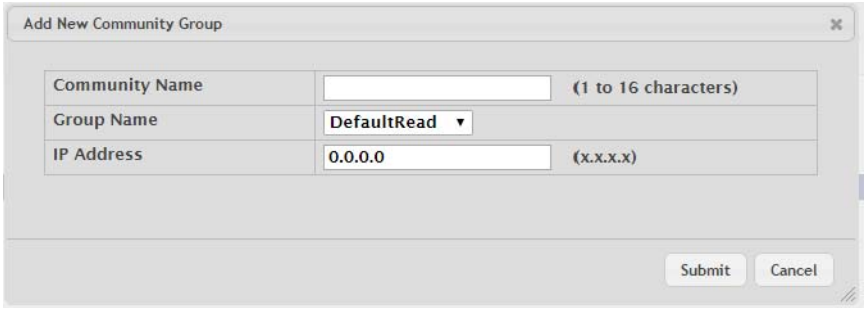


Figure 4.50 System > Advanced Configuration > SNMP > Community > Add Community Group

The following table describes the items in the previous figure.

Item	Description
Community Name	Community name used in SNMPv1/v2 packets. This is configured in the client and identifies the access the user may connect with.
Group Name	Identifies the Group associated with this Community entry.
IP Address	Specifies the IP address that can connect with this community.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Trap Receiver v1/v2

Use the SNMP v1/v2 Trap Receivers page to configure settings for each SNMPv1 or SNMPv2 management host that will receive notifications about traps generated by the device. The SNMP management host is also known as the SNMP trap receiver.

To access this page, click **System** > **Advanced Configuration** > **SNMP** > **Trap Receiver v1/v2**.

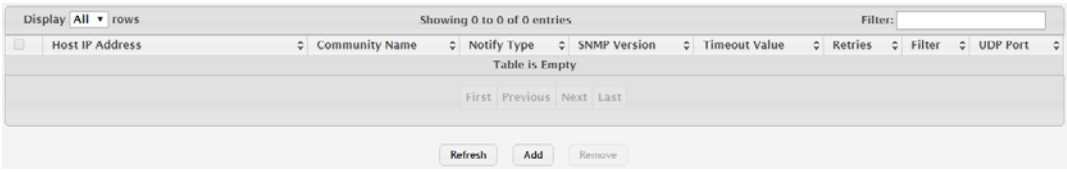


Figure 4.51 System > Advanced Configuration > SNMP > Trap Receiver v1/v2

The following table describes the items in the previous figure.

Item	Description
Host IP Address	The IP address of the SNMP management host that will receive traps generated by the device.
Community Name	The name of the SNMP community that includes the SNMP management host and the SNMP agent on the device.
Notify Type	The type of SNMP notification to send the SNMP management host: ■ Inform: An SNMP message that notifies the host when a certain event has occurred on the device. The message is acknowledged by the SNMP management host. This type of notification is not available for SNMPv1. ■ Trap: An SNMP message that notifies the host when a certain event has occurred on the device. The message is not acknowledged by the SNMP management host.
SNMP Version	The version of SNMP to use, which is either SNMPv1 or SNMPv2.

Item	Description
Timeout Value	The number of seconds to wait for an acknowledgment from the SNMP management host before resending an inform message.
Retries	The number of times to resend an inform message that is not acknowledged by the SNMP management host.
Filter	The name of the filter for the SNMP management host. The filter is configured by using the CLI and defines which MIB objects to include or exclude from the view. This field is optional.
UDP Port	The UDP port on the SNMP management host that will receive the SNMP notifications. If no value is specified when configuring a receiver, the default UDP port value is used.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new SNMP trap receiver.
Remove	Click **Remove** to remove the selected entries.

To add a new SNMP trap receiver:

Click **System** > **Advanced Configuration** > **SNMP** > **Trap Receiver v1/v2** > **Add**.

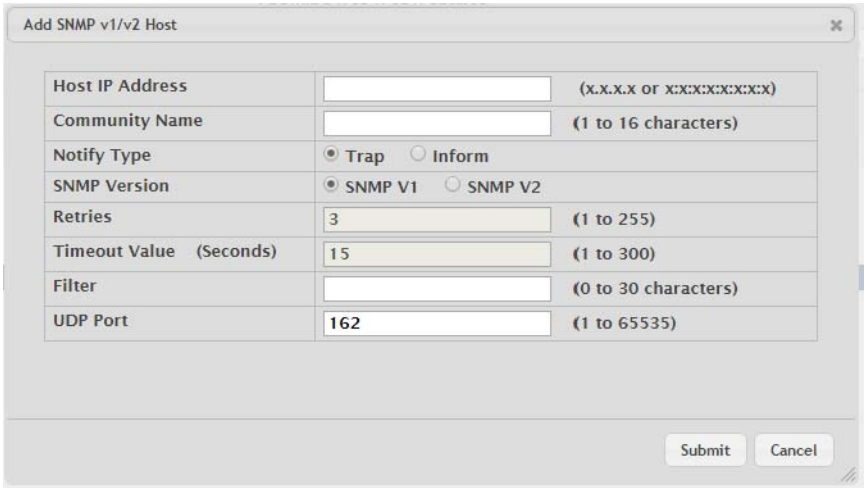


Figure 4.52 System > Advanced Configuration > SNMP > Trap Receiver v1/v2 > Add

The following table describes the items in the previous figure.

Item	Description
Host IP Address	The IP address of the SNMP management host that will receive traps generated by the device.
Community Name	The name of the SNMP community that includes the SNMP management host and the SNMP agent on the device.
Notify Type	The type of SNMP notification to send the SNMP management host: ■ Inform: An SNMP message that notifies the host when a certain event has occurred on the device. The message is acknowledged by the SNMP management host. This type of notification is not available for SNMPv1. ■ Trap: An SNMP message that notifies the host when a certain event has occurred on the device. The message is not acknowledged by the SNMP management host.
SNMP Version	The version of SNMP to use, which is either SNMPv1 or SNMPv2.
Retries	The number of times to resend an inform message that is not acknowledged by the SNMP management host.
Timeout Value (Seconds)	The number of seconds to wait for an acknowledgment from the SNMP management host before resending an inform message.

Item	Description
Filter	The name of the filter for the SNMP management host. The filter is configured by using the CLI and defines which MIB objects to include or exclude from the view. This field is optional.
UDP Port	The UDP port on the SNMP management host that will receive the SNMP notifications. If no value is specified when configuring a receiver, the default UDP port value is used.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Trap Receiver v3

Use the SNMP v3 Trap Receivers page to configure settings for each SNMPv3 management host that will receive notifications about traps generated by the device. The SNMP management host is also known as the SNMP trap receiver.

To access this page, click **System** > **Advanced Configuration** > **SNMP** > **Trap Receiver v3**.

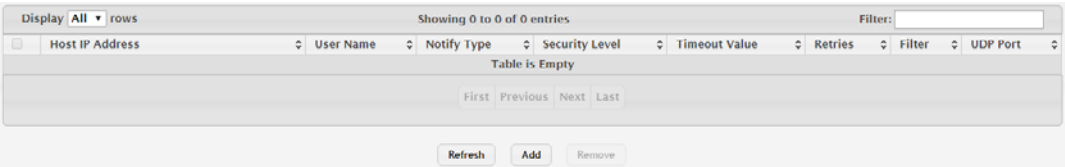


Figure 4.53 System > Advanced Configuration > SNMP > Trap Receiver v3

The following table describes the items in the previous figure.

Item	Description
Host IP Address	The IP address of the SNMP management host that will receive traps generated by the device.
User Name	The name of the SNMP user that is authorized to receive the SNMP notification.
Notify Type	The type of SNMP notification to send the SNMP management host: ■ Trap: An SNMP message that notifies the host when a certain event has occurred on the device. The message is not acknowledged by the SNMP management host. ■ Inform: An SNMP message that notifies the host when a certain event has occurred on the device. The message is acknowledged by the SNMP management host.
Security Level	The security level associated with the SNMP user, which is one of the following: ■ No Auth No Priv: No authentication and no data encryption (no security). ■ Auth No Priv: Authentication, but no data encryption. With this security level, users send SNMP messages that use an MD5 key/password for authentication, but not a DES key/password for encryption. ■ Auth Priv: Authentication and data encryption. With this security level, users send an MD5 key/password for authentication and a DES key/password for encryption.
Timeout Value	The number of seconds to wait for an acknowledgment from the SNMP receiver before resending an inform message.
Retries	The number of times to resend an inform message that is not acknowledged by the SNMP receiver.
Filter	The name of the filter for the SNMP management host. The filter is configured by using the CLI and defines which MIB objects to include or exclude from the view. This field is optional.

Item	Description
UDP Port	The UDP port on the SNMP management host that will receive the SNMP notifications. If no value is specified when configuring a receiver, the default UDP port value is used.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new SNMP trap receiver.
Remove	Click **Remove** to remove the selected entries.

To add a new SNMP trap receiver:

Click **System** > **Advanced Configuration** > **SNMP** > **Trap Receiver v3** > **Add**.

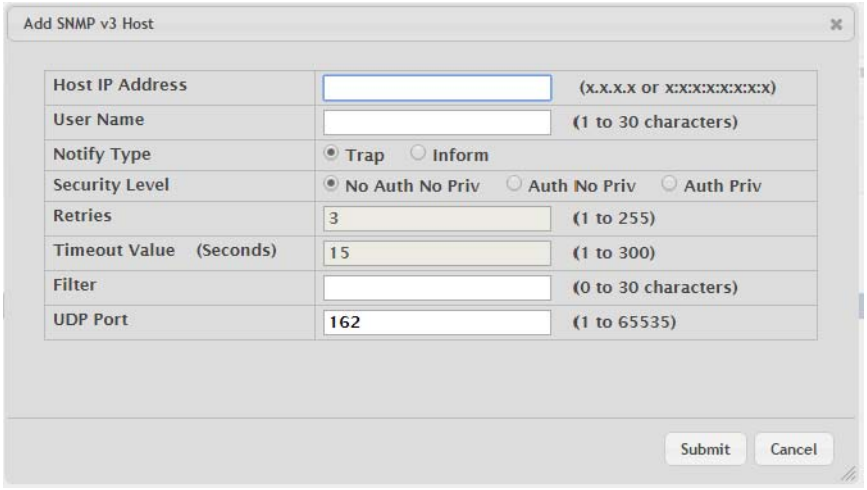


Figure 4.54 System > Advanced Configuration > SNMP > Trap Receiver v3 > Add

The following table describes the items in the previous figure.

Item	Description
Host IP Address	The IP address of the SNMP management host that will receive traps generated by the device.
User Name	The name of the SNMP user that is authorized to receive the SNMP notification.
Notify Type	The type of SNMP notification to send the SNMP management host: ■ Inform: An SNMP message that notifies the host when a certain event has occurred on the device. The message is acknowledged by the SNMP management host. ■ Trap: An SNMP message that notifies the host when a certain event has occurred on the device. The message is not acknowledged by the SNMP management host.
Security Level	The security level associated with the SNMP user, which is one of the following: ■ No Auth No Priv: No authentication and no data encryption (no security). ■ Auth No Priv: Authentication, but no data encryption. With this security level, users send SNMP messages that use an MD5 key/password for authentication, but not a DES key/password for encryption. ■ Auth Priv: Authentication and data encryption. With this security level, users send an MD5 key/password for authentication and a DES key/password for encryption.
Retries	The number of times to resend an inform message that is not acknowledged by the SNMP receiver.

Item	Description
Timeout Value (Seconds)	The number of seconds to wait for an acknowledgment from the SNMP receiver before resending an inform message.
Filter	The name of the filter for the SNMP management host. The filter is configured by using the CLI and defines which MIB objects to include or exclude from the view. This field is optional.
UDP Port	The UDP port on the SNMP management host that will receive the SNMP notifications. If no value is specified when configuring a receiver, the default UDP port value is used.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Supported MIBs

The SNMP Supported MIBs page lists the MIBs that the system currently supports.

To access this page, click **System** > **Advanced Configuration** > **SNMP** > **Supported MIBs**.

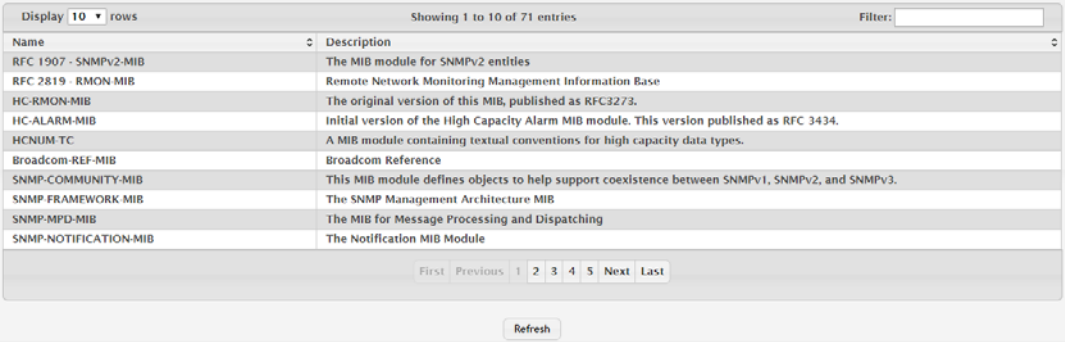


Figure 4.55 System > Advanced Configuration > SNMP > Supported MIBs

The following table describes the items in the previous figure.

Item	Description
Name	The RFC number, if applicable, followed by the defined name of the MIB.
Description	The RFC title, or a brief description of the MIB.
Refresh	Click **Refresh** to update the screen.

Access Control Group

Use the SNMP Access Control Group page to configure SNMP access control groups. These SNMP groups allow network managers to assign different levels of authorization and access rights to specific device features and their attributes. The SNMP group can be referenced by the SNMP community to provide security and context for agents receiving requests and initiating traps as well as for management systems and their tasks. An SNMP agent will not respond to a request from a management system outside of its configured group, but an agent can be a member of multiple groups at the same time to allow communication with SNMP managers from different groups. Several default SNMP groups are preconfigured on the system.

To access this page, click **System** > **Advanced Configuration** > **SNMP** > **Access Control Group**.

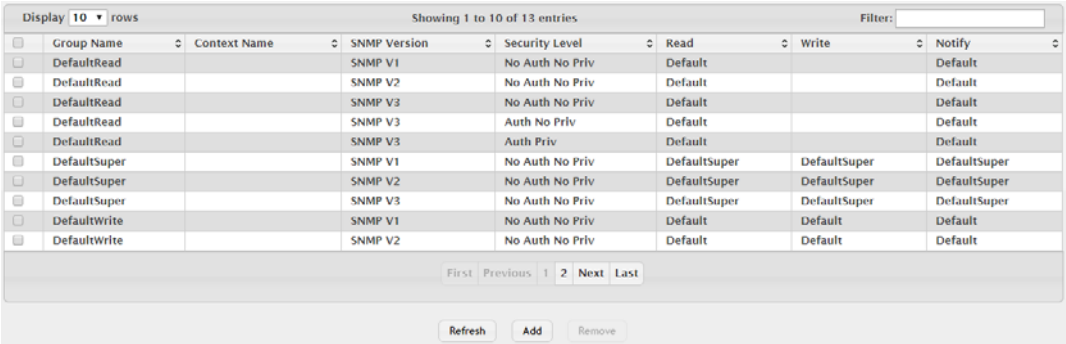


Figure 4.56 System > Advanced Configuration > SNMP > Access Control Group

The following table describes the items in the previous figure.

Item	Description
Group Name	The name that identifies the SNMP group.
Context Name	The SNMP context associated with the SNMP group and its views. A user or a management application specifies the context name to get the performance information from the MIB objects associated with that context name. The Context EngineID identifies the SNMP entity that should process the request (the physical router), and the Context Name tells the agent in which context it should search for the objects requested by the user or the management application.
SNMP Version	The SNMP version associated with the group.
Security Level	The security level associated with the group, which is one of the following: ■ No Auth No Priv: No authentication and no data encryption (no security). This is the only Security Level available for SNMPv1 and SNMPv2 groups. ■ Auth No Priv: Authentication, but no data encryption. With this security level, users send SNMP messages that use an MD5 key/password for authentication, but not a DES key/password for encryption. ■ Auth Priv: Authentication and data encryption. With this security level, users send an MD5 key/password for authentication and a DES key/password for encryption.
Read	The level of read access rights for the group. The menu includes the available SNMP views. When adding a group, select the check box to allow the field to be configured, then select the desired view that restricts management access to viewing the contents of the agent.
Write	The level of write access rights for the group. The menu includes the available SNMP views. When adding a group, select the check box to allow the field to be configured, then select the desired view that permits management read-write access to the contents of the agent but not to the community.
Notify	The level of notify access rights for the group. The menu includes the available SNMP views. When adding a group, select the check box to allow the field to be configured, then select the desired view that permits sending SNMP traps or informs.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new access control group.
Remove	Click **Remove** to remove the selected entries.

To add a new access control group:

Click **System** > **Advanced Configuration** > **SNMP** > **Access Control Group** > **Add**.

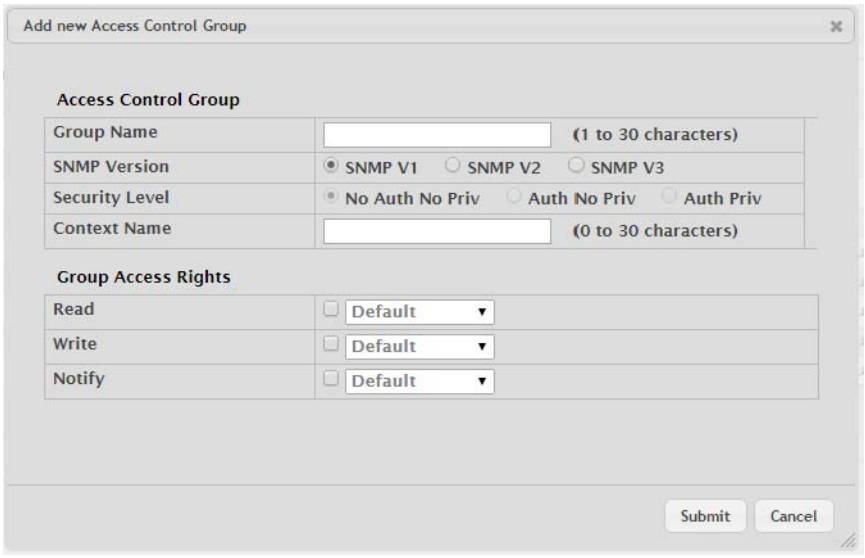


Figure 4.57 System > Advanced Configuration > SNMP > Access Control Group > Add

The following table describes the items in the previous figure.

Item	Description
Access Control Group	
Group Name	The name that identifies the SNMP group.
SNMP Version	The SNMP version associated with the group.
Security Level	The security level associated with the group, which is one of the following: ■ No Auth No Priv: No authentication and no data encryption (no security). This is the only Security Level available for SNMPv1 and SNMPv2 groups. ■ Auth No Priv: Authentication, but no data encryption. With this security level, users send SNMP messages that use an MD5 key/password for authentication, but not a DES key/password for encryption. ■ Auth Priv: Authentication and data encryption. With this security level, users send an MD5 key/password for authentication and a DES key/password for encryption.
Context Name	The SNMP context associated with the SNMP group and its views. A user or a management application specifies the context name to get the performance information from the MIB objects associated with that context name. The Context EngineID identifies the SNMP entity that should process the request (the physical router), and the Context Name tells the agent in which context it should search for the objects requested by the user or the management application.
Group Access Rights	
Read	The level of read access rights for the group. The menu includes the available SNMP views. When adding a group, select the check box to allow the field to be configured, then select the desired view that restricts management access to viewing the contents of the agent.

Item	Description
Write	The level of write access rights for the group. The menu includes the available SNMP views. When adding a group, select the check box to allow the field to be configured, then select the desired view that permits management read-write access to the contents of the agent but not to the community.
Notify	The level of notify access rights for the group. The menu includes the available SNMP views. When adding a group, select the check box to allow the field to be configured, then select the desired view that permits sending SNMP traps or informs.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

User Security Model

The SNMP User Security Model page provides the capability to configure the SNMP V3 user accounts.

To access this page, click **System** > **Advanced Configuration** > **SNMP** > **User Security Model**.

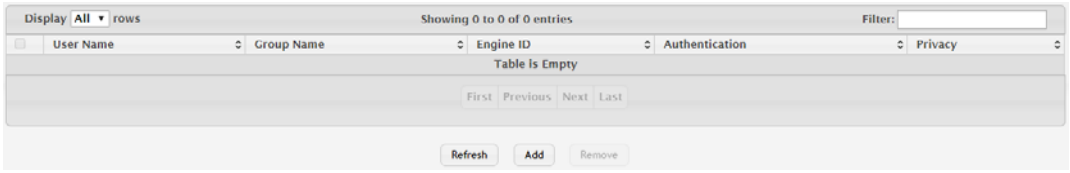


Figure 4.58 System > Advanced Configuration > SNMP > User Security Model

The following table describes the items in the previous figure.

Item	Description
User Name	Specifies the name of the SNMP user being added for the User-based Security Model (USM). Each user name must be unique within the SNMP agent user list. A user name cannot contain any leading or embedded blanks.
Group Name	A SNMP group is a group to which hosts running the SNMP service belong. A group name parameter is simply the name of that group by which SNMP communities are identified. The use of a group name provides some security and context for agents receiving requests and initiating traps and does the same for management systems and their tasks. An SNMP agent won't respond to a request from a management system outside its configured group, but an agent can be a member of multiple groups at the same time. This allows for communications with SNMP managers from different groups.
Engine ID	Each SNMPv3 agent has an engine ID that uniquely identifies the agent in the device. If given this entry will be used only for packets whose engine id is this. This field takes an hexadecimal string in the form 0102030405.
Authentication	Specifies the authentication protocol to be used on authenticated messages on behalf of the specified user. ■ SHA: SHA protocol will be used. ■ MD5: MD5 protocol will be used. ■ None: No authentication will be used for this user.
Privacy	Specifies the privacy protocol to be used on encrypted messages on behalf of the specified user. This parameter is only valid if the Authentication method parameter is not NONE. ■ DES: DES protocol will be used. ■ None: No privacy protocol will be used.

Item	Description
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new SNMP user.
Remove	Click **Remove** to remove the selected entries.

To add a new SNMP user:

Click **System** > **Advanced Configuration** > **SNMP** > **User Security Model** > **Add**.

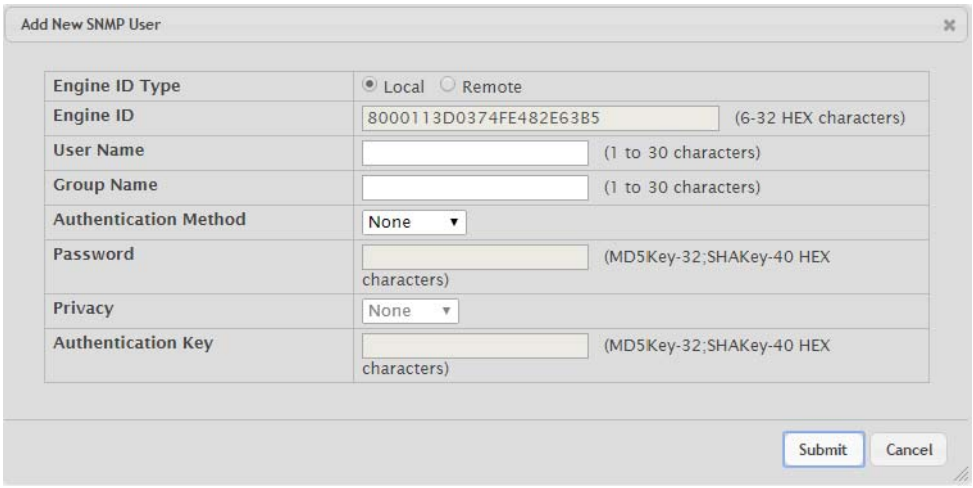


Figure 4.59 System > Advanced Configuration > SNMP > User Security Model > Add

The following table describes the items in the previous figure.

Item	Description
Engine ID Type	Specifies the engine ID type to be used. ■ Local ■ Remote
Engine ID	Each SNMPv3 agent has an engine ID that uniquely identifies the agent in the device. If given this entry will be used only for packets whose engine id is this. This field takes an hexadecimal string in the form 0102030405.
User Name	Specifies the name of the SNMP user being added for the User-based Security Model (USM). Each user name must be unique within the SNMP agent user list. A user name cannot contain any leading or embedded blanks.
Group Name	A SNMP group is a group to which hosts running the SNMP service belong. A group name parameter is simply the name of that group by which SNMP communities are identified. The use of a group name provides some security and context for agents receiving requests and initiating traps and does the same for management systems and their tasks. An SNMP agent won't respond to a request from a management system outside its configured group, but an agent can be a member of multiple groups at the same time. This allows for communications with SNMP managers from different groups.
Authentication Method	Specifies the authentication protocol to be used on authenticated messages on behalf of the specified user. ■ SHA: SHA protocol will be used. ■ MD5: MD5 protocol will be used. ■ None: No authentication will be used for this user.
Password	Specifies the password used to generate the key to be used in authenticating messages on behalf of this user. This parameter must be specified if the Authentication method parameter is not NONE.

Item	Description
Privacy	Specifies the privacy protocol to be used on encrypted messages on behalf of the specified user. This parameter is only valid if the Authentication method parameter is not NONE. ■ DES: DES protocol will be used. ■ None: No privacy protocol will be used.
Authentication Key	Specifies the password used to generate the key to be used in encrypting messages to and from this user. This parameter must be specified if the Privacy parameter is not NONE.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Source Interface Configuration

Use the SNMP Trap Source Interface Configuration page to specify the physical or logical interface to use as the SNMP client source interface. When an IP address is configured on the source interface, this address is used for all SNMP communications between the local SNMP client and the remote SNMP server. The IP address of the designated source interface is used in the IP header of SNMP management protocol packets. This allows security devices, such as firewalls, to identify all source packets coming from a specific device.

To access this page, click **System** > **Advanced Configuration** > **SNMP** > **Source Interface Configuration**.

Figure 4.60 System > Advanced Configuration > SNMP > Source Interface Configuration

The following table describes the items in the previous figure.

Item	Description
Type	The type of interface to use as the source interface: ■ None: The primary IP address of the originating (outbound) interface is used as the source address. ■ Interface: The primary IP address of a physical port is used as the source address. ■ VLAN: The primary IP address of a VLAN routing interface is used as the source address.
Interface	When the selected Type is Interface, select the physical port to use as the source interface.
VLAN ID	When the selected Type is VLAN, select the VLAN to use as the source interface. The menu contains only the VLAN IDs for VLAN routing interfaces.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

Server Configuration

Use the SNMP Server Configuration page to view and modify the SNMP Server settings on the device. A user having sufficient privilege level may change the values shown on this page.

To access this page, click **System** > **Advanced Configuration** > **SNMP** > **Server Configuration**.

Figure 4.61 System > Advanced Configuration > SNMP > Server Configuration

The following table describes the items in the previous figure.

Item	Description
SNMP Server Port	The UDP port number on which the SNMP server listens for requests. Changing this value may cause existing SNMP transactions to cease communicating with the device until the client applications are reconfigured to use the new port number.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.2.9 SNTP

Global Configuration

Use the SNTP Global Configuration page to view and adjust SNTP parameters.

To access this page, click **System** > **Advanced Configuration** > **SNTP** > **Global Configuration**.

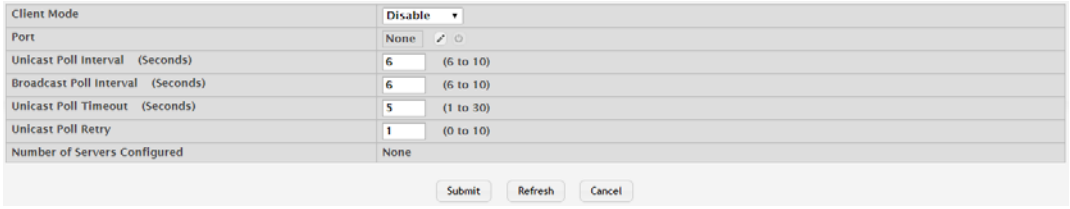


Figure 4.62 System > Advanced Configuration > SNTP > Global Configuration

The following table describes the items in the previous figure.

Item	Description
Client Mode	Specifies the mode of operation of SNTP Client. An SNTP client may operate in one of the following modes: ■ Disable: SNTP is not operational. No SNTP requests are sent from the client nor are any received SNTP messages processed. ■ Unicast: SNTP operates in a point-to-point fashion. A unicast client sends a request to a designated server at its unicast address and expects a reply from which it can determine the time and, optionally the round-trip delay and local clock offset relative to the server. ■ Broadcast: SNTP operates in the same manner as multicast mode but uses a local broadcast address instead of a multicast address. The broadcast address has a single subnet scope while a multicast address has Internet wide scope.
Port	Specifies the local UDP port to listen for responses/broadcasts.
Unicast Poll Interval (Seconds)	Specifies the interval, in seconds, between unicast poll requests expressed as a power of two when configured in unicast mode.
Broadcast Poll Interval (Seconds)	Specifies the interval, in seconds, between broadcast poll requests expressed as a power of two when configured in broadcast mode. Broadcasts received prior to the expiry of this interval are discarded.

Item	Description
Unicast Poll Timeout (Seconds)	Specifies the timeout value, in seconds, to wait for an SNTP response when configured in unicast mode.
Unicast Poll Retry	Specifies the number of times to retry a request to an SNTP server after the first time-out before attempting to use the next configured server when configured in unicast mode.
Number of Servers Configured	Specifies the number of current valid unicast server entries configured for this client.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

Global Status

Use the SNTP Global Status page to view information about the system's SNTP client.

To access this page, click **System** > **Advanced Configuration** > **SNTP** > **Global Status**.

Figure 4.63 System > Advanced Configuration > SNTP > Global Status

The following table describes the items in the previous figure.

Item	Description
Version	Specifies the SNTP version the client supports.
Supported Mode	Specifies the SNTP modes the client supports. A single client can support multiple modes.
Last Update Time	Specifies the local date and time (UTC) when the SNTP client last updated the system clock.
Last Attempt Time	Specifies the local date and time (UTC) of the last SNTP request or receipt of an unsolicited message.

Item	Description
Last Attempt Status	Specifies the status of the last SNTP request or unsolicited message for both unicast and broadcast modes. If no message has been received from a server, a status of Other is displayed. These values are appropriate for all operational modes. ■ Other: None of the following values apply, or no message has been received. ■ Success: The SNTP operation was successful, and the system time was updated. ■ Request Timed Out: A directed SNTP request timed out without receiving a response from the SNTP server. ■ Bad Date Encoded: The time provided by the SNTP server is not valid. ■ Version Not Supported: The SNTP version supported by the server is not compatible with the version supported by the client. ■ Server Unsynchronized: The SNTP server is not synchronized with its peers. This is indicated via the leap indicator field on the SNTP message. ■ Server Kiss Of Death: The SNTP server indicated that no further queries were to be sent to this server. This is indicated by a stratum field equal to 0 in a message received from a server.
Server IP Address	Specifies the IP address or hostname of the server for the last received valid packet. If no message has been received from any server, an empty string is shown.
Address Type	Specifies the address type (IP address or DNS hostname) of the SNTP server for the last received valid packet.
Server Stratum	Specifies the claimed stratum of the server for the last received valid packet. Stratums define the accuracy of the reference clock. The higher the stratum (where zero is the highest), the more accurate the clock.
Reference Clock ID	Specifies the reference clock identifier of the server for the last received valid packet.
Server Mode	Specifies the mode of the server for the last received valid packet.
Unicast Server Max Entries	Specifies the maximum number of unicast server entries that can be configured on this client.
Unicast Server Current Entries	Specifies the number of current valid unicast server entries configured for this client.
Broadcast Count	Specifies the number of unsolicited broadcast SNTP messages that have been received and processed by the SNTP client since the last reboot.
Refresh	Click **Refresh** to update the screen.

Server Configuration

Use the SNTP Server Configuration page to view and modify information for adding and modifying Simple Network Time Protocol SNTP servers.

To access this page, click **System** > **Advanced Configuration** > **SNTP** > **Server Configuration**.

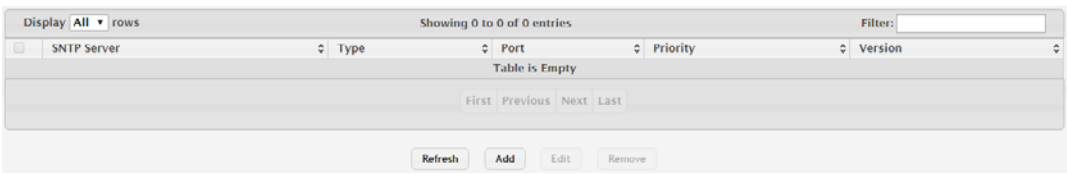


Figure 4.64 System > Advanced Configuration > SNTP > Server Configuration

The following table describes the items in the previous figure.

Item	Description
SNTP Server	The address or host name of an SNTP server the device can use to synchronize the system time.
Type	The configured SNTP server address type, which can be IPv4, IPv6, or DNS.
Port	The UDP port on the server to which SNTP requests are sent.
Priority	The order in which to query the servers. The SNTP client on the device continues sending SNTP requests to different servers until a successful response is received or all servers are exhausted. A server entry with a lower priority value is queried before one with a higher priority. If more than one server has the same priority, the SNTP client contacts the servers in the order that they appear in the table.
Version	Specifies the NTP version running on the server.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new SNTP server.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new SNTP server:

Click **System** > **Advanced Configuration** > **SNTP** > **Server Configuration** > **Add**.

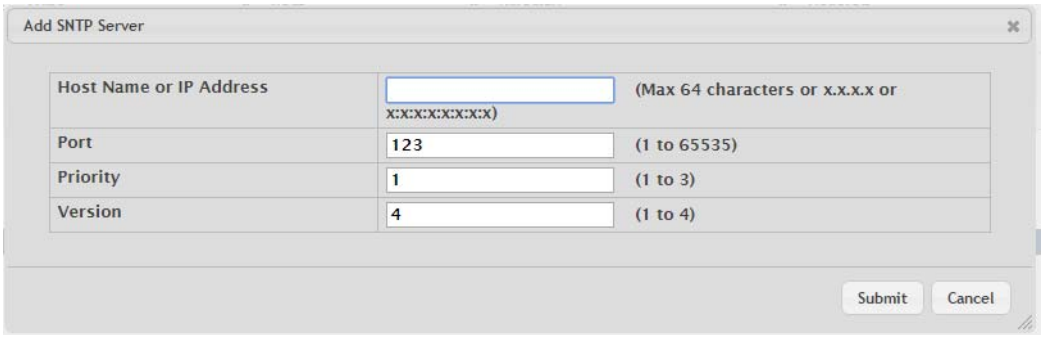


Figure 4.65 System > Advanced Configuration > SNTP > Server Configuration > Add

The following table describes the items in the previous figure.

Item	Description
Host Name or IP Address	Specify the IPv4 address, IPv6 address, or DNS-resolvable host name of the SNTP server. Unicast SNTP requests will be sent to this address. The address you enter is displayed in the SNTP Server field on the main page. The address type is automatically detected.
Port	The UDP port on the server to which SNTP requests are sent.
Priority	The order in which to query the servers. The SNTP client on the device continues sending SNTP requests to different servers until a successful response is received or all servers are exhausted. A server entry with a lower priority value is queried before one with a higher priority. If more than one server has the same priority, the SNTP client contacts the servers in the order that they appear in the table.
Version	Specifies the NTP version running on the server.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Server Status

The SNTP Server Status page displays status information about the SNTP servers configured on your switch.

To access this page, click **System** > **Advanced Configuration** > **SNTP** > **Server Status**.

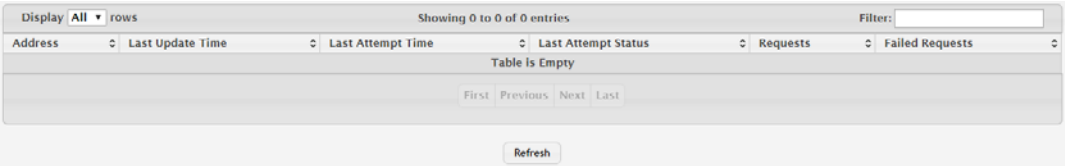


Figure 4.66 System > Advanced Configuration > SNTP > Server Status

The following table describes the items in the previous figure.

Item	Description
Address	The hostname or IP address for each SNTP server that has been configured.
Last Update Time	The local date and time (UTC) included in the response from this server that was used to update the system clock.
Last Attempt Time	Specifies the local date and time (UTC) that this SNTP server was last queried.
Last Attempt Status	Specifies the status of the last SNTP request to this server. If no packet has been received from this server, a status of Other is displayed. ■ Other: None of the following values apply, or no message has been received. ■ Success: The SNTP operation was successful, and the system time was updated. ■ Request Timed Out: A directed SNTP request timed out without receiving a response from the SNTP server. ■ Bad Date Encoded: The time provided by the SNTP server is not valid. ■ Version Not Supported: The SNTP version supported by the server is not compatible with the version supported by the client. ■ Server Unsynchronized: The SNTP server is not synchronized with its peers. This is indicated via the leap indicator field on the SNTP message. ■ Server Kiss Of Death: The SNTP server indicated that no further queries were to be sent to this server. This is indicated by a stratum field equal to 0 in a message received from a server.
Requests	Specifies the number of SNTP requests made to this server since the system was last reset.
Failed Requests	Specifies the number of failed SNTP requests made to this server since the system was last reset.
Refresh	Click **Refresh** to update the screen.

Source Interface Configuration

Use the SNTP Source Interface Configuration page to specify the physical or logical interface to use as the SNTP client source interface. When an IP address is configured on the source interface, this address is used for all SNTP communications between the local SNTP client and the remote SNTP server. The IP address of the designated source interface is used in the IP header of SNTP management protocol packets. This allows security devices, such as firewalls, to identify all source packets coming from a specific device.

To access this page, click **System** > **Advanced Configuration** > **SNTP** > **Source Interface Configuration**.

Figure 4.67 System > Advanced Configuration > SNTP > Source Interface Configuration

The following table describes the items in the previous figure.

Item	Description
Type	The type of interface to use as the source interface: ■ None: The primary IP address of the originating (outbound) interface is used as the source address. ■ Interface: The primary IP address of a physical port is used as the source address. ■ VLAN: The primary IP address of a VLAN routing interface is used as the source address.
Interface	When the selected Type is Interface, select the physical port to use as the source interface.
VLAN ID	When the selected Type is VLAN, select the VLAN to use as the source interface. The menu contains only the VLAN IDs for VLAN routing interfaces.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.2.10 Time Ranges

You can use these pages to configure time ranges to use in time-based access control list (ACL) rules. Time- based ACLs allow one or more rules within an ACL to be based on a periodic or absolute time. Each ACL rule within an ACL except for the implicit deny all rule can be configured to be active and operational only during a specific time period. The time range pages allow you to define specific times of the day and week in order to implement time-based ACLs. The time range is identified by a name and can then be referenced by an ACL rule defined with in an ACL.

Configuration

Use the Time Range Summary page to create a named time range. Each time range can consist of one absolute time entry and/or one or more periodic time entries.

To access this page, click **System** > **Advanced Configuration** > **Time Ranges** > **Configuration**.

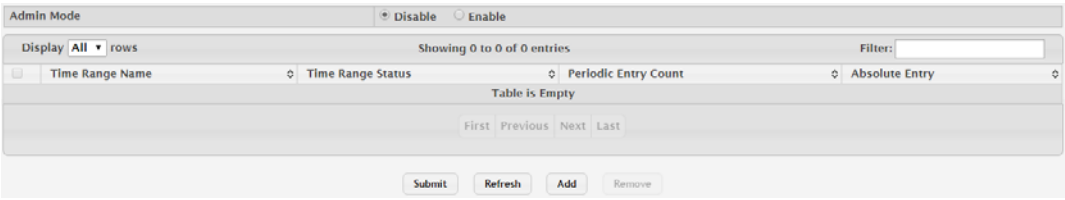


Figure 4.68 System > Advanced Configuration > Time Ranges > Configuration

The following table describes the items in the previous figure.

Item	Description
Admin Mode	Enables or disables the Time Range administrative mode. When enabled, actions with subscribed components are performed for existing time range entries.
Time Range Name	The unique ID or name that identifies this time range. A time-based ACL rule can reference the name configured in this field.
Time Range Status	Shows whether the time range is Active or Inactive. A time range is Inactive if the current day and time do not fall within any time range entries configured for the time range.
Periodic Entry Count	The number of periodic time range entries currently configured for the time range.
Absolute Entry	Shows whether an absolute time entry is currently configured for the time range.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new time range.
Remove	Click **Remove** to remove the selected entries.

To add a new authentication list:

Click **System** > **Advanced Configuration** > **Time Ranges** > **Configuration** > **Add**.

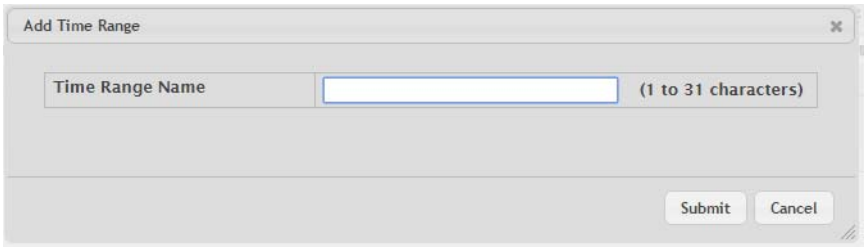


Figure 4.69 System > Advanced Configuration > Time Ranges > Configuration > Add

The following table describes the items in the previous figure.

Item	Description
Time Range Name	The unique ID or name that identifies this time range. A time-based ACL rule can reference the name configured in this field.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Entry Configuration

Use the Time Range Entry Summary page to configure entries in an existing time range configuration. Each time range configuration can have multiple Periodic entries but only one Absolute entry. A Periodic entry occurs at the same time every day or on one or more days of the week. An Absolute entry does not repeat. The start and end times for entries are based on a 24-hour clock. For example, 6:00 PM is 18:00.

Note! *The time range entries use the system time for the time periods in which they take effect. Make sure you configure the SNTP server settings so that the SNTP client on the switch can obtain the correct date and time from the server.*

To access this page, click **System** > **Advanced Configuration** > **Time Ranges** > **Entry Configuration**.

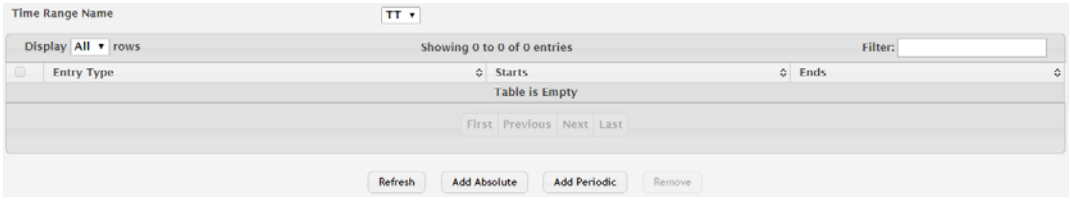


Figure 4.70 System > Advanced Configuration > Time Ranges > Entry Configuration

The following table describes the items in the previous figure.

Item	Description
Time Range Name	Click the drop-down menu to select a time range.
Entry Type	The type of time range entry, which is one of the following: ■ Absolute: Occurs once or has an undefined start or end period. The duration of an Absolute entry can be hours, days, or even years. Each time entry configuration can have only one Absolute entry. ■ Periodic: Recurring entry that takes place at fixed intervals. This type of entry occurs at the same time on one or more days of the week.
Starts	For an Absolute entry, indicates the time, day, month, and year that the entry begins. If this field is blank, the Absolute entry became active when it was configured. For a Periodic entry, indicates the time and day(s) of the week that the entry begins.
Ends	For an Absolute entry, indicates the time, day, month, and year that the entry ends. If this field is blank, the Absolute entry does not have a defined end. For a Periodic entry, indicates the time and day(s) of the week that the entry ends.
Refresh	Click **Refresh** to update the screen.
Add Absolute	Click **Add Absolute** to add a new absolute time range.
Add Periodic	Click **Add Periodic** to add a new periodic time range.
Remove	Click **Remove** to remove the selected entries.

To add a new absolute time range:

Click **System** > **Advanced Configuration** > **Time Ranges** > **Entry Configuration** > **Add Absolute**.

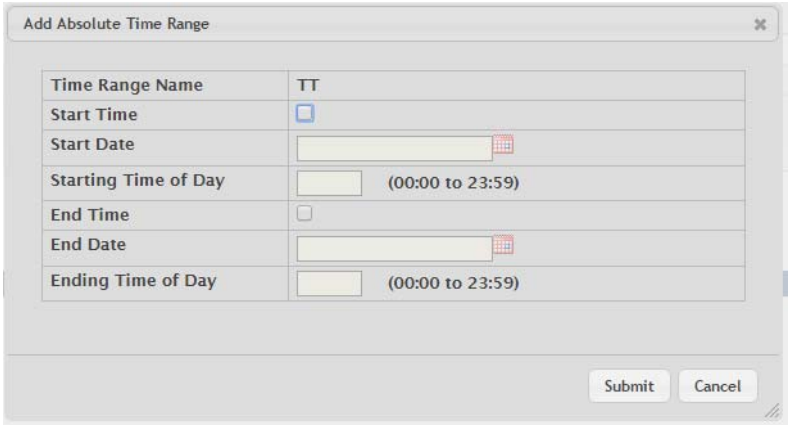


Figure 4.71 System > Advanced Configuration > Time Ranges > Entry Configuration > Add Absolute

The following table describes the items in the previous figure.

Item	Description
Time Range Name	The time range configuration that will include the Absolute time range entry.
Start Time	Select this option to configure values for the Start Date and the Starting Time of Day. If this option is not selected, the entry becomes active immediately.
Start Date	Click the calendar icon to select the day, month, and year when this entry becomes active. This field can be configured only if the Start Time option is selected.
Starting Time of Day	Specify the time of day that the entry becomes active by entering the information in the field or by using the scroll bar in the Choose Time window. Click Now to use the current time of day. Click Done to close the Choose Time window. This field can be configured only if the Start Time option is selected.
End Time	Select this option to configure values for the End Date and the Ending Time of Day. If this option is not selected, the entry does not have an end time; after the configured Start Time begins, the entry will remain active indefinitely.
End Date	Click the calendar icon to select the day, month, and year when this entry should no longer be active. This field can be configured only if the End Time option is selected.
Ending Time of Day	Specify the time of day that the entry becomes inactive by entering the information in the field or by using the scroll bar in the Choose Time window. Click **Now** to use the current time of day. Click **Done** to close the Choose Time window. This field can be configured only if the End Time option is selected.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

To add a new periodic time range:

Click **System** > **Advanced Configuration** > **Time Ranges** > **Entry Configuration** > **Add Periodic**.

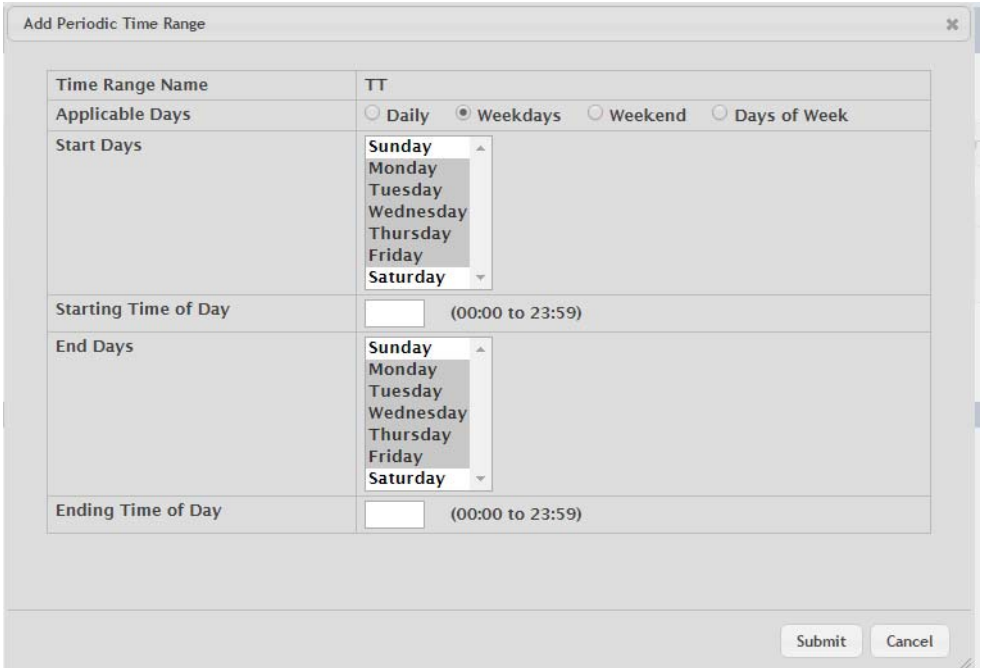


Figure 4.72 System > Advanced Configuration > Time Ranges > Entry Configuration > Add Periodic

The following table describes the items in the previous figure.

Item	Description
Time Range Name	The time range configuration that will include the Periodic time range entry.
Applicable Days	Select the days on which the Periodic time range entry is active: ■ Daily: Every day of the week ■ Weekdays: Monday through Friday ■ Weekend: Saturday and Sunday ■ Days of Week: User-defined start days
Start Days	Indicates on which days the time entry becomes active. If the selected option in the Applicable Days field is Days of Week, select one or more days on which the entry becomes active. To select multiple days, hold the CTRL key and select each desired start day.
Starting Time of Day	Specify the time of day that the entry becomes active by entering the information in the field or by using the scroll bar in the Choose Time window. Click Now to use the current time of day. Click Done to close the Choose Time window.
End Days	Indicates on which days the time entry ends. If the selected option in the Applicable Days field is Days of Week, select one or more days on which the entry ends. To select multiple days, hold the CTRL key and select each desired end day.
Ending Time of Day	Specify the time of day that the entry becomes inactive by entering the information in the field or by using the scroll bar in the Choose Time window. Click Now to use the current time of day. Click Done to close the Choose Time window.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.3.2.11 Time Zone

Summary

The Time Zone Summary page displays information about the current system time, the time zone, and the daylight saving time (also known as summer time) settings configured on the device.

To access this page, click **System** > **Advanced Configuration** > **Time Zone** > **Summary**.

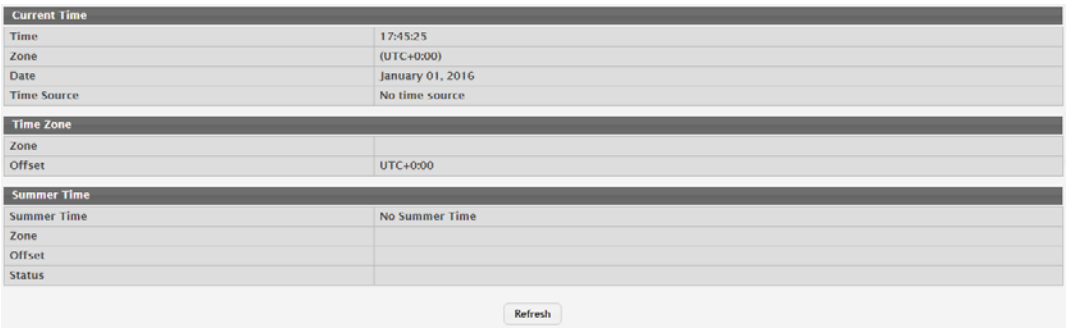


Figure 4.73 System > Advanced Configuration > Time Zone > Summary

The following table describes the items in the previous figure.

Item	Description
Current Time	
Time	The current time on the system clock. This time is used to provide time stamps on log messages. Additionally, some CLI show commands include the time in the command output.
Zone	The acronym that represents the time zone.
Date	The current date on the system.
Time Source	The time source from which the time update is taken: ■ SNTP: The time has been acquired from an SNTP server. ■ No Time Source: The time has either been manually configured or not configured at all.
Time Zone	
Zone	The acronym that represents the time zone.
Offset	The number of hours offset from Coordinated Universal Time (UTC), which is also known as Greenwich Mean Time (GMT).
Summer Time	
Summer Time	The summer time mode on the system: ■ Disable: Summer time is not active, and the time does not shift based on the time of year. ■ Recurring: Summer time occurs at the same time every year. The start and end times and dates for the time shift must be manually configured. ■ EU: The system clock uses the standard recurring summer time settings used in countries in the European Union. When this field is selected, the rest of the applicable fields on the page except Offset and Zone are automatically populated and cannot be edited. ■ USA: The system clock uses the standard recurring daylight saving time settings used in the United States. When this field is selected, the rest of the applicable fields on the page except Offset and Zone are automatically populated and cannot be edited. ■ Non-Recurring: Summer time settings are in effect only between the start date and end date of the specified year. When this mode is selected, the summer time settings do not repeat on an annual basis.
Zone	The acronym that represents the time zone of the summer time.
Offset	The number of hours offset from Coordinated Universal Time (UTC), which is also known as Greenwich Mean Time (GMT).
Status	Indicates if summer time is currently active.
Refresh	Click **Refresh** to update the screen.

Time Zone

Use the Time Zone Configuration page to manually configure the system clock settings. The SNTP client must be disabled to allow manual configuration of the system time and date.

To access this page, click **System** > **Advanced Configuration** > **Time Zone** > **Time Zone**.

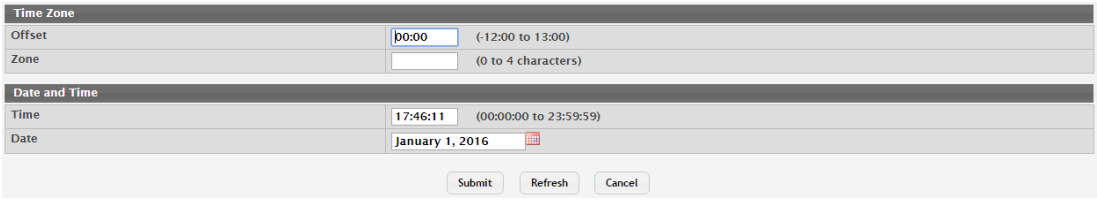


Figure 4.74 System > Advanced Configuration > Time Zone > Time Zone

The following table describes the items in the previous figure.

Item	Description
Time Zone	
Offset	The system clock's offset from UTC, which is also known as Greenwich Mean Time (GMT).
Zone	The acronym that represents the time zone. This field is not validated against an official list of time zone acronyms.
Date and Time	
Time	The current time in hours, minutes, and seconds on the system clock.
Date	The current date in month, day, and year on the system clock. To change the date, click the calendar icon to the right of the field, select the year from the menu, browse to the desired month, and click the date.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

Summer Time

Use the Summer Time Configuration page to configure settings for summer time, which is also known as daylight saving time. Used in some countries around the world, summer time is the practice of temporarily advancing clocks during the summer months. Typically clocks are adjusted forward one or more hours near the start of spring and are adjusted backward in autumn.

To access this page, click **System** > **Advanced Configuration** > **Time Zone** > **Summer Time**.

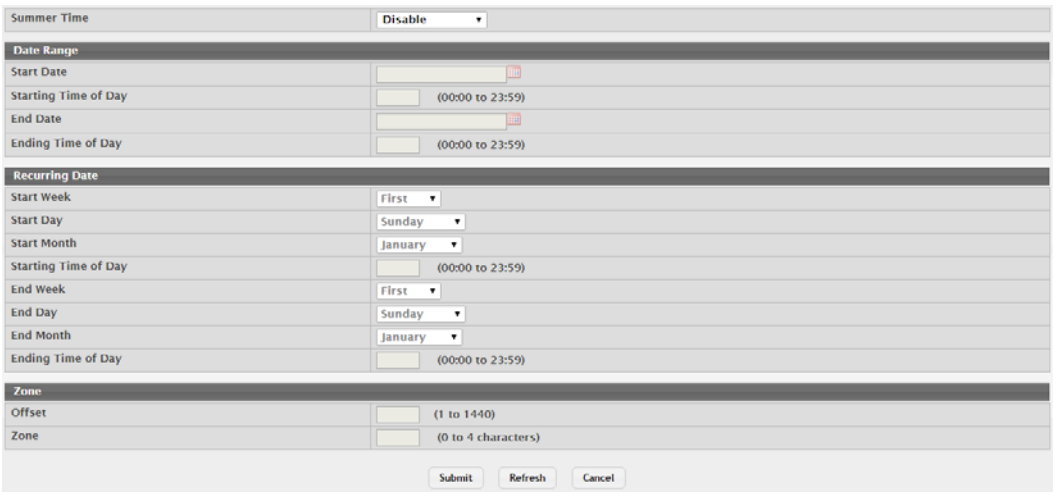


Figure 4.75 System > Advanced Configuration > Time Zone > Summer Time

The following table describes the items in the previous figure.

Item	Description
Summer Time	The summer time mode on the system: ■ Disable: Summer time is not active, and the time does not shift based on the time of year. ■ Recurring: Summer time occurs at the same time every year. The start and end times and dates for the time shift must be manually configured. ■ EU: The system clock uses the standard recurring summer time settings used in countries in the European Union. When this field is selected, the rest of the applicable fields on the page except Offset and Zone are automatically populated and cannot be edited. ■ USA: The system clock uses the standard recurring daylight saving time settings used in the United States. When this field is selected, the rest of the applicable fields on the page except Offset and Zone are automatically populated and cannot be edited. ■ Non-Recurring: Summer time settings are in effect only between the start date and end date of the specified year. When this mode is selected, the summer time settings do not repeat on an annual basis.
Date Range	
Start Date	The day, month, and year that summer time begins. To change the date, click the calendar icon to the right of the field, select the year from the menu, browse to the desired month, and click the date.
Starting Time of Day	The time, in hours and minutes, to start summer time on the specified day.
End Date	The day, month, and year that summer time ends. To change the date, click the calendar icon to the right of the field, select the year from the menu, browse to the desired month, and click the date.
Ending Time of Day	The time, in hours and minutes to end summer time on the specified day.
Recurring Date	
Start Week	The week of the month within which summer time begins.
Start Day	The day of the week on which summer time begins.
Start Month	The month of the year within which summer time begins.
Starting Time of Day	The time, in hours and minutes, to start summer time.
End Week	The week of the month within which summer time ends.
End Day	The day of the week on which summer time ends.
End Month	The month of the year within which summer time ends.
Ending Time of Day	The time, in hours and minutes, to end summer time.
Zone	
Offset	The number of minutes to shift the summer time from the standard time.
Zone	The acronym associated with the time zone when summer time is in effect.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.2.12 Event Manager

The pages in the Event Manager folder allow you to view and configure information about alarm LED, alarm relay, alarm relay2, logs, Email and SNMP traps the system generates.

Alarm Status

Use the Alarm Status page to view the current alarm status for alarm LED, alarm relay and alarm relay2.

To access this page, click **System** > **Advanced Configuration** > **Event Manager** > **Alarm Status**.

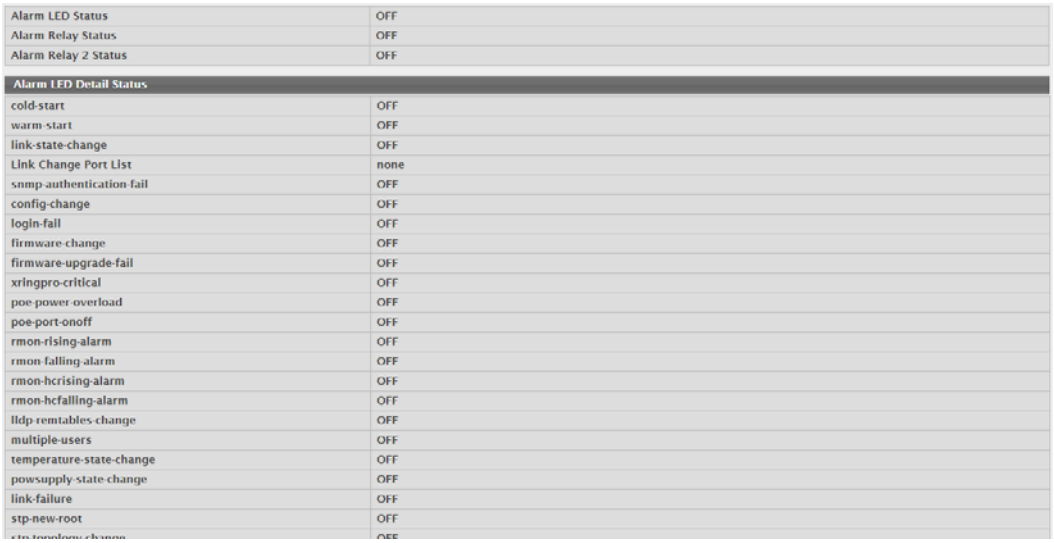


Figure 4.76 System > Advanced Configuration > Event Manager > Alarm Status

The following table describes the items in the previous figure.

Item	Description
Alarm LED Status	The current status of alarm LED. The LED status can be off, on or blinking.
Alarm Relay Status	The current status of alarm relay. The relay status can be off or on.
Alarm Relay 2 Status	The current status of alarm relay 2. The relay status can be off or on.
Refresh	Click **Refresh** to update the screen.
Clear Alarm Status	Click **Clear Alarm Status** to clear the current alarm from alarm LED, alarm relay and alarm relay2.

Trap Log

Use the System Trap Log page to view the entries in the trap log.

To access this page, click **System** > **Advanced Configuration** > **Event Manager** > **Trap Log**.

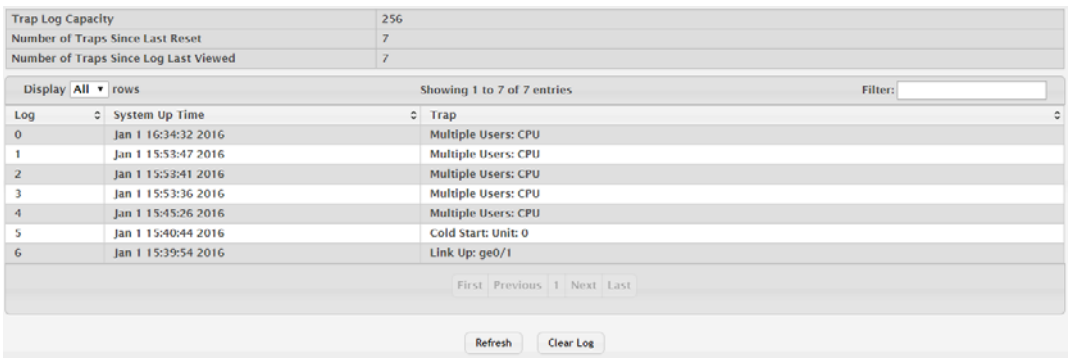


Figure 4.77 System > Advanced Configuration > Event Manager > Trap Log

The following table describes the items in the previous figure.

Item	Description
Trap Log Capacity	The maximum number of traps the log can store. If the number of traps exceeds the capacity, new entries overwrite the oldest entries.
Number of Traps Since Last Reset	The number of traps the system has generated since the trap log entries were last cleared, either by clicking **Clear Log** or by resetting the system.
Number of Traps Since Log Last Viewed	The number of traps the system has generated since the traps were last displayed. Displaying the traps by any available method (for example, uploading the file from the switch or viewing the logs from a terminal interface) will cause this counter to be reset to 0.
Log	The sequence number of this trap.
System Up Time	The time at which this trap occurred, expressed in days, hours, minutes and seconds since the device was last reset.
Trap	Provides information about the trap.
Refresh	Click **Refresh** to update the screen.
Clear Log	Click **Clear Log** to clear the current entries from the log file and resets the counters.

Policy List

Use the Policy List Configuration page to view, create, edit, and remove policy on the device. A policy is a provisioning mechanism that allows event occurs on the device that matches the policy criteria (event) to be received and transmitted only on certain events.

To access this page, click **System** > **Advanced Configuration** > **Event Manager** > **Policy List**.

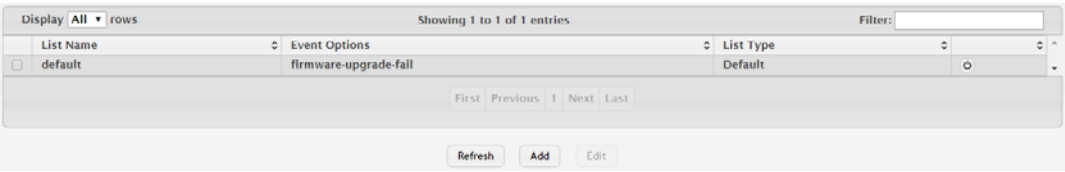


Figure 4.78 System > Advanced Configuration > Event Manager > Policy List

The following table describes the items in the previous figure.

Item	Description
List Name	The name of the policy list. This field can be configured only when adding a new policy list.
Event Options	The method(s) used to decide which events will be applied to event alarm action (Alarm LED, Alarm Relay, Alarm Relay 2, Logging, or Trap).
List Type	The type of list, which is one of the following: ■ Default: The list is preconfigured on the system. This type of list cannot be deleted, and only the Event Options are configurable. ■ Configured: The list has been added by a user.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new policy list.
Edit	Click **Edit** to edit the selected entries.

To add a new policy list:

Click **System** > **Advanced Configuration** > **Event Manager** > **Policy List** > **Add**.

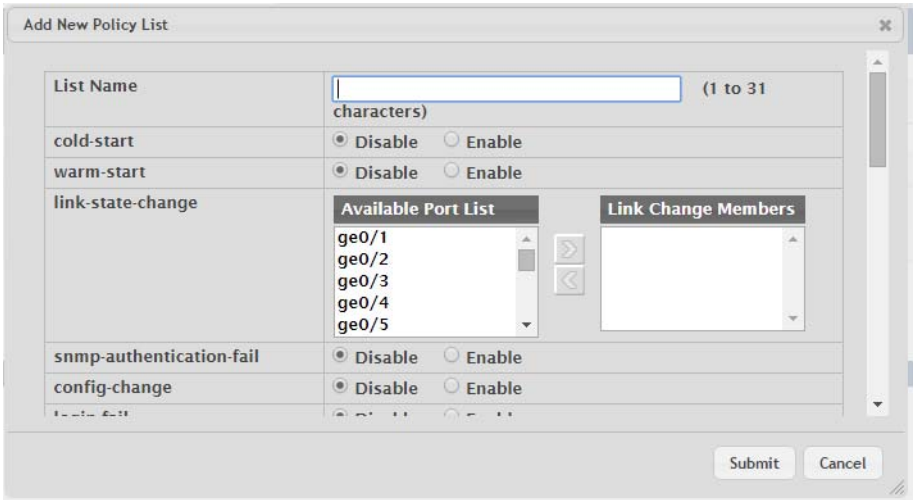


Figure 4.79 System > Advanced Configuration > Event Manager > Policy List > Add

The following table describes the items in the previous figure.

Item	Description
List Name	The name of the policy list. This field can be configured only when adding a new policy list.
Event Options	The method(s) used to authenticate a user who attempts to access the management interface or network. The possible methods are as follows: ■ Link Change Members: The port(s) included in the link-change event. If the event that meets the policy criteria that is in the Link Change Members list, it is applied to Alarm LED, Alarm Relay, Alarm Relay 2, Logging, or Trap. To add source ports to the policy, select one or more ports from the Available Port List field (CTRL + click to select multiple ports). Then, use the appropriate arrow icon to move the selected ports to the Link Change Members field.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Policy Selection

Use the Policy List Selection page to associate a policy list with each event alarm method (Alarm LED, Alarm Relay, Alarm Relay 2, Alarm Email, Logging, and SNMP Traps).

To access this page, click **System** > **Advanced Configuration** > **Event Manager** > **Policy Selection**.

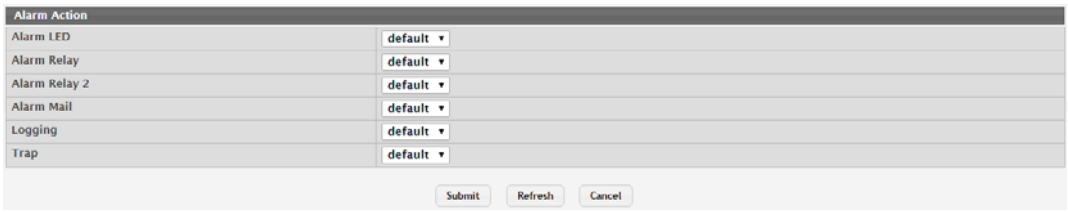


Figure 4.80 System > Advanced Configuration > Event Manager > Policy Selection

The following table describes the items in the previous figure.

Item	Description
Alarm LED	The policy list to trigger system alarm LED as always on, blinking or off.
Alarm Relay	The policy list to trigger system alarm relay as always on or off.
Alarm Relay 2	The policy list to trigger system alarm relay 2 as always on or off.
Alarm Mail	The policy list to send Email.
Logging	The policy list to log in the system Buffered Log.
Trap	The policy list to send SNMP traps.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

Severity Configuration

Use the Severity Configuration page to configure system-wide settings for severity of each event.

To access this page, click **System** > **Advanced Configuration** > **Event Manager** > **Severity Configuration**.

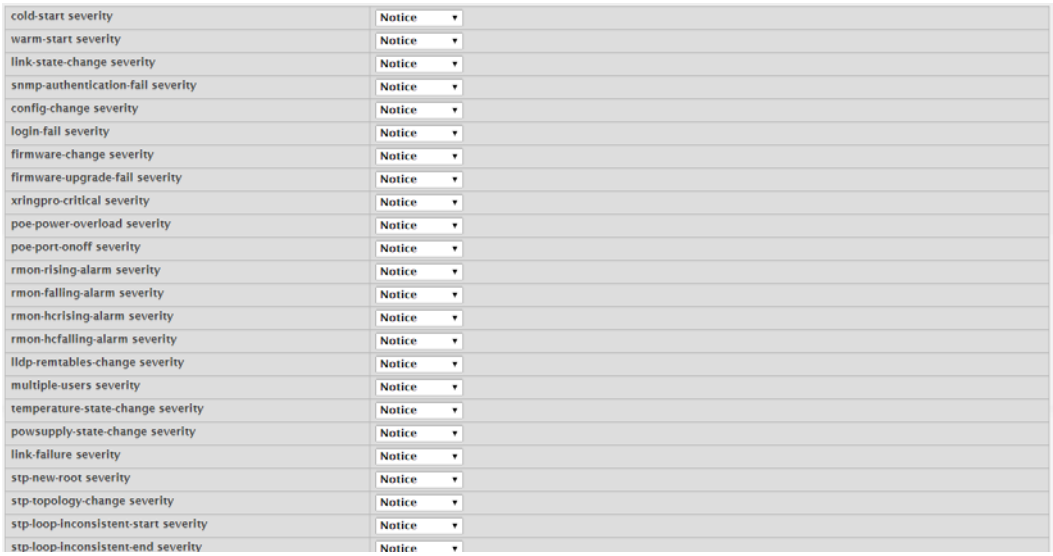


Figure 4.81 System > Advanced Configuration > Event Manager > Severity Configuration

The following table describes the items in the previous figure.

Item	Description
List Name	The name of the policy list. This field can be configured only when adding a new policy list.
Severity Configuration	The severity level for each event.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.3 Basic Configuration

4.3.3.1 Switch

IEEE 802.3x flow control works by pausing a port when the port becomes oversubscribed and dropping all traffic for small bursts of time during the congestion condition. This can lead to high-priority and/or network control traffic loss. When 802.3x flow control is enabled, lower speed switches can communicate with higher speed switches by requesting that the higher speed switch refrains from sending packets. Transmissions are temporarily halted to prevent buffer overflows.

To access this page, click **System** > **Basic Configuration** > **Switch**.

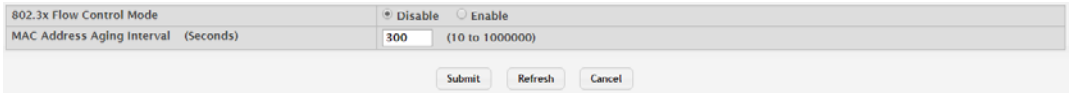


Figure 4.82 System > Basic Configuration > Switch

The following table describes the items in the previous figure.

Item	Description
802.3x Flow Control Mode	The 802.3x flow control mode on the switch. IEEE 802.3x flow control works by pausing a port when the port becomes oversubscribed. This allows lower-speed switches to communicate with higher-speed switches. A lower-speed or congested switch can send a PAUSE frame requesting that the peer device refrain from sending packets. Transmissions are temporarily halted to prevent buffer overflows. The options are as follows: ■ Disabled: The switch does not send PAUSE frames if the port buffers become full. ■ Enabled: The switch can send PAUSE frames to a peer device if the port buffers become full.
MAC Address Aging Interval (Seconds)	The MAC address table (forwarding database) contains static entries, which never age out, and dynamically-learned entries, which are removed if they are not updated within a given time. Specify the number of seconds a dynamic address should remain in the MAC address table after it has been learned.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.4 Configuration Storage

4.3.4.1 Save

Use the Save All Applied Changes page to store the system's configuration settings to non-volatile memory. Once saved the settings are available across a system reset. When you click **Save**, the save action is initiated.

To access this page, click **System** > **Configuration Storage** > **Save**.

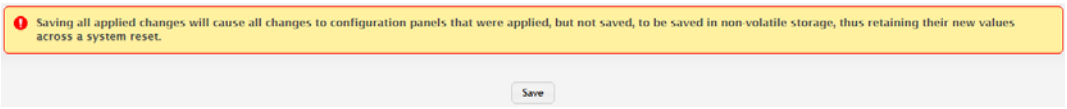


Figure 4.83 System > Configuration Storage > Save

The following table describes the items in the previous figure.

Item	Description
Save	Click **Save** to initiate a save of all system configuration after displaying a confirmation message. All of the current system configuration settings, including any that have been changed by the user, are stored into non-volatile memory so that they are preserved across a system reset.

4.3.4.2 Reset

Use the Reset Configuration page to reset the system's parameters to the factory default settings. The Reset function overrides all previously saved configuration changes. When you click **Reset**, the reset action is initiated.

To access this page, click **System** > **Configuration Storage** > **Reset**.

Figure 4.84 System > Configuration Storage > Reset

The following table describes the items in the previous figure.

Item	Description
Reset	Click **Reset** to initiate the action to reset all configuration parameters to their factory default settings after displaying a confirmation message. All configuration changes, including those that were previously saved, are reset in the running system by this action. It is possible that the IP address of the switch will change. If this occurs you will need to determine the new IP address to access the device using the web.

4.3.4.3 Erase Startup

Use the Erase Startup page to delete the text-based configuration file. The file is stored in non-volatile memory. When you click **Reset**, the Erase Startup action is initiated.

To access this page, click **System** > **Configuration Storage** > **Erase Startup**.

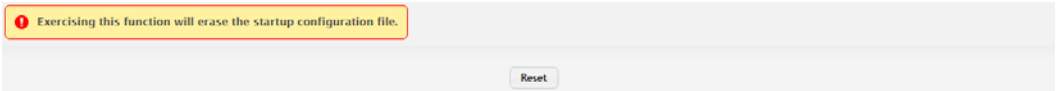


Figure 4.85 System > Configuration Storage > Erase Startup

The following table describes the items in the previous figure.

Item	Description
Reset	Click **Reset** to initiate the action to erase the text-based configuration file stored in non-volatile memory after displaying a confirmation message. If the system resets and no startup-config file is found, the system will begin the AutoInstall process to automatically update the image and download a configuration file.

4.3.4.4 Copy

Use the Copy Configuration Files page to copy the information contained in one configuration file to another configuration file on the device. When you click **Submit**, the copy action takes place immediately, and the source file overwrites the destination file.

To access this page, click **System** > **Configuration Storage** > **Copy**.

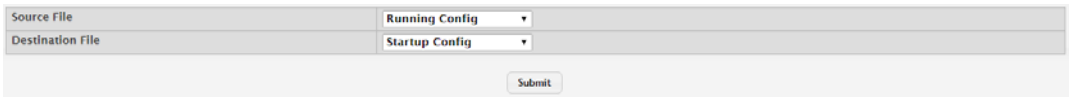


Figure 4.86 System > Configuration Storage > Copy

The following table describes the items in the previous figure.

Item	Description
Source File	Select the configuration file that will overwrite the contents in the selected destination file. The source file options are as follows: ■ Running Config: The file that contains the configuration that is currently active on the system. Copying the Running Config file to the Startup Config file is effectively the same as performing a Save. ■ Startup Config: The file that contains the configuration that loads when the system boots. ■ Backup Config: The file that is used to store a copy of the running or startup configuration.
Destination File	Select file to be overwritten by the contents in the selected source file. The destination file options are as follows: ■ Startup Config: The file that contains the configuration that loads when the system boots. ■ Backup Config: The file that is used to store a copy of the running or startup configuration.
Submit	Click **Submit** to save the values and update the screen.

4.3.5 Connectivity

4.3.5.1 IPv4

Use the IPv4 Network Connectivity page to configure and view the IPv4 network connectivity information on the network interface. The network interface is the logical interface that allows remote management of the device via any of the front-panel switch ports. To enable management of the device over an IPv4 network by using a Web browser, SNMP, Telnet, or SSH, you must first configure it with an IP address, subnet mask, and default gateway. The configuration parameters associated with the network interface do not affect the configuration of the front-panel ports through which traffic is switched or routed.

To access this page, click **System** > **Connectivity** > **IPv4**.

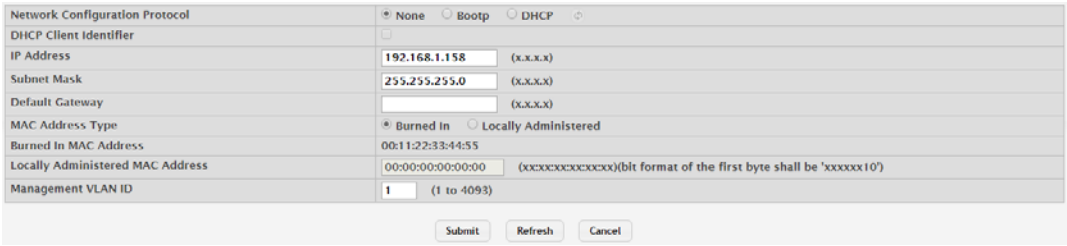


Figure 4.87 System > Connectivity > IPv4

The following table describes the items in the previous figure.

Item	Description
Network Configuration Protocol	Specify how the device acquires network information on the network interface: ■ None: The device does not attempt to acquire network information dynamically. Select this option to configure a static IP address, subnet mask, and default gateway. ■ BOOTP: During the next boot cycle, the BOOTP client on the device broadcasts a BOOTP request in an attempt to acquire information from a BOOTP server on the network. ■ DHCP: During the next boot cycle, the DHCP client on the device broadcasts a DHCP request in an attempt to acquire information from a DHCP server on the network. After this option is applied, you can use the Refresh icon at the end of the row to renew the IPv4 address learned from DHCP server.
DHCP Client Identifier	The DHCP Client Identifier (Option 61) is used by DHCP clients to specify their unique identifier. DHCP servers use this value to index their database of address bindings. This value is expected to be unique for all clients in an administrative domain. The Client Identifier string will be displayed beside the check box once DHCP is enabled on the port on which the Client Identifier option is selected. This web page will need to be refreshed once this change is made.
IP Address	The IP address of the interface. If the Network Configuration Protocol is None, you can manually configure a static IP address. If the Network Configuration Protocol is BOOTP or DHCP, this field displays the IP address that was dynamically acquired (if any).
Subnet Mask	The IP subnet mask for the interface. If the Network Configuration Protocol is None, you can manually configure a static subnet mask. If the Network Configuration Protocol is BOOTP or DHCP, this field displays the subnet mask that was dynamically acquired (if any).
Default Gateway	The default gateway for the IP interface. If the Network Configuration Protocol is None, you can manually configure the IP address of the default gateway. If the Network Configuration Protocol is BOOTP or DHCP, this field displays the default gateway address that was dynamically acquired (if any).
MAC Address Type	Specify whether the burned in or the locally administered MAC address should be used for in-band connectivity.
Burned In MAC Address	The burned in MAC address used for in-band connectivity if you choose not to configure a locally administered address.

Item	Description
Locally Administered MAC Address	You may configure a locally administered MAC address for in-band connectivity instead of using the burned in universally administered MAC address. In addition to entering an address in this field, you must also set the MAC address type to locally administered. Enter the address as twelve hexadecimal digits (6 bytes) with a colon between each byte. Bit 6 of byte 0 must be set to 1 and bit 0 to 0, i.e. byte 0 must have a value of 2, 6, A or E for its second digit.
Management VLAN ID	The VLAN ID for the management VLAN. Some network administrators use a management VLAN to isolate system management traffic from end-user data traffic.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.5.2 IPv6

Use the IPv6 Network Connectivity page to configure and view IPv6 information on the network interface. The network interface is the logical interface that allows remote management of the device via any of the front-panel switch ports. To enable management of the device over an IPv6 network by using a Web browser, SNMP, Telnet, or SSH, you must first configure the device with the appropriate IPv6 information. The configuration parameters associated with the network interface do not affect the configuration of the front-panel ports through which traffic is switched or routed.

To access this page, click **System** > **Connectivity** > **IPv6**.

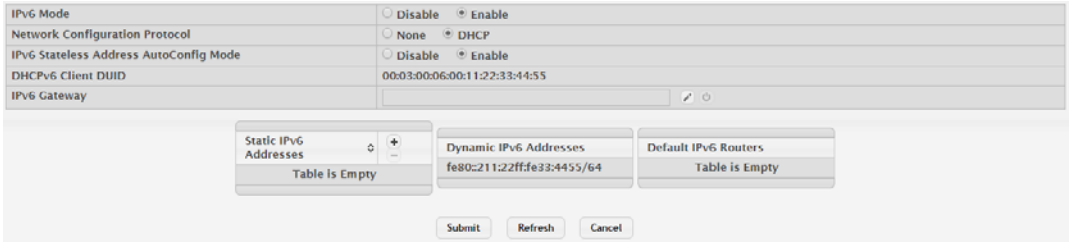


Figure 4.88 System > Connectivity > IPv6

The following table describes the items in the previous figure.

Item	Description
IPv6 Mode	Enables or disables the IPv6 administrative mode on the network interface.
Network Configuration Protocol	Specify whether the device should attempt to acquire network information from a DHCPv6 server. Selecting None disables the DHCPv6 client on the network interface.
IPv6 Stateless Address AutoConfig Mode	Sets the IPv6 stateless address auto configuration mode on the network interface. ■ Enabled: The network interface can acquire an IPv6 address through IPv6 Neighbor Discovery Protocol (NDP) and through the use of Router Advertisement messages. ■ Disabled: The network interface will not use the native IPv6 address auto configuration features to acquire an IPv6 address.
DHCPv6 Client DUID	The client identifier used by the DHCPv6 client (if enabled) when sending messages to the DHCPv6 server.
IPv6 Gateway	The default gateway for the IPv6 network interface. To configure this field, click button in the row. To reset the field to the default value, click button in the row.

Item	Description
Static IPv6 Addresses	Lists the manually configured static IPv6 addresses on the network interface. ■ To add an entry to the list, click + button to open the Add IPv6 Address dialog and provide the following: – New IPv6 Address: Specify the IPv6 address to add to the interface. – EUI Flag: Select this option to enable the Extended Universal Identifier (EUI) flag for IPv6 address, or clear the option to omit the flag. ■ To delete an entry from the list, click − button associated with the entry to remove. ■ To delete all entries from the list, click − button in the heading row.
Dynamic IPv6 Addresses	Lists the IPv6 addresses on the network interface that have been dynamically configured through IPv6 auto configuration or DHCPv6.
Default IPv6 Routers	Lists the IPv6 address of each default router that has been automatically configured through IPv6 router discovery.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.5.3 IPv6 Neighbors

When IPv6 is enabled on the service port, and a ping is initiated to a neighbor, the neighbor is added to the cache (if successful). The Network Port IPv6 Neighbors page displays data on these ports.

To access this page, click **System** > **Connectivity** > **IPv6 Neighbors**.

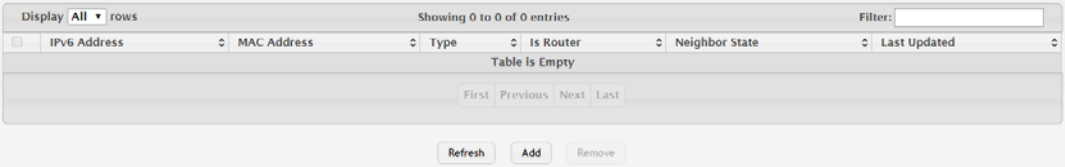


Figure 4.89 System > Connectivity > IPv6 Neighbors

The following table describes the items in the previous figure.

Item	Description
IPv6 Address	The IPv6 address of a neighbor device that has been reachable on the local link through the network interface.
MAC Address	The MAC address of the neighboring device.
Type	The type of the neighbor entry, which is one of the following: ■ Static: The neighbor entry is manually configured. ■ Dynamic: The neighbor entry is dynamically resolved. ■ Local: The neighbor entry is a local entry. ■ Other: The neighbor entry is an unknown entry.
Is Router	Identifies whether the neighbor device is a router. The possible values are: ■ True: The neighbor device is a router. ■ False: The neighbor device is not a router.

Item	Description
Neighbor State	The current reachability state of the neighboring device, which is one of the following: ■ Reachable: The neighbor is reachable through the network interface. ■ Stale: The neighbor is not known to be reachable, and the system will begin the process to reach the neighbor. ■ Delay: The neighbor is not known to be reachable, and upper-layer protocols are attempting to provide reachability information. ■ Probe: The neighbor is not known to be reachable, and the device is attempting to probe for this neighbor. ■ Unknown: The reachability status cannot be determined.
Last Updated	The amount of time that has passed since the neighbor entry was last updated.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new network port IPv6 neighbor.
Remove	Click **Remove** to remove the selected entries.

To add a new network port IPv6 neighbor:

Click **System** > **Connectivity** > **IPv6 Neighbors** > **Add**.

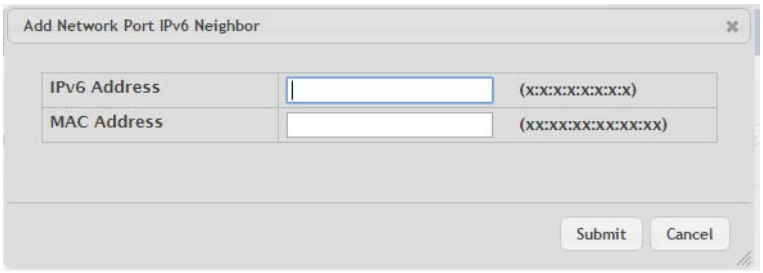


Figure 4.90 System > Connectivity > IPv6 Neighbors > Add

The following table describes the items in the previous figure.

Item	Description
IPv6 Address	The IPv6 address of a neighbor device that has been reachable on the local link through the network interface.
MAC Address	The MAC address of the neighboring device.
Submit	Click Submit to save the values.
Cancel	Click Cancel to close the window.

4.3.5.4 Service Port IPv4

Use the Service Port IPv4 Configuration page to configure network information on the service port. The service port is a dedicated Ethernet port for out-of-band management of the device. Traffic on this port is segregated from operational network traffic on the switch ports and cannot be switched or routed to the operational network.

To access this page, click **System** > **Connectivity** > **Service Port IPv4**.

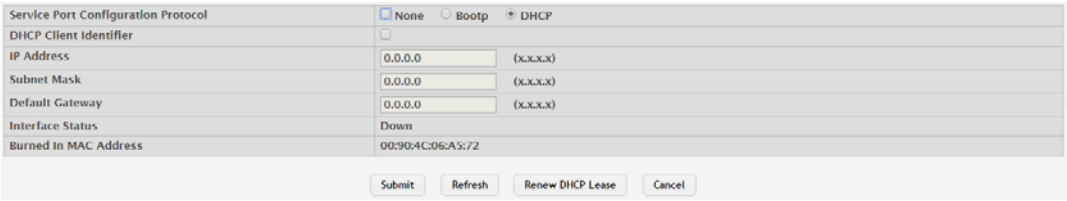


Figure 4.91 System > Connectivity > Service Port IPv4

The following table describes the items in the previous figure.

Item	Description
Service Port Configuration Protocol	Specify how the device acquires network information on the service port: ■ BOOTP: During the next boot cycle, the BOOTP client on the device broadcasts a BOOTP request in an attempt to acquire information from a BootP server on the network. ■ DHCP: During the next boot cycle, the DHCP client on the device broadcasts a DHCP request in an attempt to acquire information from a DHCP server on the network. ■ None: The device does not attempt to acquire network information dynamically.
DHCP Client Identifier	The DHCP Client Identifier (Option 61) is used by DHCP clients to specify their unique identifier. DHCP servers use this value to index their database of address bindings. This value is expected to be unique for all clients in an administrative domain. The Client Identifier string will be displayed beside the check box once DHCP is enabled on the port on which the Client Identifier option is selected. This web page will need to be refreshed once this change is made.
IP Address	The IP address of the interface. If the Service Port Configuration Protocol is None, you can manually configure a static IP address. If the Service Port Configuration Protocol is BOOTP or DHCP, this field displays the IP address that was dynamically acquired (if any).
Subnet Mask	The IP subnet mask for the interface. If the Service Port Configuration Protocol is None, you can manually configure a static subnet mask. If the Service Port Configuration Protocol is BOOTP or DHCP, this field displays the subnet mask that was dynamically acquired (if any).
Default Gateway	The default gateway for the IP interface. If the Service Port Configuration Protocol is None, you can manually configure the IP address of the default gateway. If the Service Port Configuration Protocol is BOOTP or DHCP, this field displays the default gateway address that was dynamically acquired (if any).
Interface Status	Indicates whether the link status is up or down.
Burned In MAC Address	The burned in MAC address used for out-of-band connectivity.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Renew DHCP Lease	Click **Renew DHCP Lease** to renew DHCP lease.
Cancel	Click **Cancel** to restore default value.

4.3.5.5 Service Port IPv6

Use the Service Port IPv6 Configuration page to configure IPv6 network information on the service port. The service port is a dedicated Ethernet port for out-of-band management of the device. Traffic on this port is segregated from operational network traffic on the switch ports and cannot be switched or routed to the operational network.

To access this page, click **System** > **Connectivity** > **Service Port IPv6**.

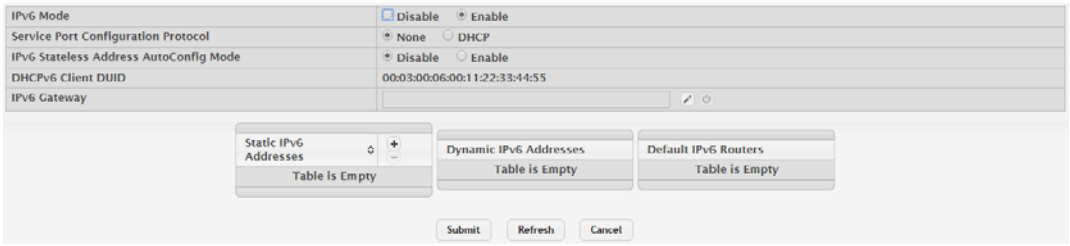


Figure 4.92 System > Connectivity > Service Port IPv6

The following table describes the items in the previous figure.

Item	Description
IPv6 Mode	Enables or disables the IPv6 administrative mode on the service port.
Service Port Configuration Protocol	Specify whether the device should attempt to acquire network information from a DHCPv6 server. Selecting None disables the DHCPv6 client on the service port.
IPv6 Stateless Address AutoConfig Mode	Sets the IPv6 stateless address auto configuration mode on the service port. ■ Enabled: The service port can acquire an IPv6 address through IPv6 Neighbor Discovery Protocol (NDP) and through the use of Router Advertisement messages. ■ Disabled: The service port will not use the native IPv6 address auto configuration features to acquire an IPv6 address.
DHCPv6 Client DUID	The client identifier used by the DHCPv6 client (if enabled) when sending messages to the DHCPv6 server.
IPv6 Gateway	The default gateway for the IPv6 service port interface. To configure this field, click button in the row. To reset the field to the default value, click button in the row.
Static IPv6 Addresses	Lists the manually configured static IPv6 addresses on the service port interface. ■ To add an entry to the list, click button to open the Add IPv6 Address dialog and provide the following: – New IPv6 Address: Specify the IPv6 address to add to the interface. – EUI Flag: Select this option to enable the Extended Universal Identifier (EUI) flag for IPv6 address, or clear the option to omit the flag. ■ To delete an entry from the list, click button associated with the entry to remove. ■ To delete all entries from the list, click button in the heading row.
Dynamic IPv6 Addresses	Lists the IPv6 addresses on the service port interface that have been dynamically configured through IPv6 auto configuration or DHCPv6.
Default IPv6 Routers	Lists the IPv6 address of each default router that has been automatically configured through IPv6 router discovery.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.5.6 Service Port IPv6 Neighbors

The Service Port IPv6 Neighbors page provides information about IPv6 neighbors the device has discovered through the service port by using the Neighbor Discovery Protocol (NDP). The manually configured static service port IPv6 neighbors are also displayed.

To access this page, click **System** > **Connectivity** > **Service Port IPv6 Neighbors**.

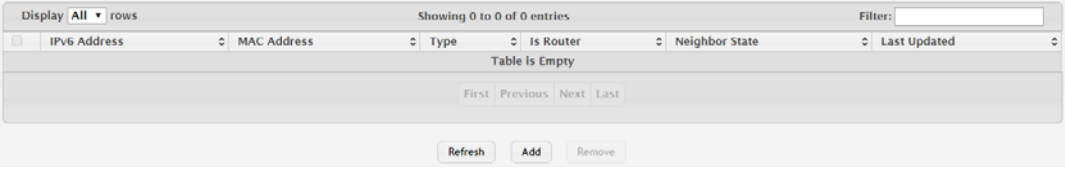


Figure 4.93 System > Connectivity > Service Port IPv6 Neighbors

The following table describes the items in the previous figure.

Item	Description
IPv6 Addresses	The IPv6 address of a neighbor device that has been reachable on the local link through the service port.
MAC Address	The MAC address of the neighboring device.
Type	The type of the neighbor entry, which is one of the following: ■ Static: The neighbor entry is manually configured. ■ Dynamic: The neighbor entry is dynamically resolved. ■ Local: The neighbor entry is a local entry. ■ Other: The neighbor entry is an unknown entry.
Is Router	Identifies whether the neighbor device is a router. The possible values are: ■ True: The neighbor device is a router. ■ False: The neighbor device is not a router.
Neighbor State	The current reachability state of the neighboring device, which is one of the following: ■ Reachable: The neighbor is reachable through the service port. ■ Stale: The neighbor is not known to be reachable, and the system will begin the process to reach the neighbor. ■ Delay: The neighbor is not known to be reachable, and upper-layer protocols are attempting to provide reachability information. ■ Probe: The neighbor is not known to be reachable, and the device is attempting to probe for this neighbor. ■ Unknown: The reachability status cannot be determined.
Last Updated	The amount of time that has passed since the neighbor entry was last updated.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new service port IPv6 neighbor.
Remove	Click **Remove** to remove the selected entries.

To add a new service port IPv6 neighbor:

Click **System** > **Connectivity** > **Service Port IPv6 Neighbors** > **Add**.

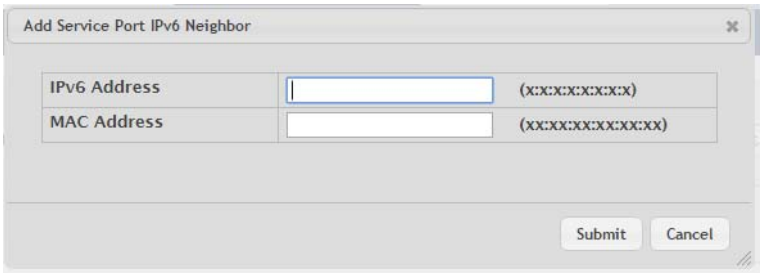


Figure 4.94 System > Connectivity > Service Port IPv6 Neighbors List > Add

The following table describes the items in the previous figure.

Item	Description
IPv6 Address	The IPv6 address of a neighbor device that has been reachable on the local link through the service port.
MAC Address	The MAC address of the neighboring device.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.3.5.7 DHCP Client Options

Use the DHCP Client Options page to configure DHCP client settings on the system.

To access this page, click **System** > **Connectivity** > **DHCP Client Options**.

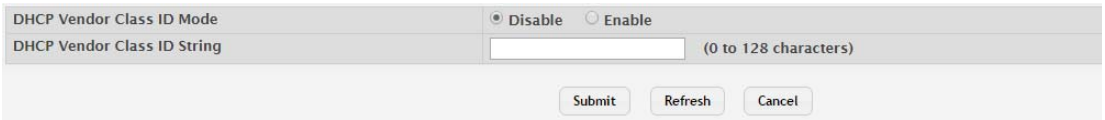


Figure 4.95 System > Connectivity > DHCP Client Options

The following table describes the items in the previous figure.

Item	Description
DHCP Vendor Class ID Mode	The VCI administrative mode. When the mode is enabled, the DHCP client includes the text configured as the DHCP Vendor Class ID String in DHCP requests.
DHCP Vendor Class ID String	The text string to add to DHCP requests as option 60, the VCI option.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.6 Firmware

4.3.6.1 Status

Use the Dual Image Status page to view information about the software images on the device. The device can store up to two software images in permanent storage. The dual image feature allows you to upgrade the device without deleting the older software image.

To access this page, click **System** > **Firmware** > **Status**.

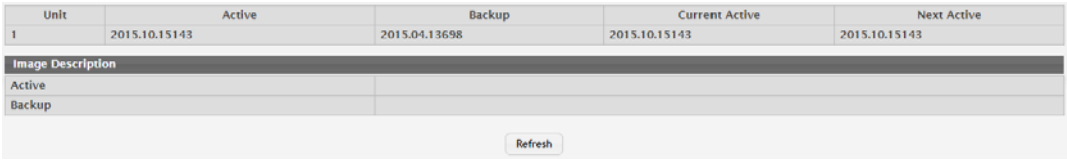


Figure 4.96 System > Firmware > Status

The following table describes the items in the previous figure.

Item	Description
Unit	The unit ID of the switch.
Active	The code file version of the active image.
Backup	The code file version of the backup image.
Current Active	The image version that is loaded and running on this unit.
Next Active	The image version to be loaded after the system reboots.
Image Description	
Active	The description associated with the active code file.
Backup	The description associated with the backup code file.
Refresh	Click **Refresh** to update the screen.

4.3.6.2 Configuration and Upgrade

Use the Dual Image Configuration and Upgrade page to transfer a new firmware (code) image to the device, select which image to load during the next boot cycle, and add a description to each image on the device. The device uses the HTTP protocol to transfer the image, and the image is saved as the backup image.

To access this page, click **System** > **Firmware** > **Configuration and Upgrade**.

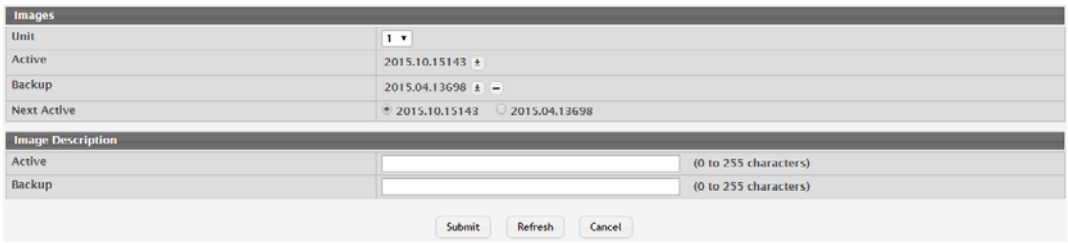


Figure 4.97 System > Firmware > Configuration and Upgrade

The following table describes the items in the previous figure.

Item	Description
Images	
Unit	Select the unit with the code image to activate, upgrade, delete, or describe.
Active	The active code file version. Use the icons to the right of the field to perform the file transfer. ■ To transfer a new code image to the device, click button. The Firmware Upgrade window opens. Click **Choose File** to browse to the file to transfer. After you select the appropriate file, click **Begin Transfer** to launch the HTTP transfer process. The active image is overwritten by the file that you transfer.

Item	Description
Backup	The backup code file version. Use the icons to the right of the field to perform the following tasks: ■ To transfer a new code image to the device, click button. The Firmware Upgrade window opens. Click **Choose File** to browse to the file to transfer. After you select the appropriate file, click **Begin Transfer** to launch the HTTP transfer process. If a backup image already exists on the device, it is overwritten by the file that you transfer. ■ To delete the backup image from permanent storage, click button. You must confirm the action before the image is deleted.
Next Active	Select the image version to load the next time this unit reboots.
Image Description	
Active Description	Specify a description to associate with the image that is currently the active code file.
Backup Description	Specify a description to associate with the image that is currently the backup code file.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.7 Logs

4.3.7.1 Buffered Log

The log messages the device generates in response to events, faults, errors, and configuration changes are stored locally on the device in the RAM (cache). This collection of log files is called the RAM log or buffered log. When the buffered log file reaches the configured maximum size, the oldest message is deleted from the RAM when a new message is added. If the system restarts, all messages are cleared.

To access this page, click **System** > **Logs** > **Buffered Log**.

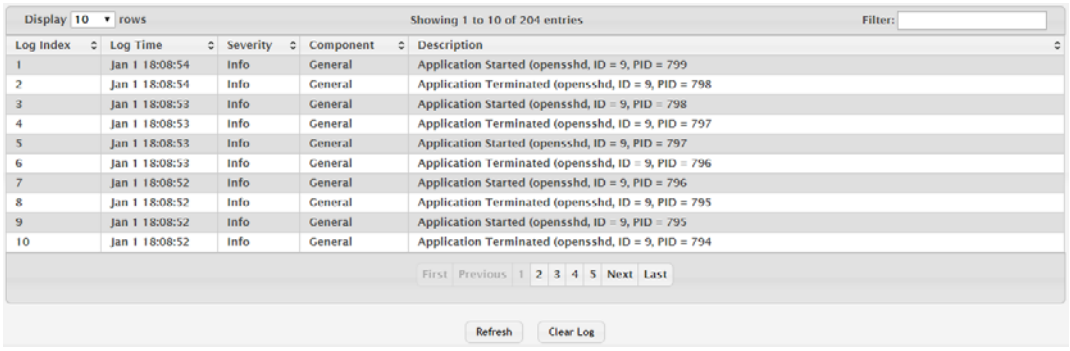


Figure 4.98 System > Logs > Buffered Log

The following table describes the items in the previous figure.

Item	Description
Log Index	The position of the entry within the buffered log file. The most recent log message always has a Log Index value of 1.
Log Time	The time the entry was added to the log.

Item	Description
Severity	The severity level associated with the log entry. The severity can be one of the following: ■ Emergency (0): The device is unusable. ■ Alert (1): Action must be taken immediately. ■ Critical (2): The device is experiencing primary system failures. ■ Error (3): The device is experiencing non-urgent failures. ■ Warning (4): The device is experiencing conditions that could lead to system errors if no action is taken. ■ Notice (5): The device is experiencing normal but significant conditions. ■ Info (6): The device is providing non-critical information. ■ Debug (7): The device is providing debug-level information.
Component	The component that issued the log entry.
Description	The text description for the log entry.
Refresh	Click **Refresh** to update the screen.
Clear Log	Click **Clear Log** to clear the buffered log messages and resets the counters.

4.3.7.2 Event Log

Use the Event Log page to display the event log, which is used to hold error messages for catastrophic events. After the event is logged and the updated log is saved in flash memory, the switch will be reset. The log can hold at least 2,000 entries (the actual number depends on the platform and OS), and is erased when an attempt is made to add an entry after it is full. The event log is preserved across system resets.

To access this page, click **System** > **Logs** > **Event Log**.

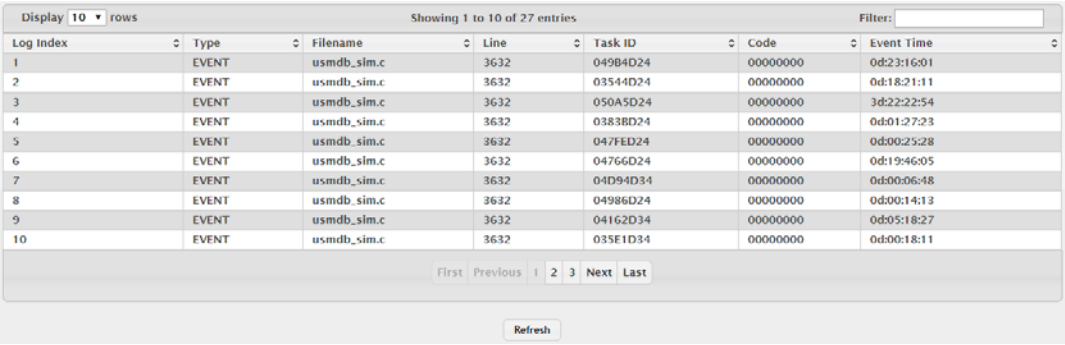


Figure 4.99 System > Logs > Event Log

The following table describes the items in the previous figure.

Item	Description
Log Index	A display row index number used to identify the event log entry, with the most recent entry listed first (lowest number).
Type	The incident category that indicates the cause of the log entry: EVENT, ERROR, etc.
Filename	The source code filename of the event origin.
Line	Within the source code filename, the line number of the event origin.
Task ID	A system identifier of the task that was running when the event occurred. This value is assigned by, and is specific to, the operating system.
Code	An event-specific code value that is passed to the log handler by the source code file reporting the event.

Item	Description
Event Time	A time stamp (days, hours, minutes, and seconds) indicating when the event occurred, measured from the time the device was last reset. The only correlation between any two entries in the event log is the relative amount of time after a system reset that the event occurred.
Refresh	Click **Refresh** to update the screen.

4.3.7.3 Persistent Log

Persistent log messages are stored in persistent storage so that they survive across device reboots. Two types of log files exist in flash (persistent) memory: the system startup log and the system operation logs. The system startup log stores the first 32 messages received after system reboot. The log file stops when it is full. The system operation log stores the last 32 messages received during system operation. The oldest messages are overwritten when the file is full.

To access this page, click **System** > **Logs** > **Persistent Log**.

Figure 4.100 System > Logs > Persistent Log

The following table describes the items in the previous figure.

Item	Description
Log Index	The position of the entry within the buffered log file. The most recent log message always has a Log Index value of 1.
Log Time	The time the entry was added to the log.
Severity	The severity level associated with the log entry. The severity can be one of the following: ■ Emergency (0): The device is unusable. ■ Alert (1): Action must be taken immediately. ■ Critical (2): The device is experiencing primary system failures. ■ Error (3): The device is experiencing non-urgent failures. ■ Warning (4): The device is experiencing conditions that could lead to system errors if no action is taken. ■ Notice (5): The device is experiencing normal but significant conditions. ■ Info (6): The device is providing non-critical information. ■ Debug (7): The device is providing debug-level information.
Component	The component that has issued the log entry.
Description	The text description for the log entry.
Refresh	Click **Refresh** to update the screen.

4.3.7.4 Hosts

Use the Logging Hosts page to configure remote logging hosts where the switch can send logs.

To access this page, click **System** > **Logs** > **Hosts**.

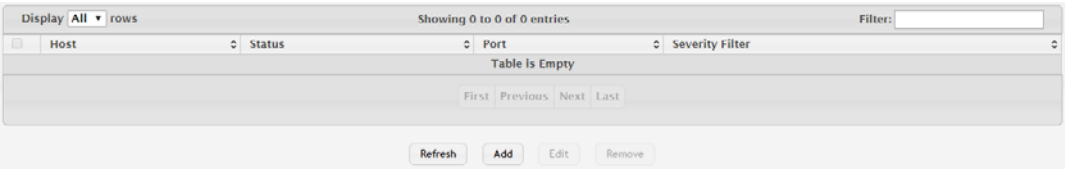


Figure 4.101 System > Logs > Hosts

The following table describes the items in the previous figure.

Item	Description
Host	The IP address or DNS-resolvable host name of the remote host to receive log messages.
Status	Indicates whether the host has been configured to be actively logging or not.
Port	The UDP port on the logging host to which syslog messages are sent.
Severity Filter	Severity level threshold for log messages. All log messages with a severity level at and above the configured level are forwarded to the logging host.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new host.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new host:

Click **System** > **Logs** > **Hosts** > **Add**.

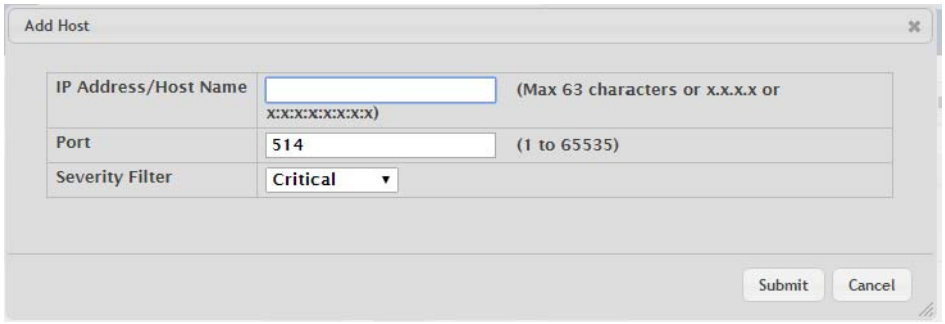


Figure 4.102 System > Logs > Hosts > Add

The following table describes the items in the previous figure.

Item	Description
IP Address/Host Name	The IP address or DNS-resolvable host name of the remote host to receive log messages.
Port	The UDP port on the logging host to which syslog messages are sent.
Severity Filter	Severity level threshold for log messages. All log messages with a severity level at and above the configured level are forwarded to the logging host.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.3.7.5 Configuration

The Log Configuration page allows administrators with the appropriate privilege level to configure the administrative mode and various settings for logging features on the switch.

To access this page, click **System** > **Logs** > **Configuration**.

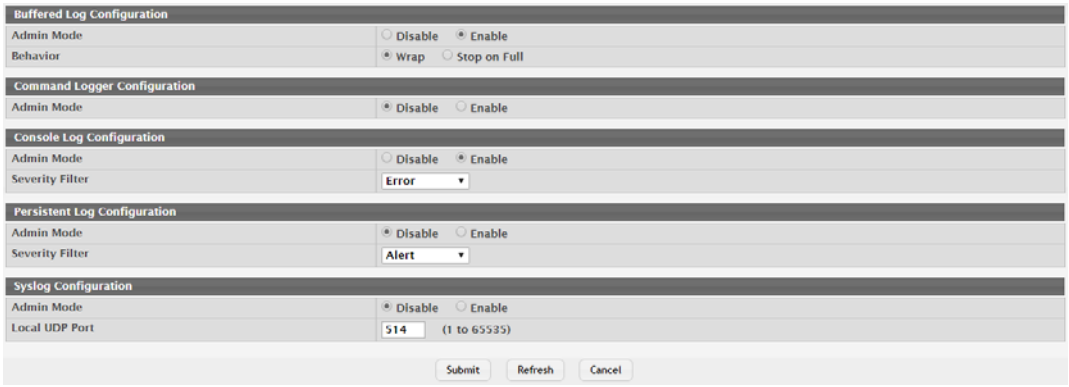


Figure 4.103 System > Logs > Configuration

The following table describes the items in the previous figure.

Item	Description
Buffered Log Configuration	
Admin Mode	Enable or disable logging to the buffered (RAM) log file.
Behavior	Specify what the device should do when the buffered log is full. It can either overwrite the oldest messages (Wrap) or stop writing new messages to the buffer (Stop on Full).
Command Logger Configuration	
Admin Mode	Enable or disable logging of the command-line interface (CLI) commands issued on the device.
Console Log Configuration	
Admin Mode	Enable or disable logging to any serial device attached to the host.
Severity Filter	Select the severity of the messages to be logged. All messages at and above the selected threshold are logged to the console. The severity can be one of the following: ■ Emergency (0): The device is unusable. ■ Alert (1): Action must be taken immediately. ■ Critical (2): The device is experiencing primary system failures. ■ Error (3): The device is experiencing non-urgent failures. ■ Warning (4): The device is experiencing conditions that could lead to system errors if no action is taken. ■ Notice (5): The device is experiencing normal but significant conditions. ■ Info (6): The device is providing non-critical information. ■ Debug (7): The device is providing debug-level information.
Persistent Log Configuration	
Admin Mode	Enable or disable logging to the persistent log. These messages are not deleted when the device reboots.
Severity Filter	Select the severity of the messages to be logged. All messages at and above the selected threshold are logged to the console. See the previous severity filter description for more information about each severity level.
Syslog Configuration	
Admin Mode	Enable or disable logging to configured syslog hosts. When the syslog admin mode is disabled the device does not relay logs to syslog hosts, and no messages will be sent to any collector/relay. When the syslog admin mode is enabled, messages will be sent to configured collectors/relays using the values configured for each collector/relay.

Item	Description
Local UDP Port	The UDP port on the local host from which syslog messages are sent.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.7.6 Source Interface Configuration

Use the Syslog Source Interface Configuration page to specify the physical or logical interface to use as the logging (Syslog) client source interface. When an IP address is configured on the source interface, this address is used for all Syslog communications between the local logging client and the remote Syslog server. The IP address of the designated source interface is used in the IP header of Syslog management protocol packets. This allows security devices, such as firewalls, to identify all source packets coming from a specific device.

To access this page, click **System** > **Logs** > **Source Interface Configuration**.

Figure 4.104 System > Logs > Source Interface Configuration

The following table describes the items in the previous figure.

Item	Description
Type	The type of interface to use as the source interface: ■ None: The primary IP address of the originating (outbound) interface is used as the source address. ■ Interface: The primary IP address of a physical port is used as the source address. ■ VLAN: The primary IP address of a VLAN routing interface is used as the source address.
Interface	When the selected Type is Interface, select the physical port to use as the source interface.
VLAN ID	When the selected Type is VLAN, select the VLAN to use as the source interface. The menu contains only the VLAN IDs for VLAN routing interfaces.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.7.7 Statistics

The Log Statistics page displays summary information about the number of messages logged to the buffered, persistent, or syslog file. It also displays the number of messages that were successfully or unsuccessfully relayed to any remote syslog servers configured on the device.

To access this page, click **System** > **Logs** > **Statistics**.

Figure 4.105 System > Logs > Statistics

The following table describes the items in the previous figure.

Item	Description
Buffered Log	
Total Number of Messages	The number of log messages currently stored in RAM.
Persistent Log	
Total Number of Messages	The number of log messages currently stored in persistent storage.
Syslog	
Messages Received	The total number of messages received by the log process. This includes messages that are dropped or ignored. The number includes messages of all severity levels.
Messages Dropped	The number of messages that failed to be relayed to a remote syslog server. The configured syslog server might be unreachable, misconfigured, or out of storage space.
Messages Relayed	The number of log messages successfully relayed to a remote syslog server. Messages forwarded to multiple hosts are counted once for each host.
Refresh	Click **Refresh** to update the screen.

4.3.8 Management Access

4.3.8.1 System

Use the System Connectivity page to control access to the management interface by administratively enabling or disabling various access methods.

To access this page, click **System** > **Management Access** > **System**.

Figure 4.106 System > Management Access > System

The following table describes the items in the previous figure.

Item	Description
HTTP	
HTTP Admin Mode	Enables or disables the HTTP administrative mode. When this mode is enabled, the device management interface can be accessed through a web browser using the HTTP protocol.

Item	Description
Java Mode	Enables or disables the port that Java uses. When this mode is disabled, any feature on the device that uses Java is not available and cannot be viewed by using a web browser.
Telnet	
Telnet Server Admin Mode	Enables or disables the telnet administrative mode. When this mode is enabled, the device command-line interface (CLI) can be accessed through the telnet port. Disabling this mode disconnects all existing telnet connections and shuts down the telnet port in the device.
Allow New Sessions	Enables or disables new telnet sessions. When this option is disabled, the system does not accept any new telnet sessions, but existing telnet sessions are unaffected.
Secure HTTP	
HTTPS Admin Mode	Enables or disables the administrative mode of secure HTTP. When this mode is enabled, the device management interface can be accessed through a web browser using the HTTPS protocol.
Secure Shell	
SSH Admin Mode	Enables or disables the administrative mode of SSH. When this mode is disabled, all existing SSH connections remain connected until timed-out or logged out, but new SSH connections cannot be established.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.8.2 Telnet

Telnet is a terminal emulation TCP/IP protocol. ASCII terminals can be virtually connected to the local device through a TCP/IP protocol network. Telnet is an alternative to a local login terminal where a remote login is required.

The switch supports up to five simultaneous telnet sessions. All CLI commands can be used over a telnet session.

The Telnet Session Configuration page allows you to control inbound telnet settings on the switch. Inbound telnet sessions originate on a remote system and allow a user on that system to connect to the switch CLI.

To access this page, click **System** > **Management Access** > **Telnet**.

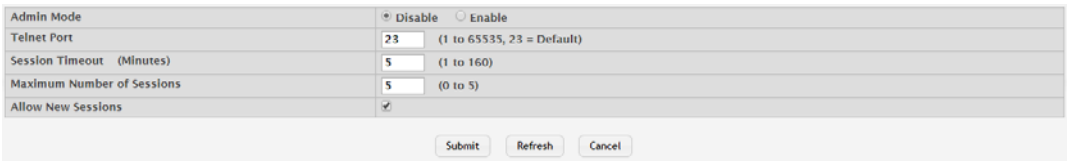


Figure 4.107 System > Management Access > Telnet

The following table describes the items in the previous figure.

Item	Description
Admin Mode	Enables or disables the telnet administrative mode. When enabled, the device may be accessed through the telnet port (23). Disabling this mode value disconnects all existing telnet connections and shuts down the telnet port in the device.

Item	Description
Telnet Port	The TCP port number on which the telnet server listens for requests. Existing telnet login sessions are not affected by a change in this value, although establishment of any new telnet sessions must use the new port number. *NOTE: Before changing this value, check your system (e.g. using netstat) to make sure the desired port number is not currently being used by any other service.*
Session Timeout (Minutes)	The telnet session inactivity timeout value, in minutes. A connected user that does not exhibit any telnet activity for this amount of time is automatically disconnected from the device.
Maximum Number of Sessions	The maximum number of telnet sessions that may be connected to the device simultaneously.
Allow New Sessions	Controls whether new telnet sessions are allowed. Setting this value to Disable disallows any new telnet sessions from starting (although existing telnet sessions are unaffected).
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.8.3 Serial

The Serial Port page allows you to change the switch's serial port settings. In order for a terminal or terminal emulator to communicate with the switch, the serial port settings on both devices must be the same. Some settings on the switch cannot be changed.

To access this page, click **System** > **Management Access** > **Serial**.

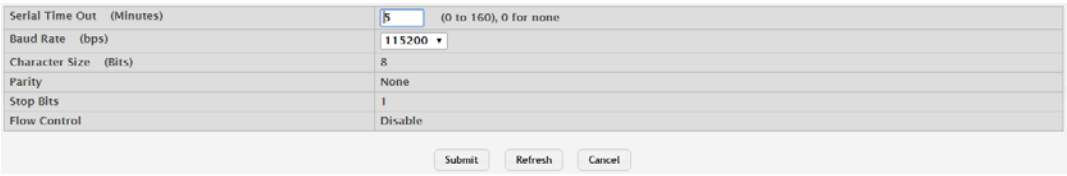


Figure 4.108 System > Management Access > Serial

The following table describes the items in the previous figure.

Item	Description
Serial Time Out (Minutes)	Serial port inactivity timeout value, in minutes. A logged-in user who does not exhibit any CLI activity through the serial port connection for this amount of time is automatically logged out of the device.
Baud Rate (bps)	The number of signals per second transmitted over the physical medium, measured in bits per second.
Character Size (Bits)	The number of bits in a character. This value is always 8.
Parity	The parity method used on the serial port.
Stop Bits	The number of stop bits per character.
Flow Control	Indicates whether hardware flow control is enabled or disabled on the serial port.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.8.4 CLI Banner

Use the CLI Banner Configuration page to configure a message that appears before the user prompt as a Pre- login banner. The message configured shows up on Telnet, SSH and Console connections.

To access this page, click **System** > **Management Access** > **CLI Banner**.

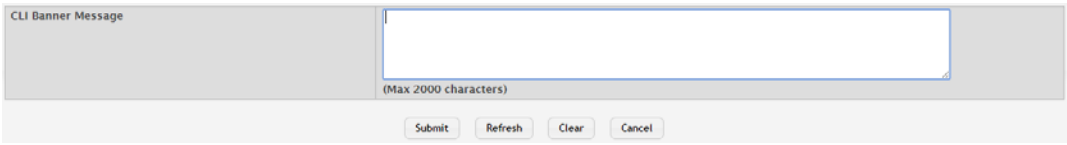


Figure 4.109 System > Management Access > CLI Banner

The following table describes the items in the previous figure.

Item	Description
CLI Banner Message	Text area for creating, viewing, or updating the CLI banner message. To create the CLI banner message, type the desired message in the text area. If you reach the end of the line, the text wraps to the next line. The line might not wrap at the same location in the CLI. To create a line break (carriage return) in the message, press the Enter key on the keyboard. The line break in the text area will be at the same location in the banner message when viewed through the CLI.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Clear	Click **Clear** to clear the CLI banner message from the device
Cancel	Click **Cancel** to restore default value.

4.3.8.5 HTTP

Use the HTTP Configuration page to configure the HTTP server settings on the system.

To access this page, click **System** > **Management Access** > **HTTP**.

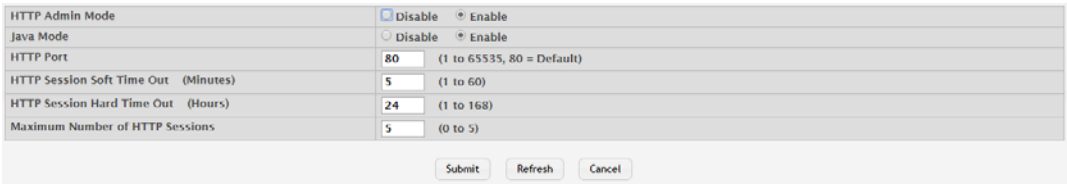


Figure 4.110 System > Management Access > HTTP

The following table describes the items in the previous figure.

Item	Description
HTTP Admin Mode	Enables or disables the HTTP administrative mode. When enabled, the device can be accessed through a web browser using the HTTP protocol.
Java Mode	Enables or disables the Java mode. When enabled, the Java port (port 4242) is open. Port 4242 is used by certain applications within the system. This field applies to both HTTP and HTTPs connections.
HTTP Port	The TCP port number on which the HTTP server listens for requests. Existing HTTP login sessions are closed whenever this value is changed. All new HTTP sessions must use the new port number. *NOTE: Before changing this value, check your system (e.g. using netstat) to make sure the desired port number is not currently being used by any other service.*

Item	Description
HTTP Session Soft Time Out (Minutes)	HTTP session inactivity timeout value. A logged-in user that does not exhibit any HTTP activity for this amount of time is automatically logged out of the HTTP session.
HTTP Session Hard Time Out (Hours)	HTTP session hard timeout value. A user connected to the device via an HTTP session is automatically logged out after this amount of time regardless of the amount of HTTP activity that occurs.
Maximum Number of HTTP Sessions	The maximum number of HTTP sessions that may be connected to the device simultaneously.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.8.6 HTTPS

Use the Secure HTTP Configuration page to view and modify the Secure HTTP (HTTPS) settings on the device. HTTPS increases the security of web-based management by encrypting communication between the administrative system and the device.

To access this page, click **System** > **Management Access** > **HTTPS**.

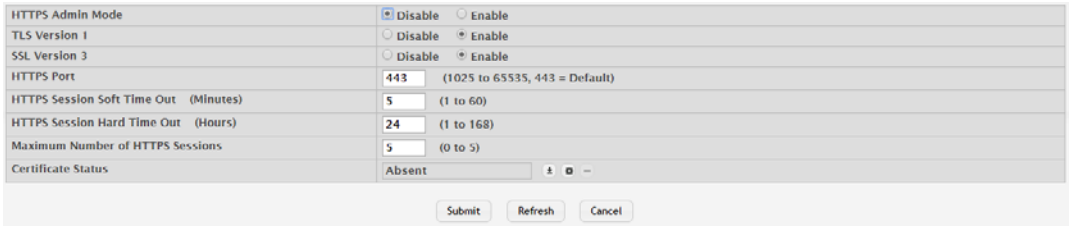


Figure 4.111 System > Management Access > HTTPS

The following table describes the items in the previous figure.

Item	Description
HTTPS Admin Mode	Enables or disables the HTTPS administrative mode. When this mode is enabled, the device can be accessed through a web browser using the HTTPS protocol.
TLS Version 1	Enables or disables Transport Layer Security Version 1.0. When this option is enabled, communication between the web browser on the administrative system and the web server on the device is sent through TLS 1.0.
SSL Version 3	Enables or disables Secure Sockets Layer Version 3.0. When this option is enabled, communication between the web browser on the administrative system and the web server on the device is sent through SSL 3.0. SSL must be administratively disabled while downloading an SSL certificate file from a remote server to the device.
HTTPS Port	The TCP port number that HTTPS uses. *NOTE: Before changing this value, check your system (e.g. using netstat) to make sure the desired port number is not currently being used by any other service.*
HTTPS Session Soft Time Out (Minutes)	HTTPS session inactivity timeout value. A logged-in user that does not exhibit any HTTPS activity for this amount of time is automatically logged out of the HTTPS session.
HTTPS Session Hard Time Out (Hours)	HTTPS session hard timeout value. A user connected to the device via an HTTPS session is automatically logged out after this amount of time regardless of the amount of HTTPS activity that occurs.

Item	Description
Maximum Number of HTTPS Sessions	The maximum number of HTTPS sessions that can be connected to the device simultaneously.
Certificate Status	The status of the SSL certificate generation process. ■ Present: The certificate has been generated and is present on the device. ■ Absent: Certificate is not available on the device. ■ Generation In Progress: An SSL certificate is currently being generated.
	Allows you to download an SSL certificate file from a remote system to the device. Note that to download SSL certificate files, SSL must be administratively disabled.
	Generates an SSL certificate to use for secure communication between the web browser and the embedded web server on the device.
	Deletes the SSL certificate. This button is available only if an SSL certificate is present on the device.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.8.7 SSH

Use the SSH Configuration page to view and modify the Secure Shell (SSH) server settings on the device. SSH is a network protocol that enables access to the CLI management interface by using an SSH client on a remote administrative system. SSH is a more secure access method than Telnet because it encrypts communication between the administrative system and the device. This page also allows you to download or generate SSH host keys for secure CLI-based management.

To access this page, click **System** > **Management Access** > **SSH**.

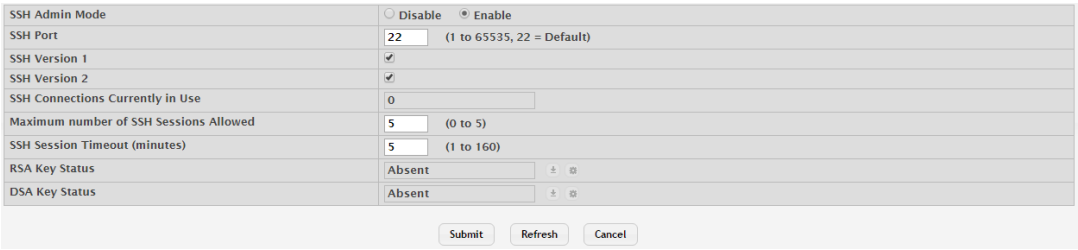


Figure 4.112 System > Management Access > SSH

The following table describes the items in the previous figure.

Item	Description
SSH Admin Mode	Enables or disables the SSH server administrative mode. When this mode is enabled, the device can be accessed by using an SSH client on a remote system.
SSH Port	The TCP port number on which the SSH server listens for requests. Existing SSH login sessions are not affected by a change in this value, although establishment of any new SSH sessions must use the new port number. *NOTE: Before changing this value, check your system (e.g. using netstat) to make sure the desired port number is not currently being used by any other service.*

Item	Description
SSH Version 1	When this option is selected, the SSH server on the device can accept connections from an SSH client using SSH-1 protocol. If the option is clear, the device does not allow connections from clients using the SSH-1 protocol.
SSH Version 2	When this option is selected, the SSH server on the device can accept connections from an SSH client using SSH-2 protocol. If the option is clear, the device does not allow connections from clients using the SSH-2 protocol.
SSH Connections Currently in Use	The number of active SSH sessions between remote SSH clients and the SSH server on the device.
Maximum number of SSH Sessions Allowed	The maximum number of SSH sessions that may be connected to the device simultaneously.
SSH Session Time-out (minutes)	The SSH session inactivity timeout value. A connected user that does not exhibit any SSH activity for this amount of time is automatically disconnected from the device.
RSA Key Status	The status of the SSH-1 Rivest-Shamir-Adleman (RSA) key file or SSH-2 RSA key file (PEM Encoded) on the device, which might be Present, Absent, or Generation in Progress.
DSA Key Status	The status of the SSH-2 Digital Signature Algorithm (DSA) key file (PEM Encoded) on the device, which might be Present, Absent, or Generation in Progress.
	Click the button to download an SSH-1 RSA, SSH-2 RSA, or SSH-2 DSA key file from a remote system to the device. After you click the button, a Download Certificates window opens. Select the file type to download, browse to the location on the remote system, and select the file to upload. Then, click Begin Transfer. The Status field provides information about the file transfer.
	Click the button to manually generate an RSA key or DSA key on the device.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.9 Passwords

4.3.9.1 Line Password

Use the Line Password Configuration page to configure line mode passwords.

To access this page, click **System** > **Passwords** > **Line Password**.

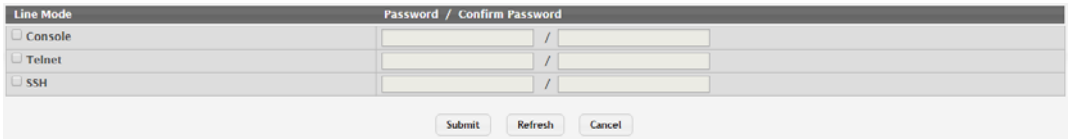


Figure 4.113 System > Passwords > Line Password

The following table describes the items in the previous figure.

Item	Description
Line Mode	Any or all of the following passwords may be changed on this page by checking the box that precedes it: ■ Console ■ Telnet ■ SSH
Password	Enter the new password for the corresponding Line Mode in this field. Be sure the password conforms to the allowed number of characters. The password characters are not displayed on the page, but are disguised in a browser-specific manner.
Confirm Password	Re-enter the new password for the corresponding Line Mode in this field. This must be the same value entered in the Password field. Be sure the password conforms to the allowed number of characters. The password characters are not displayed on the page, but are disguised in a browser-specific manner.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.9.2 Enable Password

Use the Enable Password Configuration page to configure the enable password.

To access this page, click **System** > **Passwords** > **Enable Password**.

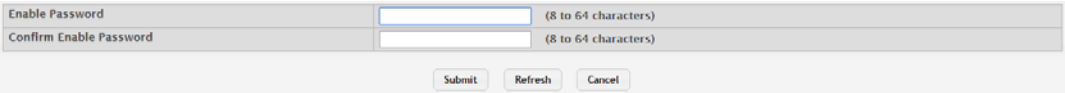


Figure 4.114 System > Passwords > Enable Password

The following table describes the items in the previous figure.

Item	Description
Enable Password	Specify the password all users must enter after executing the enable command at the CLI prompt.
Confirm Enable Password	Type the password again to confirm that you have entered it correctly.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.9.3 Password Rules

Use the Password Rules page to configure settings that apply to all user passwords.

To access this page, click **System** > **Passwords** > **Password Rules**.

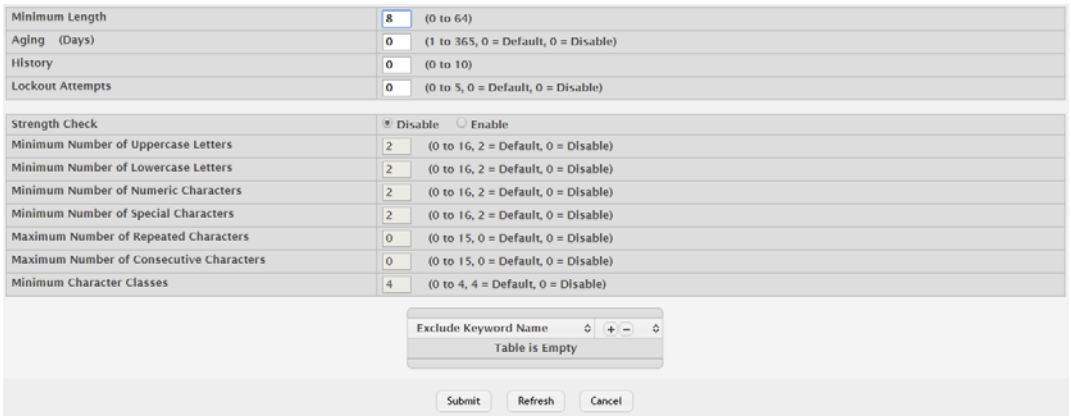


Figure 4.115 System > Passwords > Password Rules

The following table describes the items in the previous figure.

Item	Description
Minimum Length	The minimum number of characters required for a valid password.
Aging (Days)	The number of days that a user password is valid from the time the password is set. Once a password expires, the user is required to enter a new password at the next login.
History	The number of previous passwords that are retained to prevent password reuse. This helps to ensure that a user does not attempt to reuse the same password too often.
Lockout Attempts	The number of local authentication attempts that are allowed to fail before the user account is automatically locked.
Strength Check	Enables or disables the password strength checking feature. Enabling this feature forces the user to configure passwords that comply with the various strong password configuration parameters that are defined on this page.
Minimum Number of Uppercase Letters	The minimum number of upper-case letters that a valid password must contain.
Minimum Number of Lowercase Letters	The minimum number of lower-case letters that a valid password must contain.
Minimum Number of Numeric Characters	The minimum number of numeric characters that a valid password must contain.
Minimum Number of Special Characters	The minimum number of special characters (such as the keyboard symbols @, $, &) that a valid password must contain.
Maximum Number of Repeated Characters	The maximum number of characters of any type that are allowed to repeat in a valid password. Repetition is defined as the same character occurring in succession anywhere within the password, such as “11” or “%%%” or “EEEE”.
Maximum Number of Consecutive Characters	The maximum number of characters belonging to a sequence that are allowed to occur in a valid password. Consecutive characters are defined as a sequential pattern of case-sensitive alphabetic or numeric characters, such as “2345” or “def” or “YZ”.
Minimum Character Classes	This minimum number of character classes, defined as the various password strength categories listed above, that must be met in order for a password to be considered valid. It is permissible, therefore, to define strength checking criteria for each of the different types of conditions, but only require a valid password to meet some of them. The number of these character classes that must be met is specified by this value.

Item	Description
Exclude Keyword Name	The list of keywords that a valid password must not contain. Excluded keyword checking is case-insensitive. Additionally, a password cannot contain the backwards version of an excluded keyword. For example, if pass is an excluded keyword, passwords such as 23passA2c, ssapword, and PAsSwoRD are prohibited. Use the plus and minus buttons to perform the following tasks: ■ To add a keyword to the list, click + button, type the word to exclude in the Exclude Keyword Name field, and click **Submit**. ■ To remove a keyword from the list, click − button associated with the keyword to remove and confirm the action. ■ To remove all keywords from the list, click − button in the header row and confirm the action.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.9.4 Last Password

Use the Last Password Result page view information about the last attempt to set a user password. If the password set was unsuccessful, a reason for the failure is given.

To access this page, click **System** > **Passwords** > **Last Password**.

Figure 4.116 System > Passwords > Last Password

The following table describes the items in the previous figure.

Item	Description
Last Result	Displays information about the last (User/Line/Enable) password configuration result. If the field is blank, no passwords have been configured on the device. Otherwise, the field shows that the password was successfully set or provides information about the type of password configuration that failed and why it could not be set.
Strength Check	Displays Enabled if Strength Check is applied in last password change, otherwise it displays Disabled.
Refresh	Click **Refresh** to update the screen.

4.3.9.5 Reset Passwords

Use the Reset Passwords page to reset all system login passwords to factory default values. When you click **Reset**, the reset action is initiated.

To access this page, click **System** > **Passwords** > **Reset Passwords**.

Figure 4.117 System > Passwords > Reset Passwords

The following table describes the items in the previous figure.

Item	Description
Reset	Click **Reset** to initiates a reset of all login passwords to their factory default setting after displaying a confirmation message.

4.3.10 Port

The pages in the Port folder allow you to view and monitor the physical port information for the ports available on the switch. The Port folder has links to the following pages:

4.3.10.1 Summary

Use the Port Summary page to view the settings for all physical ports on the platform.

To access this page, click **System** > **Port** > **Summary**.

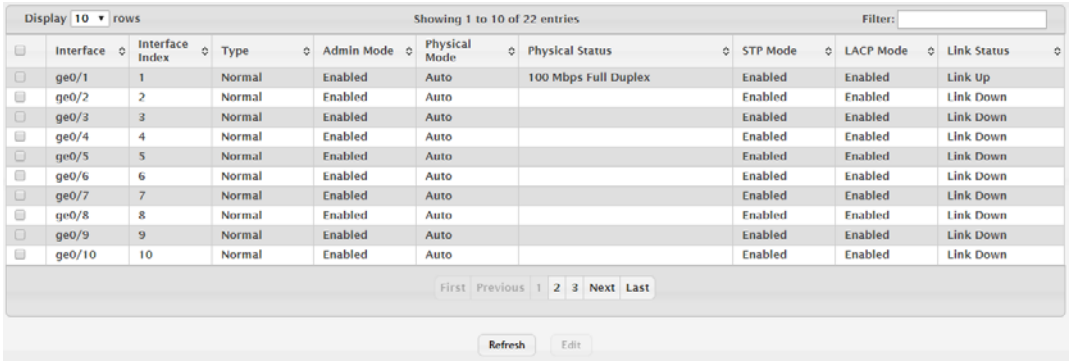


Figure 4.118 System > Port > Summary

The following table describes the items in the previous figure.

Item	Description
Interface	Identifies the port or LAG.
Interface Index	The interface index object value assigned by the IF-MIB. This value is used to identify the interface when managing the device by using SNMP.
Type	The interface type, which is one of the following: ■ Normal: The port is a normal port, which means it is not a LAG member or configured for port mirroring. ■ Trunk Member: The port is a member of a LAG. ■ Mirrored: The port is configured to mirror its traffic (ingress, egress, or both) to another port (the probe port). ■ Probe: The port is configured to receive mirrored traffic from one or more source ports.
Admin Mode	The administrative mode of the interface. If a port or LAG is administratively disabled, it cannot forward traffic.
Physical Mode	The port speed and duplex mode. If the mode is Auto, the port's maximum capability are advertised, and the duplex mode and speed are set from the auto-negotiation process. The physical mode for a LAG is reported as “LAG”.
Physical Status	Indicates the port speed and duplex mode for physical interfaces. The physical status for LAGs is not reported. When a port is down, the physical status is unknown.
STP Mode	The Spanning Tree Protocol (STP) Administrative Mode associated with the port or LAG. STP is a layer 2 protocol that provides a tree topology for switches on a bridged LAN. STP allows a network to have redundant paths without the risk of network loops. by providing a single path between end stations on a network. The possible values for STP mode are: ■ Enable: Spanning tree is enabled for this port. ■ Disable: Spanning tree is disabled for this port.

Item	Description
LACP Mode	Shows the administrative mode of the Link Aggregation Control Protocol (LACP), which is one of the following: ■ Enabled: The port uses LACP for dynamic LAG configuration. When LACP is enabled, the port sends and receives LACP PDUs with its link partner to confirm that the external switch is also configured for link aggregation. ■ Disabled: The port is supports static LAG configuration only. This mode might be used when the port is connected to a device that does not support LACP. When a port is added to a LAG as a static member, it neither transmits nor receives LACP PDUs.
Link Status	Indicates whether the link is up or down. The link is the physical connection between the port or LAG and the interface on another device.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.3.10.2 Description

Use the Port Description page to configure a human-readable description of the port.

To access this page, click **System** > **Port** > **Description**.

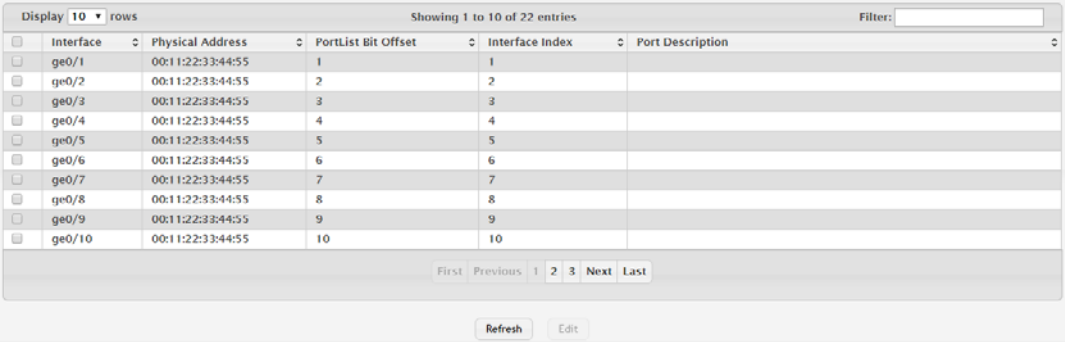


Figure 4.119 System > Port > Description

The following table describes the items in the previous figure.

Item	Description
Interface	Identifies the port or LAG.
Physical Address	The MAC address of the interface.
PortList Bit Offset	The bit offset value that corresponds to the interface when the MIB object type Port List is used when managing the device by using SNMP.
Interface Index	The interface index object value assigned by the IF-MIB. This value is used to identify the interface when managing the device by using SNMP.
Port Description	The current description, if any, associated with the interface to help identify it.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.3.10.3 Cable Test

The cable test feature enables you to determine the cable connection status on a selected port. You can also obtain an estimate of the length of the cable connected to the port, if the PHY on the ports supports this functionality.

Note! *The cable test feature is supported only for copper cable. It is not supported for optical fiber cable.*

To access this page, click **System** > **Port** > **Cable Test**.

Figure 4.120 System > Port > Cable Test

The following table describes the items in the previous figure.

Item	Description
Interface	Click the drop-down menu to select the port with the connected cable to test.
Failure Location Distance	The estimated distance from the end of the cable to the failure location. *NOTE: This field displays a value only when the Cable Status is Open or Short; otherwise, this field is blank.*
Cable Length (Meters)	The estimated length of the cable. If the cable length cannot be determined, Unknown is displayed. This field shows the range between the shortest estimated length and the longest estimated length. *NOTE: This field displays a value only when the Cable Status is Normal; otherwise, this field is blank.*
Cable Status	Displays the cable status as one of the following: ■ Normal: The cable is working correctly. ■ Open: The cable is disconnected, or there is a faulty connector. ■ Open and Short: There is an electrical short in the cable. ■ Cable status test failed: The cable status could not be determined. The cable may in fact be working.
Test Cable	Click **Test Cable** to perform a cable test on the selected interface. The cable test may take up to 2 seconds to complete. If the port has an active link, the link is not taken down, and the Cable Status always indicates Normal. The test returns a cable length estimate if this feature is supported by the PHY for the current link speed. *NOTE: If the link is down and a cable is attached to a 10/100 Ethernet adapter, the Cable Status may indicate Open or Short because some Ethernet adapters leave unused wire pairs unterminated or grounded.*

4.3.10.4 Mirroring

Port mirroring selects the network traffic for analysis by a network analyzer. This is done for specific ports of the switch. As such, many switch ports are configured as source ports and one switch port is configured as a destination port. You have the ability to configure how traffic is mirrored on a source port. Packets that are received on the source port, that are transmitted on a port, or are both received and transmitted, can be mirrored to the destination port.

The packet that is copied to the destination port is in the same format as the original packet on the wire. This means that if the mirror is copying a received packet, the copied packet is VLAN tagged or untagged as it was received on the source port. If the mirror is copying a transmitted packet, the copied packet is VLAN tagged or untagged as it is being transmitted on the source port.

Use the Multiple Port Mirroring page to define port mirroring sessions.

To access this page, click **System** > **Port** > **Mirroring**.

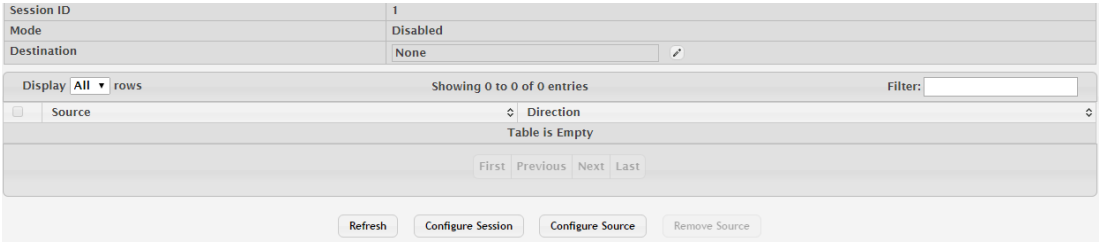


Figure 4.121 System > Port > Mirroring

The following table describes the items in the previous figure.

Item	Description
Session ID	The port mirroring session ID. The number of sessions allowed is platform specific.
Mode	The administrative mode for the selected port mirroring session. If the mode is disabled, the configured source is not mirroring traffic to the destination.
Destination	The interface that receives traffic from all configured source ports. After you click button, the Destination Configuration window opens. The following information describes the additional fields available in this window. ■ Type: The type of interface to use as the destination, which is one of the following: – None: The destination is not configured. – Remote VLAN: Traffic is mirrored to the VLAN on the system that is configured as the RSPAN VLAN. In an RSPAN configuration, the destination should be the Remote VLAN on any device that does not have a port connected to the network traffic analyzer. – Interface: Traffic is mirrored to a physical port on the local device. The interface is the probe port that is connected to a network traffic analyzer. ■ Remote VLAN: The VLAN that is configured as the RSPAN VLAN. ■ Port: The port to which traffic is mirrored. If the Type is Remote VLAN, the selected port is a reflector port. The reflector port is a trunk port that carries the mirrored traffic towards the destination device. If the Type is Interface, the selected port is the probe port that is connected to a network traffic analyzer.
Source	The ports or VLAN configured to mirror traffic to the destination. You can configure multiple source ports or one source VLAN per session. The source VLAN can also be a remote VLAN.

Item	Description
Direction	The direction of traffic on the source port (or source ports) or VLAN that is sent to the specified destination. A source VLAN mirrors all received and transmitted packets to the destination. Possible values for source ports are: ■ Tx and Rx: Both ingress and egress traffic. ■ Rx: Ingress traffic only. ■ Tx: Egress traffic only.
Refresh	Click **Refresh** to update the screen.
Configure Session	Click **Configure Session** to configure the administrative mode for a port mirroring session or to select an ACL for flow-based mirroring.
Configure Source	Click **Configure Source** to configure one or more source ports or a VLAN for the mirroring session and to determine which traffic is mirrored (Tx, Rx, or both).
Remove Source	Click **Remove Source** to remove the selected source ports.

4.3.10.5 Transceiver Brief

Use the Port Transceiver Brief page to display Digital Diagnostics Monitoring Interface information about plug-in transceiver.

To access this page, click **System** > **Port** > **Transceiver Brief**.

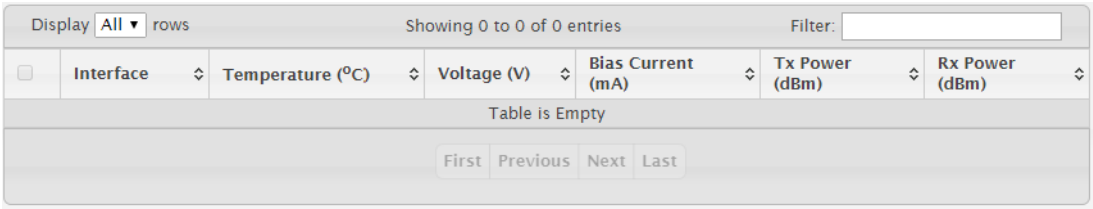


Figure 4.122 System > Port > Transceiver Brief

The following table describes the items in the previous figure.

Item	Description
Interface	Identifies the port.
Temperature	The internal temperature of the transceiver measured value.
Voltage	The supply voltage of the transceiver measured value.
Bias Current	The bias current of the transceiver measured value.
Tx Power	The transmission power of the transceiver measured value.
Rx Power	The received power of the transceiver measured value.
High Alarm Threshold	The high alarm threshold will be displayed by red color.
High Warning Threshold	The high warning threshold will be displayed by orange color.
Low Warning Threshold	The low warning threshold will be displayed by green color.
Low Alarm Threshold	The low alarm threshold will be displayed by blue color.

4.3.11 Statistics

4.3.11.1 System

Switch

The Switch Statistics page shows summary information about traffic transmitted and received on the device, entries in the MAC address table, and Virtual Local Area Networks (VLANs) that exist on the device.

To access this page, click **System** > **Statistics** > **System** > **Switch**.

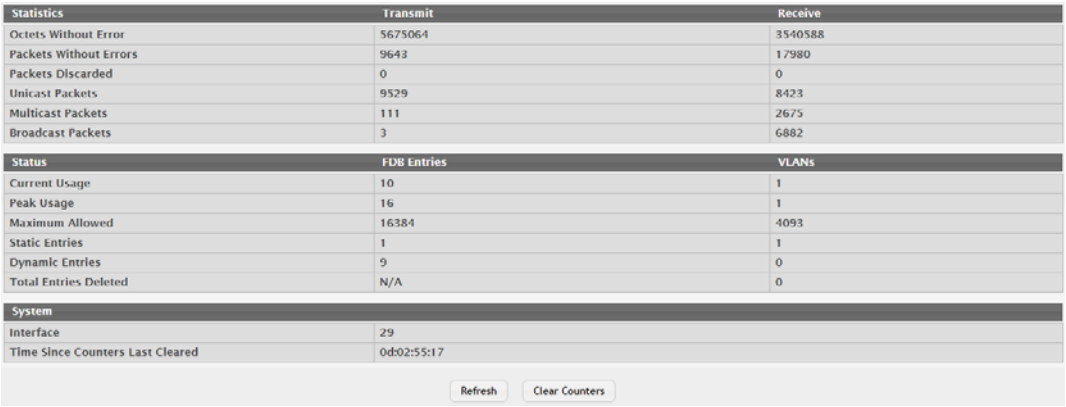


Figure 4.123 System > Statistics > System > Switch

The following table describes the items in the previous figure.

Item	Description
Statistics	
Octets Without Error	The total number of octets (bytes) of data successfully transmitted or received by the processor (excluding framing bits but including FCS octets).
Packets Without Errors	The total number of packets including unicast, broadcast, and multicast packets, successfully transmitted or received by the processor.
Packets Discarded	The number of outbound (Transmit column) or inbound (Receive column) packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.
Unicast Packets	The number of subnetwork-unicast packets delivered to or received from a higher-layer protocol.
Multicast Packets	The total number of packets transmitted or received by the device that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.
Broadcast Packets	The total number of packets transmitted or received by the device that were directed to the broadcast address. Note that this number does not include multicast packets.
Status	
Current Usage	In the FDB Entries column, the value shows the number of learned and static entries in the MAC address table. In the VLANs column, the value shows the total number of static and dynamic VLANs that currently exist in the VLAN database.
Peak Usage	The highest number of entries that have existed in the MAC address table or VLAN database since the most recent reboot.
Maximum Allowed	The maximum number of statically configured or dynamically learned entries allowed in the MAC address table or VLAN database.

Item	Description
Static Entries	The current number of entries in the MAC address table or VLAN database that an administrator has statically configured.
Dynamic Entries	The current number of entries in the MAC address table or VLAN database that have been dynamically learned by the device.
Total Entries Deleted	The number of VLANs that have been created and then deleted since the last reboot. This field does not apply to the MAC address table entries.
System	
Interface	The interface index object value of the interface table entry associated with the Processor of this switch. This value is used to identify the interface when managing the device by using SNMP.
Time Since Counters Last Cleared	The amount of time in days, hours, minutes, and seconds, that has passed since the statistics for this device were last reset.
Refresh	Click **Refresh** to update the screen.
Clear Counters	Click **Clear Counters** to reset all counters to zero. *NOTE: The Packets Discarded cannot be cleared.*

Port Summary

The Port Summary Statistics page shows statistical information about the packets received and transmitted by each port and LAG.

To access this page, click **System** > **Statistics** > **System** > **Port Summary**.

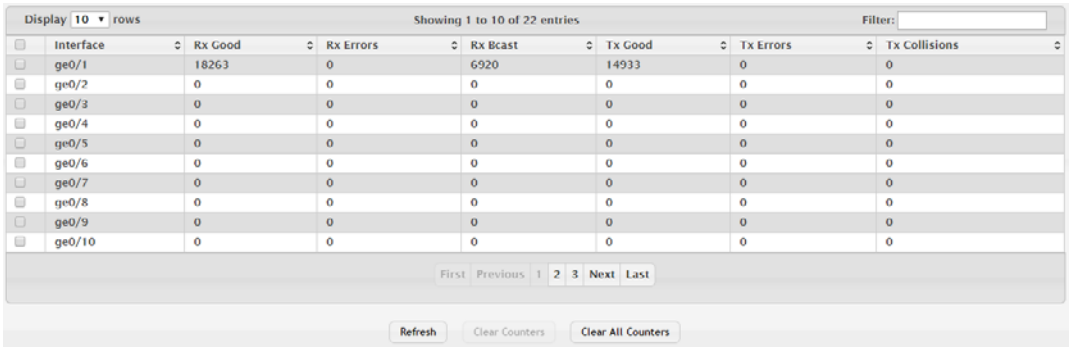


Figure 4.124 System > Statistics > System > Port Summary

The following table describes the items in the previous figure.

Item	Description
Interface	Identifies the port or LAG.
Rx Good	The total number of inbound packets received by the interface without errors.
Rx Errors	The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.
Rx Bcast	The total number of good packets received that were directed to the broadcast address. Note that this number does not include multicast packets.
Tx Good	The total number of outbound packets transmitted by the interface to its Ethernet segment without errors.
Tx Errors	The number of outbound packets that could not be transmitted because of errors.
Tx Collisions	The best estimate of the total number of collisions on this Ethernet segment.
Refresh	Click **Refresh** to update the screen.

Item	Description
Clear Counters	Click **Clear Counters** to reset the selected counters to zero.
Clear All Counters	Click **Clear All Counters** to reset all counters to zero.

Port Detailed

The Port Detailed Statistics page shows detailed information about the traffic transmitted and received by each interface.

To access this page, click **System** > **Statistics** > **System** > **Port Detailed**.

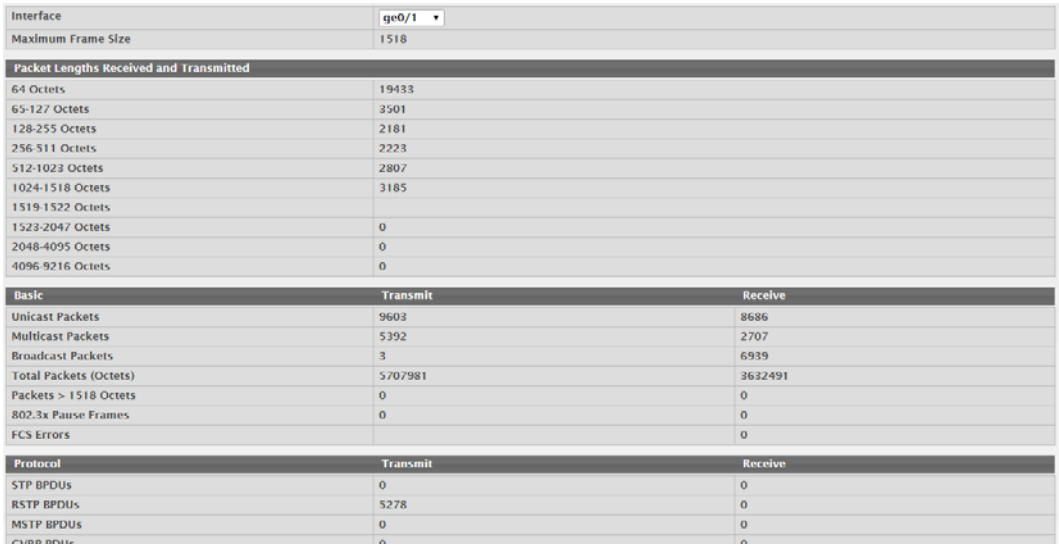


Figure 4.125 System > Statistics > System > Port Detailed

The following table describes the items in the previous figure.

Item	Description
Interface	Identifies the port or LAG. To view the statistics for a specific interface, select the interface number from the drop-down menu. The page automatically refreshes with the statistics for the selected interface.
Maximum Frame Size	The maximum Ethernet frame size the interface supports or is configured to support. The maximum frame size includes the Ethernet header, CRC, and payload.
Packet Lengths Received and Transmitted	The table shows how many packets of certain lengths have been received and transmitted by the interface.
Basic	The table shows basic information about the types of packets received or transmitted by the selected interface. Statistics for transmitted traffic and received traffic are shown in separate columns.
Unicast Packets	Packets sent from one network point to a single network destination. The receiver is identified by an IP address within the range 1.1.1.1-223.255.255.255.
Multicast Packets	Packets sent from multiple network points to one or more network destinations.
Broadcast Packets	Packets sent from one network point to all other network destinations.
Total Packets (Octets)	Total number of packets sent or recived (meaured in Octets).
Packets > 1518 Octets	Total number of packets sent or received which were longer than 1518 Octets in size.
802.3x Pause Frames	Ethernet flow control mechanism; Pause Frames are used to stop sender transmission for a specified duration.

Item	Description
FCS Errors	Frame Check Sequence errors may occur if a network link is bad or if packets are being dropped.
Protocol	The table shows statistics about various protocol data units (PDUs) or EAPOL frames transmitted or received by the interface. Statistics for transmitted traffic and received traffic are shown in separate columns.
Advanced - Transmit	The table shows statistics about problems that occurred while transmitting traffic.
Advanced - Receive	This table shows statistics about problems that occurred with traffic received on the interface.
Time Since Counters Last Cleared	The amount of time in days, hours, minutes, and seconds, that has passed since the statistics for this interface were last reset.
Refresh	Click **Refresh** to update the screen.
Clear Counters	Click **Clear Counters** to reset the detailed statistics for the selected interface to the default values.
Clear All Counters	Click **Clear All Counters** to reset the detailed statistics for all interfaces to the default values.

Network DHCPv6

The Network Port DHCPv6 Client Statistics page displays the DHCPv6 client statistics values for the network interface. The DHCPv6 client on the device exchanges several different types of UDP messages with one or more network DHCPv6 servers during the process of acquiring address, prefix, or other relevant network configuration information from the server. The values indicate the various counts that have accumulated since they were last cleared.

To access this page, click **System** > **Statistics** > **System** > **Network DHCPv6**.

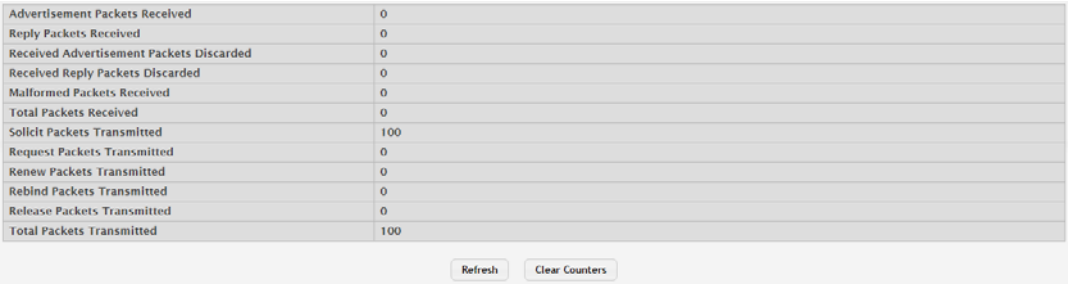


Figure 4.126 System > Statistics > System > Network DHCPv6

The following table describes the items in the previous figure.

Item	Description
Advertisement Packets Received	Number of DHCPv6 advertisement messages received from one or more DHCPv6 servers in response to the client's solicit message.
Reply Packets Received	Number of DHCPv6 reply messages received from one or more DHCPv6 servers in response to the client's request message.
Received Advertisement Packets Discarded	Number of DHCPv6 advertisement messages received from one or more DHCPv6 servers to which the client did not respond.
Received Reply Packets Discarded	Number of DHCPv6 reply messages received from one or more DHCPv6 servers to which the client did not respond.
Malformed Packets Received	Number of messages received from one or more DHCPv6 servers that were improperly formatted.
Total Packets Received	Total number of messages received from all DHCPv6 servers.
Solicit Packets Transmitted	Number of DHCPv6 solicit messages the client sent to begin the process of acquiring network information from a DHCPv6 server.

Item	Description
Request Packets Transmitted	Number of DHCPv6 request messages the client sent in response to a DHCPv6 server's advertisement message.
Renew Packets Transmitted	Number of renew messages the DHCPv6 client has sent to the server to request an extension of the lifetime of the information provided by the server. This message is sent to the DHCPv6 server that originally assigned the addresses and configuration information.
Rebind Packets Transmitted	Number of rebind messages the DHCPv6 client has sent to any available DHCPv6 server to request an extension of its addresses and an update to any other relevant information. This message is sent only if the client does not receive a response to the renew message.
Release Packets Transmitted	Number of release messages the DHCPv6 client has sent to the server to indicate that it no longer needs one or more of the assigned addresses.
Total Packets Transmitted	Total number of messages sent to all DHCPv6 servers.
Refresh	Click **Refresh** to update the screen.
Clear Counters	Click **Clear Counters** to reset all counters to zero.

4.3.11.2 Time Based

Group

Use the Time Based Group Statistics page to define criteria for collecting time-based statistics for interface traffic. The time-based statistics can be useful for troubleshooting and diagnostics purposes. The statistics application uses the system clock for time-based reporting, so it is important to configure the system clock (manually or through SNTP) before using this feature.

To access this page, click **System** > **Statistics** > **Time Based** > **Group**.

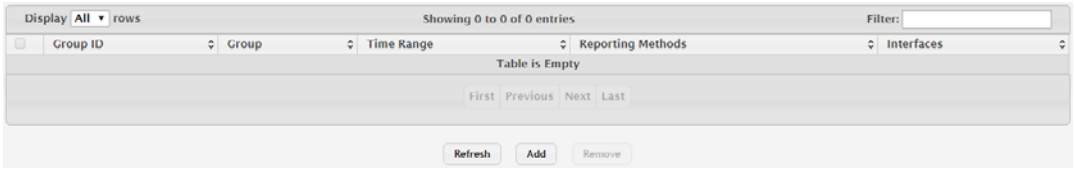


Figure 4.127 System > Statistics > Time Based > Group

The following table describes the items in the previous figure.

Item	Description
Group	The type of traffic statistics to collect for the group, which is one of the following: ■ Received: The number of packets received on the interfaces within the group. ■ Received Errors: The number of packets received with errors on the interfaces within the group. ■ Transmitted: The number of packets transmitted by the interfaces within the group. ■ Received Transmitted: The number of packets received and transmitted by the interfaces within the group. ■ Port Utilization: The percentage of total bandwidth used by the port within the specified time period. ■ Congestion: The percentage of time within the specified time range that the ports experienced congestion.

Item	Description
Time Range	The name of the periodic or absolute time range to use for data collection. The time range is configured by using the Time Range Summary and Time Range Entry Summary pages. The time range must be configured on the system before the time-based statistics can be collected.
Reporting Methods	The methods for reporting the collected statistics at the end of every configured time range interval. The available options are: ■ None: The statistics are not reported to the console or an external server. They can be viewed only by using the web interface or by issuing a CLI command. ■ Console: The statistics are displayed on the console. ■ E-Mail: The statistics are sent to an e-mail address. The SNTP server and e-mail address information is configured by using the appropriate Email Alerts pages. ■ Syslog: The statistics are sent to a remote syslog server. The syslog server information is configured on the Logging Hosts page.
Interfaces	The interface or interfaces on which data is collected. To select multiple interfaces when adding a new group, CTRL + click each interface to include in the group.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new time based group.
Remove	Click **Remove** to remove the selected entries.

To add a new time based group:

Click **System** > **Statistics** > **Time Based** > **Group** > **Add**.

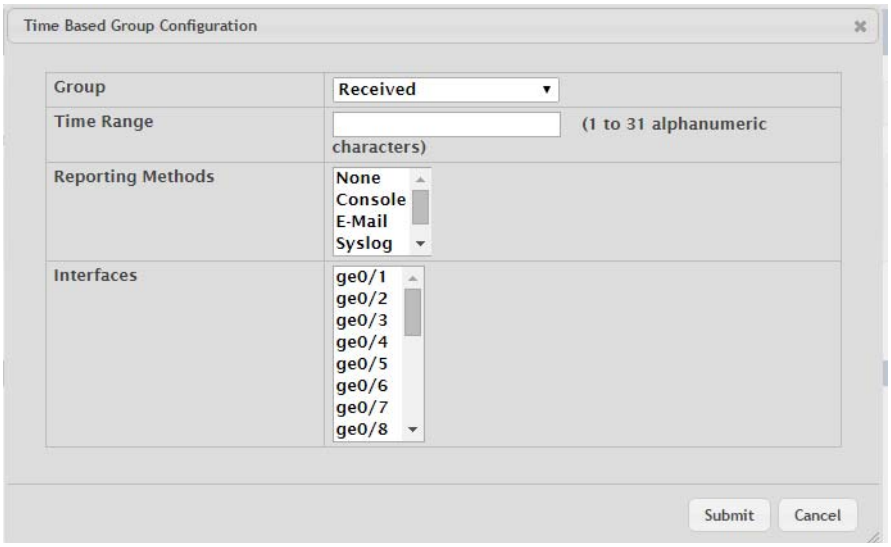


Figure 4.128 System > Statistics > Time Based > Group > Add

The following table describes the items in the previous figure.

Item	Description
Group	The type of traffic statistics to collect for the group, which is one of the following: ■ Received: The number of packets received on the interfaces within the group. ■ Received Errors: The number of packets received with errors on the interfaces within the group. ■ Transmitted: The number of packets transmitted by the interfaces within the group. ■ Received Transmitted: The number of packets received and transmitted by the interfaces within the group. ■ Port Utilization: The percentage of total bandwidth used by the port within the specified time period. ■ Congestion: The percentage of time within the specified time range that the ports experienced congestion.
Time Range	The name of the periodic or absolute time range to use for data collection. The time range is configured by using the Time Range Summary and Time Range Entry Summary pages. The time range must be configured on the system before the time-based statistics can be collected.
Reporting Methods	The methods for reporting the collected statistics at the end of every configured time range interval. The available options are: ■ None: The statistics are not reported to the console or an external server. They can be viewed only by using the web interface or by issuing a CLI command. ■ Console: The statistics are displayed on the console. ■ E-Mail: The statistics are sent to an e-mail address. The SNTP server and e-mail address information is configured by using the appropriate Email Alerts pages. ■ Syslog: The statistics are sent to a remote syslog server. The syslog server information is configured on the Logging Hosts page.
Interfaces	The interface or interfaces on which data is collected. To select multiple interfaces when adding a new group, CTRL + click each interface to include in the group.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Flow Based

Use the Time Based Flow Statistics page to define criteria for collecting time-based statistics for specific traffic flows. The statistics include a per-interface hit count based on traffic that meets the match criteria configured in a rule for the interfaces included in the rule. The hit count statistics are collected only during the specified time range. The statistics application uses the system clock for time-based reporting. Configure the system clock (manually or through SNTP) before using the time-based statistics feature.

To access this page, click **System** > **Statistics** > **Time Based** > **Flow Based**.

Figure 4.129 System > Statistics > Time Based > Flow Based

The following table describes the items in the previous figure.

Item	Description
Reporting Methods	The methods for reporting the collected statistics at the end of every configured interval. To change the reporting methods for all flow-based statistics rules, click the Edit icon and select one or more methods. To reset the field to the default value, click the Reset icon. The available reporting methods are: ■ None: The statistics are not reported to the console or an external server. They can be viewed only by using the web interface or by issuing a CLI command. ■ Console: The statistics are displayed on the console. ■ E-Mail: The statistics are sent to an e-mail address. The SNTP server and e-mail address information is configured by using the appropriate Email Alerts pages. ■ Syslog: The statistics are sent to a remote syslog server. The syslog server information is configured on the Logging Hosts page.
Rule Id	The number that identifies the flow-based statistics collection rule.
Time Range	The name of the periodic or absolute time range to use for data collection. The time range is configured by using the Time Range Summary and Time Range Entry Summary pages. The time range must be configured on the system before the time-based statistics can be collected.
Match Conditions	The criteria a packet must meet to match the rule.
Interfaces	The interface or interfaces on which the flow-based rule is applied. Only traffic on the specified interfaces is checked against the rule.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new time based flow.
Remove	Click **Remove** to remove the selected entries.

To add a new time based flow:

Click **System** > **Statistics** > **Time Based** > **Flow Based** > **Add**.

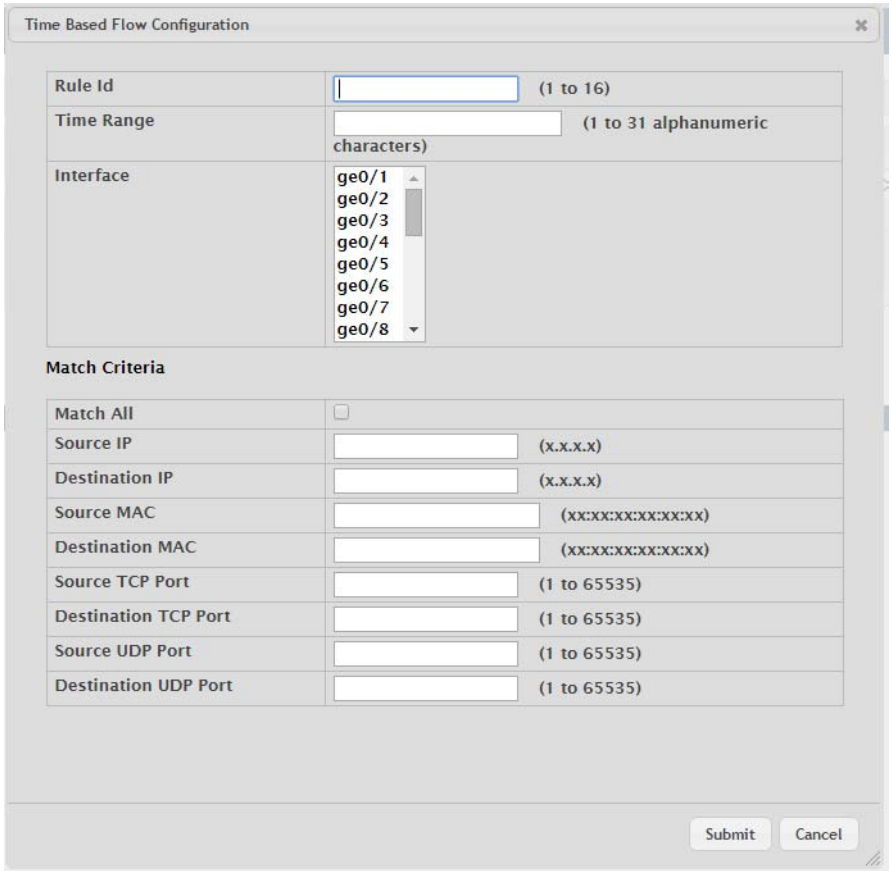


Figure 4.130 System > Statistics > Time Based > Flow Based > Add

The following table describes the items in the previous figure.

Item	Description
Rule Id	The number that identifies the flow-based statistics collection rule.
Time Range	The name of the periodic or absolute time range to use for data collection. The time range is configured by using the Time Range Summary and Time Range Entry Summary pages. The time range must be configured on the system before the time-based statistics can be collected.
Interface	The interface or interfaces on which the flow-based rule is applied. Only traffic on the specified interfaces is checked against the rule.
Match Criteria	
Match All	Select this option to indicate that all traffic matches the rule and is counted in the statistics. This option is exclusive to all other match criteria, so if Match All is selected, no other match criteria can be configured.
Source IP	The source IP address to match in the IPv4 packet header.
Destination IP	The destination IP address to match in the IPv4 packet header.
Source MAC	The source MAC address to match in the ingress frame header.
Destination MAC	The destination MAC address to match in the ingress frame header.
Source TCP Port	The TCP source port to match in the TCP header.
Destination TCP Port	The TCP destination port to match in the TCP header.
Source UDP Port	The UDP source port to match in the UDP header.
Destination UDP Port	The UDP destination port to match in the UDP header.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Statistics

Use the Time Based Statistics page to view time-based statistics collected for the configured traffic groups and flow-based rules.

To access this page, click **System** > **Statistics** > **Time Based** > **Statistics**.

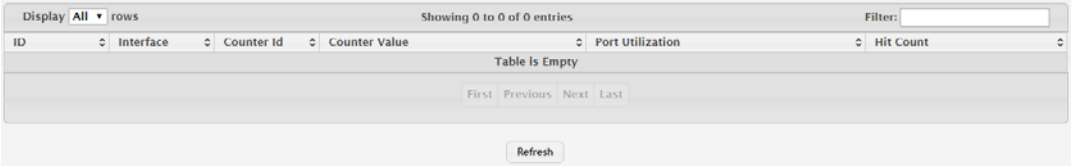


Figure 4.131 System > Statistics > Time Based > Statistics

The following table describes the items in the previous figure.

Item	Description
ID	The traffic group name or flow-based rule ID associated with the rest of the statistics in the row.
Interface	The interface on which the statistics were reported.
Counter Id	For traffic group statistics, this field identifies the type of traffic.
Counter Value	For traffic group statistics, this field shows the number of packets of the type identified by the Counter Id field that were reported on the interface during the time range.
Port Utilization	For a port utilization traffic group, this field reports the percentage of the total available bandwidth used on the interface during the time range.
Hit Count	For flow-based statistics, this field reports the number of packets that matched the flow-based rule criteria during the time range.
Refresh	Click **Refresh** to update the screen.

4.3.12 Status

4.3.12.1 ARP Cache

The ARP cache is a table maintained locally in each station on a network. ARP cache entries are learned by examining the source information in the ARP packet payload fields, regardless of whether it is an ARP request or response. Thus, when an ARP request is broadcast to all stations on a LAN segment or virtual LAN (VLAN), every recipient has the opportunity to store the sender's IP and MAC address in their respective ARP cache. The ARP response, being unicast, is normally seen only by the requestor, who stores the sender information in its ARP cache. Newer information always replaces existing content in the ARP cache.

The ARP cache can support 1024 entries, although this size is user-configurable to any value less than 1024. When multiple network interfaces are supported by a device, as is typical of a router, either a single ARP cache is used for all interfaces, or a separate cache is maintained per interface. While the latter approach is useful when network addressing is not unique per interface, this is not the case for Ethernet MAC address assignment so a single ARP cache is employed.

To access this page, click **System** > **Status** > **ARP Cache**.

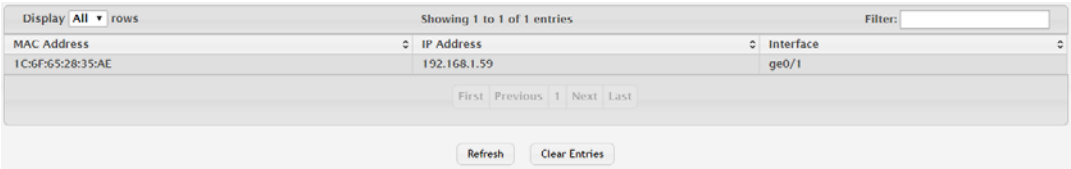


Figure 4.132 System > Status > ARP Cache

The following table describes the items in the previous figure.

Item	Description
MAC Address	The physical (MAC) address associated with the IP address of the connection.
IP Address	The Internet (IP) address of the connection.
Interface	Shows the switch port through which the connection was established, or displays as Management if the connection occurred via a non-network port interface (if applicable).
Refresh	Click **Refresh** to update the screen.
Clear Entries	Click **Clear Entries** to clear all entries from the system ARP Cache.

4.3.12.2 Resource Status

Use the System Resource Status page to display the following memory information for the switch:

- Free memory
- Allocated memory
- CPU utilization by task
- Total CPU utilization at the following intervals:
  - Five seconds
  - One minute
  - Five minutes

To access this page, click **System** > **Status** > **Resource Status**.

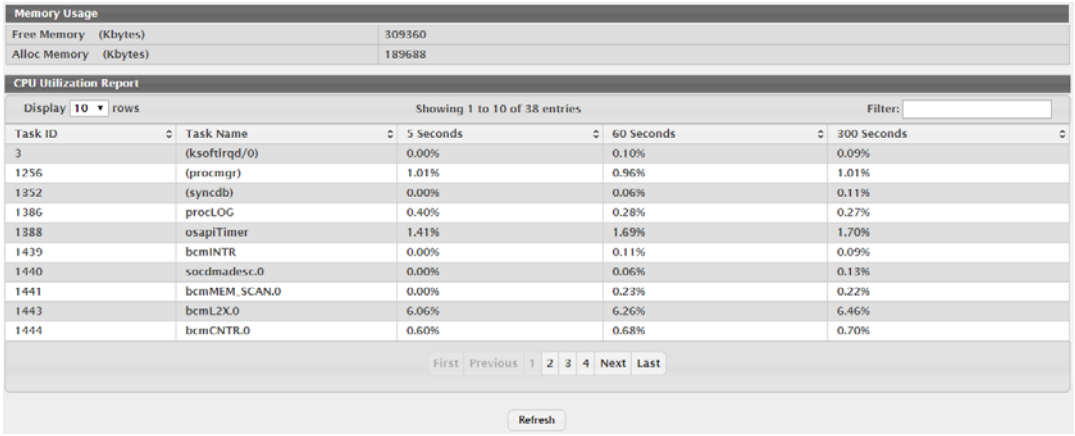


Figure 4.133 System > Status > Resource Status

The following table describes the items in the previous figure.

Item	Description
Memory Usage	
Free Memory (Kbytes)	The amount of system memory that is currently available for allocation, specified in kilobytes.
Alloc Memory (Kbytes)	The amount of system memory that is currently allocated for use, specified in kilobytes.
CPU Utilization Report	
Task ID	System task identifier. The entry named Total represents the total CPU utilization, expressed as a percentage, that is used by the entire system for each of the specified time intervals.
Task Name	System task name.
5 Seconds	The percentage amount of CPU utilization consumed by the corresponding task in the last 5 seconds.

Item	Description
60 Seconds	The percentage amount of CPU utilization consumed by the corresponding task in the last 60 seconds.
300 Seconds	The percentage amount of CPU utilization consumed by the corresponding task in the last 300 seconds.
Refresh	Click **Refresh** to update the screen.

4.3.12.3 Resource Configuration

Use the System Resource Configuration page to configure the threshold parameters for monitoring CPU utilization and the amount of free memory in the system.

To access this page, click **System** > **Status** > **Resource Configuration**.

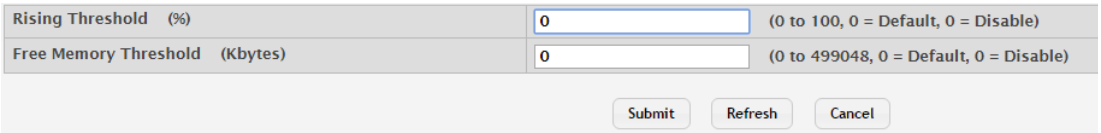


Figure 4.134 System > Status > Resource Configuration

The following table describes the items in the previous figure.

Item	Description
Rising Threshold (%)	The CPU utilization rising threshold, expressed as a percentage. When the CPU utilization is increasing, an event is signaled when it reaches or exceeds this level.
Free Memory Threshold (Kbytes)	The free memory threshold in kilobytes. If enabled, an event is signaled when the amount of free memory in the system falls below this value.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.13 Summary

4.3.13.1 Dashboard

The FASTPATH page provides a brief overview of the system and serves as the home page upon successful login to the device.

To access this page, click **System** > **Summary** > **Dashboard**.

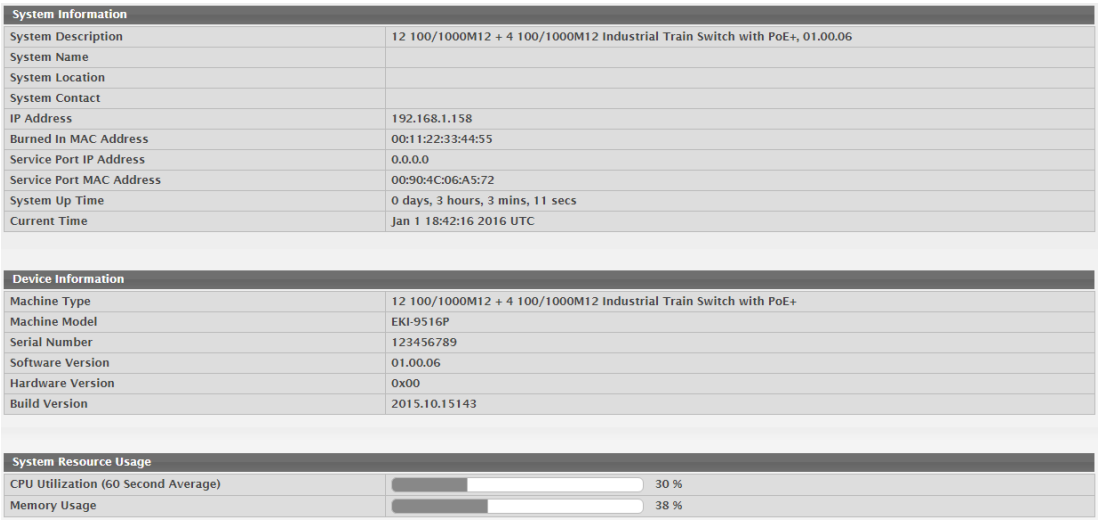


Figure 4.135 System > Summary > Dashboard

The following table describes the items in the previous figure.

Item	Description
System Information	
System Description	The product name of this device.
System Name	The configured name used to identify this device.
System Location	The configured location of this device.
System Contact	The configured contact person for this device.
IP Address	The IP address assigned to the network interface. The network interface is the logical interface that allows remote management of the device via any of the front-panel switch ports.
Burned In MAC Address	The device burned-in universally-administered media access control (MAC) address of the base system.
Service Port IP Address	The IP address assigned to the service port. The service port provides remote management access to the device. Traffic on this port is segregated from operational network traffic on the switch ports and cannot be switched or routed to the operational network.
Service Port MAC Address	The device burned-in universally-administered media access control (MAC) address of the service port.
System Up Time	The time in days, hours, minutes and seconds since the system was last reset.
Current Time	The current time in system.
Device Information	
Machine Type	The device hardware type or product family.
Machine Model	The model identifier, which is usually related to the Machine Type.
Serial Number	The unique device serial number.
Software Version	The release.version.maintenance number of the software currently running on the device. For example, if the release is 1, the version is 2 and the maintenance number is 4, this version number is displayed as 1.2.4.
Hardware Version	The device hardware version.
Build Version	The software trunk version.
System Resource Usage	
CPU Utilization (60 Second Average)	The percentage of CPU utilization for the entire system averaged over the past 60 seconds.
Memory Usage	The percentage of total available system memory (RAM) that is currently in use.
Logged In Users	A brief summary indicating all other users currently logged into the device. The Idle Time field gives an indication of user activity, with a smaller time value denoting more recent access to the system.
Recent Log Entries	A brief list of the newest entries recorded in the system log.
Refresh	Click **Refresh** to update the screen.

4.3.13.2 Description

Use the System Description page to view and configure basic information about the device. This page contains information that is useful for administrators who manage the device by using a Network Management System (NMS) that communicates with the Simple Network Manage Protocol (SNMP) agent on the device.

To access this page, click **System** > **Summary** > **Description**.

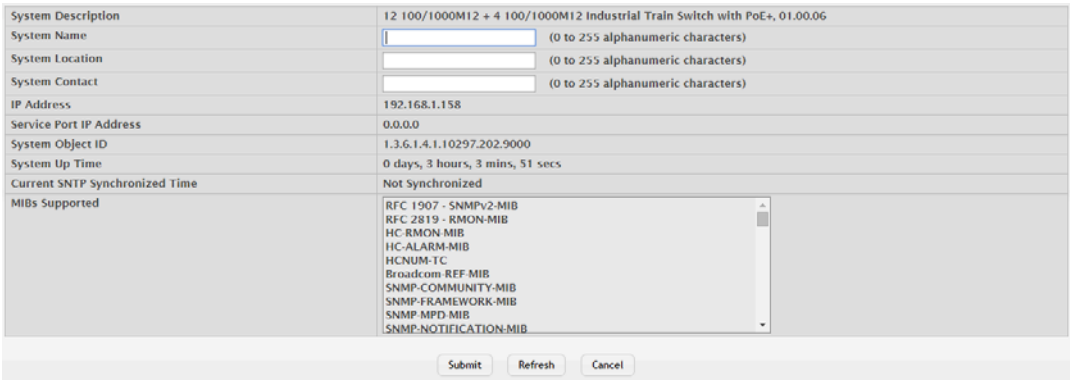


Figure 4.136 System > Summary > Description

The following table describes the items in the previous figure.

Item	Description
System Description	The product name of this device.
System Name	The name used to identify this device. The factory default is blank.
System Location	The location of this device. The factory default is blank.
System Contact	The contact person for this device. The factory default is blank.
IP Address	The IP address assigned to the network interface. The network interface is the logical interface that allows remote management of the device via any of the front-panel switch ports.
Service Port IP Address	The IP address assigned to the service port. The service port provides remote management access to the device. Traffic on this port is segregated from operational network traffic on the switch ports and cannot be switched or routed to the operational network.
System Object ID	The base object ID for the device's enterprise MIB. This ID is used for SNMP-based management of the device.
System Up Time	The time in days, hours, minutes, and seconds since the last device reboot.
Current SNTP Synchronized Time	Displays the currently synchronized SNTP time in UTC. If the time is not synchronized with an SNTP server, it displays “Not Synchronized”.
MIBs Supported	The list of MIBs supported by the SNMP agent running on this device.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.3.13.3 Inventory

The System Inventory Information page displays information about the system hardware and software.

To access this page, click **System** > **Summary** > **Inventory**.

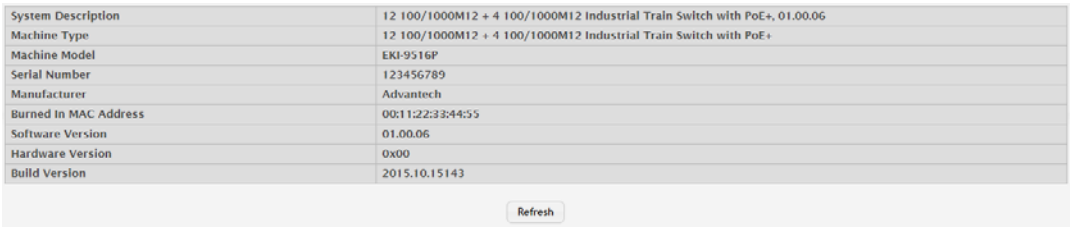


Figure 4.137 System > Summary > Inventory

The following table describes the items in the previous figure.

Item	Description
System Description	The product name of this device.
Machine Type	The hardware platform of this device.
Machine Model	The product model number.
Serial Number	The unique serial number used to identify the device.
Manufacturer	The two-octet code that identifies the manufacturer.
Burned In MAC Address	The device burned-in universally-administered media access control (MAC) address.
Software Version	The release.version.maintenance number of the code currently running on the switch. For example, if the release is 1, the version is 2 and the maintenance number is 4, the format is 1.2.4.
Hardware Version	The device hardware version.
Build Version	The software trunk version.
Refresh	Click **Refresh** to update the screen.

4.3.13.4 MAC Address Table

The MAC address table keeps track of the Media Access Control (MAC) addresses that are associated with each port. This table allows the device to forward unicast traffic through the appropriate port. The MAC address table is sometimes called the bridge table or the forwarding database.

Use the MAC Address Table page to display information about entries in the MAC address table. The transparent bridging function uses these entries to determine how to forward a received frame.

To access this page, click **System** > **Summary** > **MAC Address Table**.

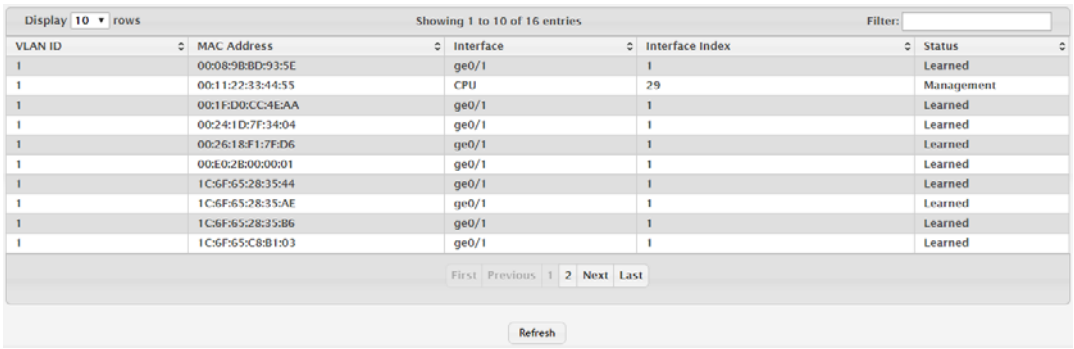


Figure 4.138 System > Summary > MAC Address Table

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN with which the MAC address is associated. A MAC address can be associated with multiple VLANs.
MAC Address	A unicast MAC address for which the switch has forwarding and/or filtering information. The format is a six-byte MAC address, with each byte separated by colons.
Interface	The port where this address was learned. The port identified in this field is the port through which the MAC address can be reached.
Interface Index	The Interface Index of the MIB interface table entry associated with the source port. This value helps identify an interface when using SNMP to manage the device.

Item	Description
Status	Provides information about the entry and why it is in the table, which can be one of the following: ■ Static: The address has been manually configured and does not age out. ■ Learned: The address has been automatically learned by the device and can age out when it is not in use. Dynamic addresses are learned by examining information in incoming Ethernet frames. ■ Management: The burned-in MAC address of the device. ■ Self: The MAC address belongs to one of the device's physical interfaces. ■ GMRP Learned: The address was added dynamically by the GARP Multicast Registration Protocol (GMRP). ■ Other: The address was added dynamically through an unidentified protocol or method. ■ Unknown: The device is unable to determine the status of the entry.
Refresh	Click **Refresh** to update the screen.

4.3.14 Users

4.3.14.1 Accounts

By default, the switch contains two user accounts:

- admin, with 'Read/Write' privilege
- user, with 'Read Only' privileges

Admin account's password is also admin by default. User account's password is also user by default.

If you log on to the switch with the user account that Read/Write privileges (i.e., as admin), you can use the User Accounts page to assign passwords and set security parameters for the default accounts. You can also add up to five read-only accounts. You can delete all accounts except for the Read/Write account.

Note! *Only a user with Read/Write privileges may alter data on this screen, and only one account can exist with Read/Write privileges.*

To access this page, click **System** > **Users** > **Accounts**.

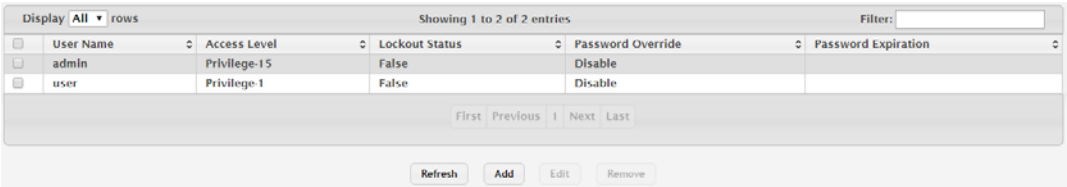


Figure 4.139 System > Users > Accounts

The following table describes the items in the previous figure.

Item	Description
User Name	A unique ID or name used to identify this user account.

Item	Description
Access Level	The access or privilege level for this user. The options are: ■ Privilege-15: The user can view and modify the configuration. ■ Privilege-1: The user can view the configuration but cannot modify any fields. ■ Privilege-0: The user exists but is not permitted to log on to the device.
Lockout Status	Provides the current lockout status for this user. If the lockout status is True, the user cannot access the management interface even if the correct username and password are provided. The user has been locked out of the system due to a failure to supply the correct password within the configured number of login attempts.
Password Override	Identifies the password override complexity status for this user. ■ Enable: The system does not check the strength of the password. ■ Disable: When configuring a password, it is checked against the Strength Check rules configured for passwords.
Password Expiration	Indicates the current expiration date (if any) of the password.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new user.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new user:

Click **System** > **Users** > **Accounts** > **Add**.

Figure 4.140 System > Users > Accounts > Add

The following table describes the items in the previous figure.

Item	Description
User Name	A unique ID or name used to identify this user account.
Password	The password assigned to this user.
Confirm	Re-enter the password to confirm that you have entered it correctly.
Access Level	The access or privilege level for this user. The options are: ■ Privilege-15: The user can view and modify the configuration. ■ Privilege-1: The user can view the configuration but cannot modify any fields. ■ Privilege-0: The user exists but is not permitted to log on to the device.
Password Override	Identifies the password override complexity status for this user. ■ Enable: The system does not check the strength of the password. ■ Disable: When configuring a password, it is checked against the Strength Check rules configured for passwords.

Item	Description
Password Strength	Shows the status of password strength check.
Encrypted Password	Specifies the password encryption.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.3.14.2 Auth Server Users

Use the Auth Server Users page to add and remove users from the local authentication server user database. For some security features, such as IEEE 802.1X port-based authentication, you can configure the device to use the locally stored list of usernames and passwords to provide authentication to users instead of using an external authentication server.

To access this page, click **System** > **Users** > **Auth Server Users**.

Figure 4.141 System > Users > Auth Server Users

The following table describes the items in the previous figure.

Item	Description
User Name	A unique name used to identify this user account. You configure the User Name when you add a new user.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new user to the local authentication server database.
Edit	Click **Edit** to change the password information for the selected user.
Remove	Click **Remove** to remove the selected entries.
Clear All User	Click **Clear All User** to remove all users from the database.

To add a new authentication list:

Click **System** > **Users** > **Auth Server Users** > **Add**.

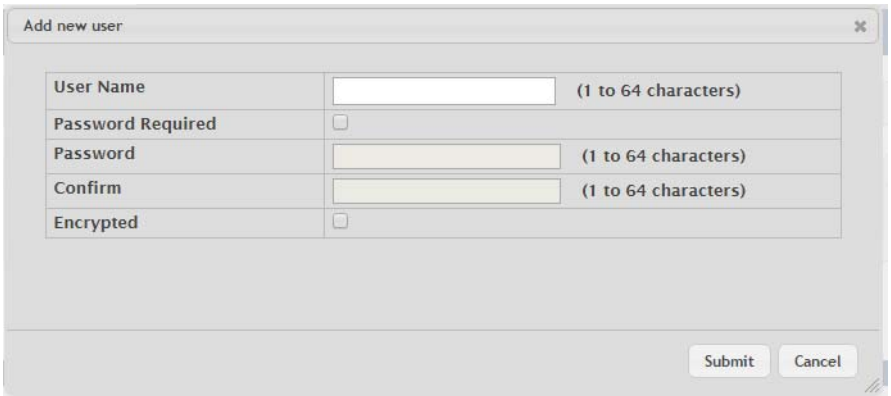


Figure 4.142 System > Users > Auth Server Users > Add

The following table describes the items in the previous figure.

Item	Description
User Name	A unique name used to identify this user account. You configure the User Name when you add a new user.

Item	Description
Password Required	Select this option to indicate that the user must enter a password to be authenticated. If this option is clear, the user is required only to enter a valid user name.
Password	Specify the password to associate with the user name (if required).
Confirm	Re-enter the password to confirm the entry.
Encrypted	Select this option to encrypt the password before it is stored on the device.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.3.14.3 Sessions

The Logged In Sessions page identifies the users that are logged in to the management interface of the device. The page also provides information about their connections.

To access this page, click **System** > **Users** > **Sessions**.

Figure 4.143 System > Users > Sessions

The following table describes the items in the previous figure.

Item	Description
ID	The unique ID of the session.
User Name	The name that identifies the user account.
Connection From	Identifies the administrative system that is the source of the connection. For remote connections, this field shows the IP address of the administrative system. For local connections through the console port, this field shows the communication standard for the serial connection.
Idle Time	Shows the amount of time in hours, minutes, and seconds that the logged-on user has been inactive.
Session Time	Shows the amount of time in hours, minutes, and seconds since the user logged onto the system.
Session Type	Shows the type of session, which can be Telnet, Serial, SSH, HTTP, or HTTPS.
Refresh	Click **Refresh** to update the screen.

4.3.15 Utilities

4.3.15.1 System Reset

Use the System Reset page to reboot the system. If the platform supports stacking, you can reset any of the switches in the stack, or all switches in the stack from this page.

To access this page, click **System** > **Utilities** > **System Reset**.

Figure 4.144 System > Utilities > System Reset

The following table describes the items in the previous figure.

Item	Description
Reset	Click **Reset** to initiates the system reset action after displaying a confirmation message.

4.3.15.2 Ping

Use the Ping page to tell the switch to send a Ping request to a specified IP address. You can use this feature to check whether the switch can communicate with a particular network host.

To access this page, click **System** > **Utilities** > **Ping**.

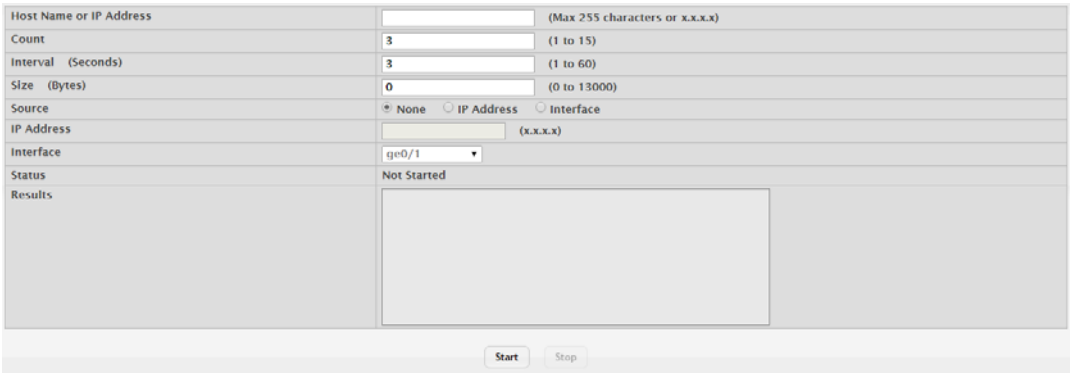


Figure 4.145 System > Utilities > Ping

The following table describes the items in the previous figure.

Item	Description
Host Name or IP Address	The DNS-resolvable hostname or IP address of the system to ping.
Count	Enter the number of ICMP echo request packets to send to the host.
Interval (Seconds)	Enter the number of seconds to wait between sending ping packets.
Size (Bytes)	The size of the ping packet, in bytes. Changing the size allows you to troubleshoot connectivity issues with a variety of packet sizes, such as large or very large packets.
Source	The source IP address or interface to use when sending the echo request packets. If source is not required, select None as source option.
IP Address	The source IP address to use when sending the Echo requests packets. This field is enabled when IP Address is selected as source option.
Interface	The interface to use when sending the Echo requests packets. This field is enabled when Interface is selected as source option.
Status	The current status of the ping test, which can be: ■ Not Started: The ping test has not been initiated since viewing the page. ■ In Progress: The ping test has been initiated and is running. ■ Stopped: The ping test was interrupted by clicking the **Stop** button. ■ Done: The test has completed, and information about the test is displayed in the Results area.
Results	The results of the ping test, which includes information about the reply (if any) received from the host.

Item	Description
Start	Click **Start** to start the ping test. The device sends the specified number of ping packets to the host.
Stop	Click **Stop** to interrupts the current ping test.

4.3.15.3 Ping IPv6

Use the Ping IPv6 page to tell the device to send one or more ping requests to a specified IPv6 host. You can use the ping request to check whether the device can communicate with a particular host on an IPv6 network. A ping request is an Internet Control Message Protocol version 6 (ICMPv6) echo request packet. The information you enter on this page is not saved as part of the device configuration.

To access this page, click **System** > **Utilities** > **Ping IPv6**.

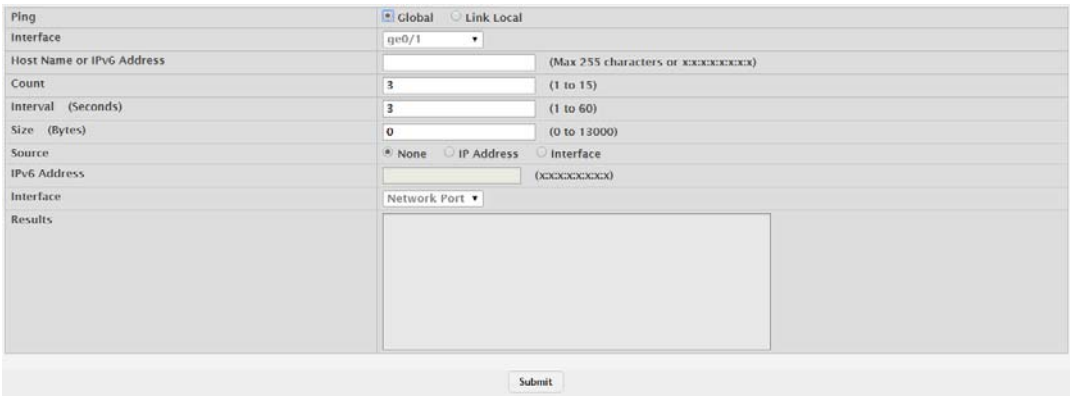


Figure 4.146 System > Utilities > Ping IPv6

The following table describes the items in the previous figure.

Item	Description
Ping	Select either a global IPv6 address or a link local address to ping. A global address is routable over the Internet, while a link-local address is intended for communication only within the local network. Link local addresses have a prefix of fe80::/64.
Interface	Select the interface on which to issue the Link Local ping request.
Host Name or IPv6 Address	Enter the global or link-local IPv6 address, or the DNS-resolvable host name of the station to ping. If the ping type is Link Local, you must enter a link-local address and cannot enter a host name.
Count	Enter the number of ICMP echo request packets to send to the host.
Interval (Seconds)	Enter the number of seconds to wait between sending ping packets.
Size (Bytes)	The size of the ping packet, in bytes. Changing the size allows you to troubleshoot connectivity issues with a variety of packet sizes, such as large or very large packets.
Source	The source IP address or interface to use when sending the echo request packets. If source is not required, select None as source option.
IPv6 Address	The source IPv6 address to use when sending the Echo requests packets. This field is enabled when IP Address is selected as source option.
Interface	The interface to use when sending the Echo requests packets. This field is enabled when Interface is selected as source option.
Results	The results of the ping test, which includes information about the reply (if any) received from the host.
Submit	Click **Submit** to start the ping test.

4.3.15.4 TraceRoute

Use the TraceRoute page to determine the layer 3 path a packet takes from the device to a specific IP address or hostname. When you initiate the TraceRoute command by clicking the **Start** button, the device sends a series of TraceRoute probes toward the destination. The results list the IP address of each layer 3 device a probe passes through until it reaches its destination - or fails to reach its destination and is discarded. The information you enter on this page is not saved as part of the device configuration.

To access this page, click **System** > **Utilities** > **TraceRoute**.

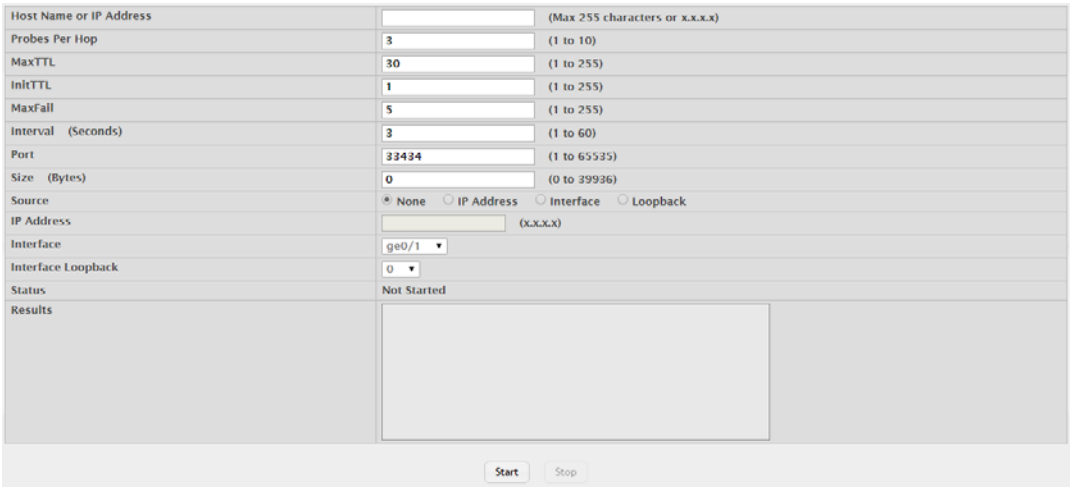


Figure 4.147 System > Utilities > TraceRoute

The following table describes the items in the previous figure.

Item	Description
Host Name or IP Address	The DNS-resolvable hostname or IP address of the system to attempt to reach.
Probes Per Hop	TraceRoute works by sending UDP packets with increasing Time-To-Live (TTL) values. Specify the number of probes sent with each TTL.
MaxTTL	The maximum Time-To-Live (TTL). The TraceRoute terminates after sending probes that can be layer 3 forwarded this number of times. If the destination is further away, the TraceRoute will not reach it.
InitTTL	The initial Time-To-Live (TTL). This value controls the maximum number of layer 3 hops that the first set of probes may travel.
MaxFail	The number of consecutive failures that terminate the TraceRoute. If the device fails to receive a response for this number of consecutive probes, the TraceRoute terminates.
Interval (Seconds)	The number of Seconds to wait between sending probes.
Port	The UDP destination port number to be used in probe packets. The port number should be a port that the target host is not listening on, so that when the probe reaches the destination, it responds with an ICMP Port Unreachable message.
Size (Bytes)	The size of probe payload in bytes.
Source	Select None, IP Address, Interface, or Loopback as a source. Each option enables the respective menu item: IP Address, Interface, or Interface Loopback, allowing the entry of the related information.
IP Address	Enabled if IP Address option is selected from Source setting.
Interface	Enabled if Interface option is selected from Source setting.
Interface Loopback	Enabled if Loopback option is selected from Source setting.

Item	Description
Status	The current status of the TraceRoute, which can be: ■ Not Started: The TraceRoute has not been initiated since viewing the page. ■ In Progress: The TraceRoute has been initiated and is running. ■ Stopped: The TraceRoute was interrupted by clicking the **Stop** button. ■ Done: The TraceRoute has completed, and information about the TraceRoute is displayed in the Results area.
Results	The results of the TraceRoute, which are displayed in the following format: 1 10.20.24.1 0 ms 0 ms 0 ms 2 66.20.17.9 10 ms 0 ms 10 ms 3 66.20.246.82 10 ms 20 ms 10 ms 4 129.20.4.4 20 ms 10 ms 40 ms 5 129.20.3.55 80 ms 80 ms 90 ms 6 129.20.5.246 80 ms 80 ms 80 ms 7 198.20.90.26 70 ms 70 ms 70 ms 8 216.20.255.105 90 ms 70 ms 80 ms 9 63.20.216.155 80 ms 80 ms 90 ms Hop Count = 9 Last TTL = 9 Test attempt = 27 Test Success = 27 For each TTL value probed, the results show the IP address of the router that responded to the probes and the response time for each probe. If no response is received for probes with a particular TTL, the IP address is reported as 0.0.0.0. An error code may be printed with the response time for each probe. The error codes signify that either no response was received or an ICMP Destination Unreachable message was received with error codes as follows: ■ * no response was received to the probe ■ P: Protocol unreachable (RFC 792) ■ N: Network unreachable (RFC 792) ■ H: Host unreachable (RFC 792) ■ F: Fragmentation needed and DF set (RFC 792) ■ S: Source route failed (RFC 792) ■ A: Communication with Destination Network is Administratively Prohibited (RFC 1122) ■ C: Communication with Destination Host is Administratively Prohibited (RFC 1122) The Hop Count is the number of sets of probes sent, each set of probes having a particular TTL. The Last TTL is the TTL sent in the final set of probes. The Test Attempt value shows the number of probes sent. The Test Success value shows the number of probes that received a response.
Start	Click **Start** to initiates the TraceRoute.
Stop	Click **Stop** to interrupts the running TraceRoute.

4.3.15.5 TraceRoute IPv6

Use the TraceRoute IPv6 page to determine the layer 3 path a packet takes from the device to a specific IP address or hostname. When you initiate the IPv6 TraceRoute command by clicking the **Submit** button, the device sends a series of IPv6 TraceRoute probes toward the destination. The results list the IP address of each layer 3 device a probe passes through until it reaches its destination - or fails to reach its destination and is discarded. The information you enter on this page is not saved as part of the device configuration.

To access this page, click **System** > **Utilities** > **TraceRoute IPv6**.

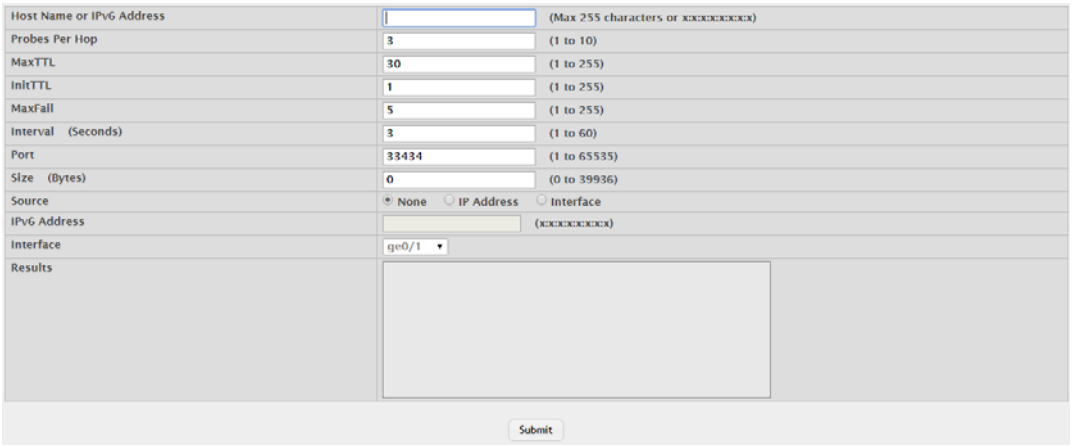


Figure 4.148 System > Utilities > TraceRoute IPv6

The following table describes the items in the previous figure.

Item	Description
Host Name or IPv6 Address	The DNS-resolvable hostname or IPv6 address of the system to attempt to reach.
Probes Per Hop	IPv6 TraceRoute works by sending UDP packets with increasing Time-To-Live (TTL) values. Specify the number of probes sent with each TTL.
MaxTTL	The maximum Time-To-Live (TTL). The TraceRoute terminates after sending probes that can be layer 3 forwarded this number of times. If the destination is further away, the TraceRoute will not reach it.
InitTTL	The initial Time-To-Live (TTL). This value controls the maximum number of layer 3 hops that the first set of probes may travel.
MaxFail	The number of consecutive failures that terminate the TraceRoute. If the device fails to receive a response for this number of consecutive probes, the TraceRoute terminates.
Interval (Seconds)	Specifies the time between probes, in Seconds. If a response is not received within this interval, then traceroute considers the probe a failure and sends the next probe. If traceroute does receive a response to a probe within this interval, then it sends the next probe immediately.
Port	The UDP destination port number to be used in probe packets. The port number should be a port that the target host is not listening on, so that when the probe reaches the destination, it responds with an ICMPv6 Port Unreachable message.
Size (Bytes)	The size of probe payload in bytes.
Source	The source IP address or interface to use when sending the trace route command. If source is not required, select None as source option.
IPv6 Address	The source IPv6 address to use when sending the trace route command. This field is enabled when IP Address is selected as source option.
Interface	The interface to use when sending the trace route command. This field is enabled when Interface is selected as source option.

Item	Description
Results	The results of the TraceRoute, which are displayed in the following format: 1 3001::1 708 ms 41 ms 11 ms 2 4001::2 250 ms 200 ms 193 ms 3 5001::3 289 ms 313 ms 278 ms 4 6001::4 651 ms 41 ms 270 ms 5 :: * N * N * N Hop Count = 4 Last TTL = 5 Test attempt = 1 Test Success = 0 For each TTL value probed, the results show the IP address of the router that responded to the probes and the response time for each probe. If no response is received for probes with a particular TTL, the IP address is reported as 0.0.0.0. An error code may be printed with the response time for each probe. The error codes signify that either no response was received or an ICMP Destination Unreachable message was received with error codes as follows: ■ * no response was received to the probe ■ P: Protocol unreachable (RFC 792) ■ N: Network unreachable (RFC 792) ■ H: Host unreachable (RFC 792) ■ F: Fragmentation needed and DF set (RFC 792) ■ S: Source route failed (RFC 792) ■ A: Communication with Destination Network is Administratively Prohibited (RFC 1122) ■ C: Communication with Destination Host is Administratively Prohibited (RFC 1122) The Hop Count is the number of sets of probes sent, each set of probes having a particular TTL. The Last TTL is the TTL sent in the final set of probes. The Test Attempt value shows the number of probes sent. The Test Success value shows the number of probes that received a response.
Submit	Click **Submit** to initiates the TraceRoute.

4.3.15.6 IP Address Conflict

Use the IP Address Conflict Detection page to determine whether the IP address configured on the device is the same as the IP address of another device on the same LAN (or on the Internet, for a routable IP address) and to help you resolve any existing conflicts. An IP address conflict can make both this system and the system with the same IP address unusable for network operation.

To access this page, click **System** > **Utilities** > **IP Address Conflict**.

Figure 4.149 System > Utilities > IP Address Conflict

The following table describes the items in the previous figure.

Item	Description
Status	

Item	Description
IP Address Conflict Currently Exists	Indicates whether a conflicting IP address has been detected since this status was last reset. ■ False: No conflict detected (the subsequent fields on this page display as N/A). ■ True: Conflict was detected (the subsequent fields on this page show the relevant information).
History	
Last Conflicting IP Address	The device interface IP address that is in conflict. If multiple conflicts were detected, only the most recent occurrence is displayed.
Last Conflicting MAC Address	The MAC address of the remote host associated with the IP address that is in conflict. If multiple conflicts are detected, only the most recent occurrence is displayed.
Time Since Conflict Detected	The elapsed time (displayed in days, hours, minutes, and seconds) since the last address conflict was detected, provided the **Clear History** button has not yet been pressed.
Refresh	Click **Refresh** to update the screen.
Run Detection	Click **Run Detection** to activate the IP address conflict detection operation in the system.
Clear History	Click **Clear History** to reset the IP address conflict detection status information that was last seen by the device.

4.3.15.7 Transfer

Use the File Transfer page to upload files from the device to a remote system and to download files from a remote system to the device.

To access this page, click **System** > **Utilities** > **Transfer**.

Figure 4.150 System > Utilities > Transfer

The following table describes the items in the previous figure.

Item	Description
Transfer Protocol	The protocol to use to transfer the file. Files can be transferred from the device to a remote system using TFTP, or FTP. Files can be transferred from a remote system to the device using HTTP, TFTP, or FTP.
Upload	To transfer a file from the device to a remote system using TFTP, or FTP, click the upload icon in the same row as the desired transfer protocol. The File Upload window appears. Configure the information for the file transfer (described below), and click the upload icon to the right of the Progress field to begin the transfer.
Download	To transfer a file from a remote system to the device using HTTP, TFTP, or FTP, click the download icon in the same row as the desired transfer protocol. The File Download window appears. Configure the information for the file transfer (described below), and click the download icon to the right of the Progress field to begin the transfer.

Item	Description
	■ File Type: Specify the type of file to transfer from the device to a remote system. – Active Code: Select this option to transfer an active image. – Backup Code: Select this option to transfer an backup image. – Startup Configuration: Select this option to transfer a copy of the stored startup configuration from the device to a remote system. – Backup Configuration: Select this option to transfer a copy of the stored backup configuration from the device to a remote system. – Script File: Select this option to transfer a custom text configuration script from the device to a remote system. – CLI Banner: Select this option to transfer the file containing the text to be displayed on the CLI before the login prompt to a remote system. – MIB File: Select this option to transfer the MIB file to a remote system. – Crash Log: Select this option to transfer the system crash log to a remote system. – Operational Log: Select this option to transfer the system operational log to a remote system. – Startup Log: Select this option to transfer the system startup log to a remote system. – Trap Log: Select this option to transfer the system trap records to a remote system. – Error Log: Select this option to transfer the system error (persistent) log, which is also known as the event log, to a remote system. – Buffered Log: Select this option to transfer the system buffered (in-memory) log to a remote system. ■ Image: If the selected File Type is Code, specify whether to transfer the Active or Backup image to a remote system. ■ Server Address: Specify the IPv4 address, IPv6 address, or DNS-resolvable hostname of the remote server that will receive the file. ■ File Path: Specify the path on the server where you want to put the file. ■ File Name: Specify the name that the file will have on the remote server. ■ User Name: For and FTP transfers, if the server requires authentication, specify the user name for remote login to the server that will receive the file. ■ Password: For and FTP transfers, if the server requires authentication, specify the password for remote login to the server that will receive the file. ■ Progress: Represents the completion percentage of the file transfer. The file transfer begins after you complete the required fields and click the upload icon to the right of this field. ■ Status: Provides information about the status of the file transfer.

Item	Description
	■ File Type: Specify the type of file to transfer to the device: – Active Code: Select this option to transfer a new image to the device. The code file is stored as the active image. – Backup Code: Select this option to transfer a new image to the device. The code file is stored as the backup image. – Startup Configuration: Select this option to update the stored startup configuration file. If the file has errors, the update will be stopped. – Backup Configuration: Select this option to update the stored backup configuration file. If the file has errors, the update will be stopped. – Script File: Select this option to transfer a text-based configuration script to the device. You must use the command-line interface (CLI) to validate and activate the script. – CLI Banner: Select this option to transfer the CLI banner file to the device. This file contains the text to be displayed on the CLI before the login prompt. – IAS Users: Select this option to transfer an Internal Authentication Server (IAS) users database file to the device. The IAS user database stores a list of user name and (optional) password values for local port-based user authentication. – SSH-1 RSA Key File: Select this option to transfer an SSH-1 Rivest-Shamir-Adleman (RSA) key file to the device. SSH key files contain information to authenticate SSH sessions for remote CLI-based access to the device. – SSH-2 RSA Key PEM File: Select this option to transfer an SSH-2 Rivest-Shamir-Adleman (RSA) key file (PEM Encoded) to the device. – SSH-2 DSA Key PEM File: Select this option to transfer an SSH-2 Digital Signature Algorithm (DSA) key file (PEM Encoded) to the device. – SSL Trusted Root Certificate PEM File: Select this option to transfer an SSL Trusted Root Certificate file (PEM Encoded) to the device. SSL files contain information to encrypt, authenticate, and validate HTTPS sessions. – SSL Server Certificate PEM File: Select this option to transfer an SSL Server Certificate file (PEM Encoded) to the device. – SSL DH Weak Encryption Parameter PEM File: Select this option to transfer an SSL Diffie-Hellman Weak Encryption Parameter file (PEM Encoded) to the device. – SSL DH Strong Encryption Parameter PEM File: Select this option to transfer an SSL Diffie-Hellman Strong Encryption Parameter file (PEM Encoded) to the device. *Note: To download SSH key files, SSH must be administratively disabled, and there can be no active SSH sessions. To download SSL related files, HTTPS must be administratively disabled.*

Item	Description
	■ Select File: If HTTP is the Transfer Protocol, browse to the directory where the file is located and select the file to transfer to the device. This field is not present if the Transfer Protocol is TFTP or FTP. ■ Server Address: For TFTP, or FTP transfers, specify the IPv4 address, IPv6 address, or DNS-resolvable hostname of the remote server. ■ File Path: For TFTP, or FTP transfers, specify the path on the server where the file is located. ■ File Name: For TFTP, or FTP transfers, specify the name of the file you want to transfer to the device. ■ User Name: For FTP transfers, if the server requires authentication, specify the user name for remote login to the server where the file resides. ■ Password: For FTP transfers, if the server requires authentication, specify the password for remote login to the server where the file resides. ■ Progress: Represents the completion percentage of the file transfer. The file transfer begins after you complete the required fields and click the download icon to the right of this field. ■ Status: Provides information about the status of the file transfer.

4.4 Switching

4.4.1 Class of Service

4.4.1.1 802.1p

The IEEE 802.1p feature allows traffic prioritization at the MAC level. The switch can prioritize traffic based on the 802.1p tag attached to the L2 frame. Each port on the switch has multiple queues to give preference to certain packets over others based on the class of service (CoS) criteria you specify. When a packet is queued for transmission in a port, the rate at which it is serviced depends on how the queue is configured and possibly the amount of traffic present in the other queues of the port. If a delay is necessary, packets get held in the queue until the scheduler authorizes the queue for transmission.

Use the 802.1p Priority Mapping page to view or change which internal traffic classes are mapped to the 802.1p priority class values in Ethernet frames the device receives. The priority-to-traffic class mappings can be applied globally or per-interface. The mapping allows the device to group various traffic types (e.g. data or voice) based on their latency requirements and give preference to time-sensitive traffic.

To access this page, click **Switching** > **Class of Service** > **802.1p**.

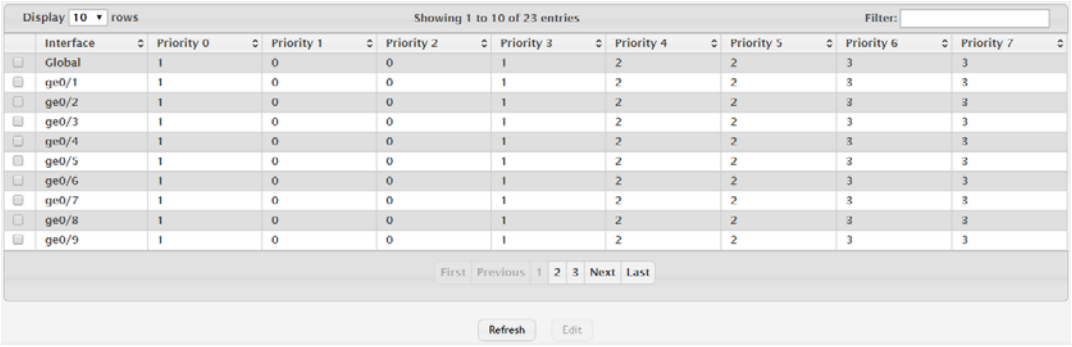


Figure 4.151 Switching > Class of Service > 802.1p

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. The Global entry represents the common settings for all interfaces, unless specifically overridden individually.
Priority	The heading row lists each 802.1p priority value (0-7), and the data in the table shows which traffic class is mapped to the priority value. Incoming frames containing the designated 802.1p priority value are mapped to the corresponding traffic class in the device.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.4.2 DHCP Snooping

4.4.2.1 Base

Global

Use the DHCP Snooping Configuration page to view and configure the global settings for DHCP Snooping.

To access this page, click **Switching** > **DHCP Snooping** > **Base** > **Global**.

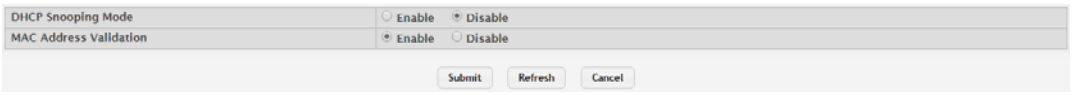


Figure 4.152 Switching > DHCP Snooping > Base > Global

The following table describes the items in the previous figure.

Item	Description
DHCP Snooping Mode	The administrative mode of DHCP snooping on the device.
MAC Address Validation	Enables or Disables the verification of the sender MAC address for DHCP snooping. When enabled, the device checks packets that are received on untrusted interfaces to verify that the MAC address and the DHCP client hardware address match. If the addresses do not match, the device drops the packet.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

VLAN Configuration

Use the DHCP Snooping VLAN Configuration page to view and configure the DHCP snooping settings on VLANs that exist on the device. DHCP snooping can be configured on switching VLANs and routing VLANs. For Layer 2 (non-routing) VLANs, DHCP snooping forwards valid DHCP client messages received on the VLANs. The message is forwarded on all trusted interfaces in the VLAN. When a DHCP packet is received on a routing VLAN, the DHCP snooping application applies its filtering rules and updates the bindings database. If a client message passes filtering rules, the message is placed into the software forwarding path, where it may be processed by the DHCP relay agent, the local DHCP server, or forwarded as an IP packet.

To access this page, click **Switching** > **DHCP Snooping** > **Base** > **VLAN Configuration**.

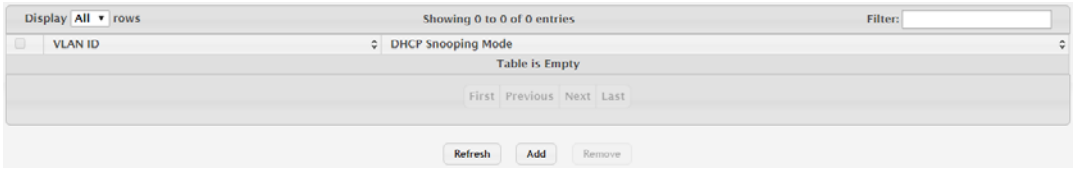


Figure 4.153 Switching > DHCP Snooping > Base > VLAN Configuration

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN ID that is enabled for DHCP snooping. In the Add DHCP Snooping VLAN Configuration window, this field lists the VLAN ID of all VLANs that exist on the device.
DHCP Snooping Mode	The current administrative mode of DHCP snooping for the VLAN. Only VLANs that are enabled for DHCP snooping appear in the list.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to enable a VLAN for DHCP snooping. To select multiple VLANs, CTRL + click each VLAN to select.
Remove	Click **Remove** to disable DHCP snooping on the selected entries.

To enable a VLAN for DHCP snooping:

Click **Switching** > **DHCP Snooping** > **Base** > **VLAN Configuration** > **Add**.

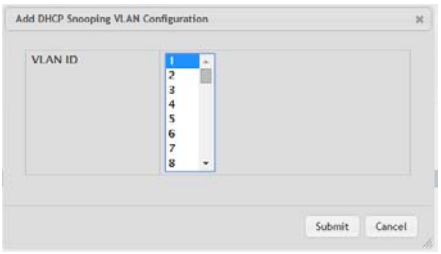


Figure 4.154 Switching > DHCP Snooping > Base > VLAN Configuration > Add

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN ID that is enabled for DHCP snooping. In the Add DHCP Snooping VLAN Configuration window, this field lists the VLAN ID of all VLANs that exist on the device.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Interface Configuration

Use the DHCP Snooping Interface Configuration page to view and configure the DHCP snooping settings for each interface. The DHCP snooping feature processes

incoming DHCP messages. For DHCPRELEASE and DHCPDECLINE messages, the feature compares the receive interface and VLAN with the client's interface and VLAN in the binding database. If the interfaces do not match, the application logs the event (when logging of invalid packets is enabled) and drops the message. If MAC address validation is globally enabled, messages that pass the initial validation are checked to verify that the source MAC address and the DHCP client hardware address match. Where there is a mismatch, DHCP snooping logs the event (when logging of invalid packets is enabled) and drops the packet.

To access this page, click **Switching** > **DHCP Snooping** > **Base** > **Interface Configuration**.

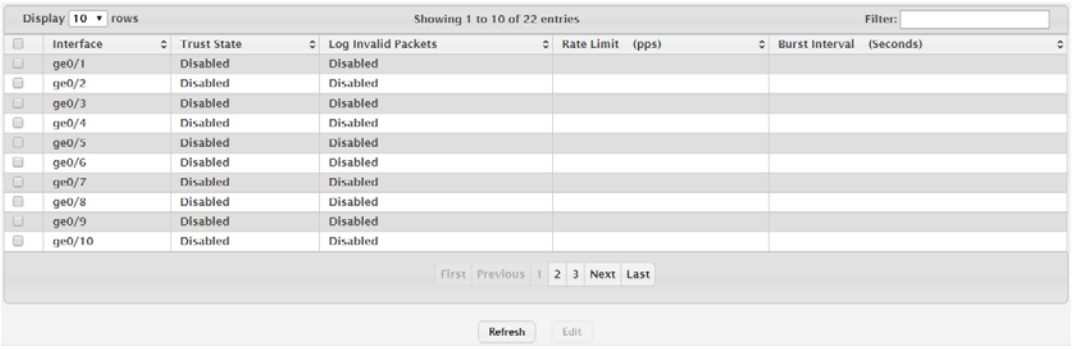


Figure 4.155 Switching > DHCP Snooping > Base > Interface Configuration

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When configuring the settings for one or more interfaces, this field identifies each interface that is being configured.
Trust State	The trust state configured on the interface. The trust state is one of the following: ■ Disabled: The interface is considered to be untrusted and could potentially be used to launch a network attack. DHCP server messages are checked against the bindings database. On untrusted ports, DHCP snooping enforces the following security rules: – DHCP packets from a DHCP server (DHCPOFFER, DHCPACK, DHCPNAK, DHCPRELEASEQUERY) are dropped. – DHCPRELEASE and DHCPDECLINE messages are dropped if the MAC address is in the snooping database but the binding's interface is other than the interface where the message was received. – DHCP packets are dropped when the source MAC address does not match the client hardware address if MAC Address Validation is globally enabled. ■ Enabled: The interface is considered to be trusted and forwards DHCP server messages without validation.
Log Invalid Packets	The administrative mode of invalid packet logging on the interface. When enabled, the DHCP snooping feature generates a log message when an invalid packet is received and dropped by the interface.

Item	Description
Rate Limit (pps)	The rate limit value for DHCP packets received on the interface. To prevent DHCP packets from being used as a DoS attack when DHCP snooping is enabled, the snooping application enforces a rate limit for DHCP packets received on untrusted interfaces. If the incoming rate of DHCP packets exceeds the value of this object during the amount of time specified for the burst interval, the port will be shutdown. You must administratively enable the port to allow it to resume traffic forwarding.
Burst Interval (Seconds)	The burst interval value for rate limiting on this interface. If the rate limit is unspecified, then burst interval has no meaning.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

Static Bindings

Use the DHCP Snooping Static Bindings page to view, add, and remove static bindings in the DHCP snooping bindings database.

To access this page, click **Switching** > **DHCP Snooping** > **Base** > **Static Bindings**.

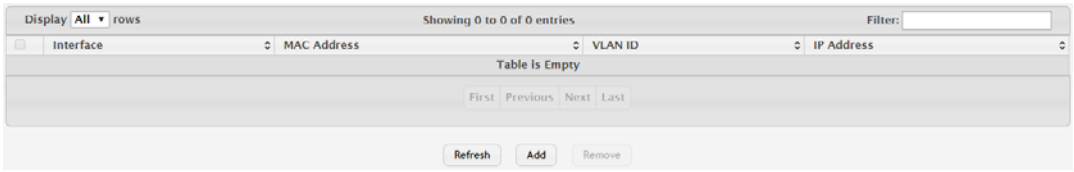


Figure 4.156 Switching > DHCP Snooping > Base > Static Bindings

The following table describes the items in the previous figure.

Item	Description
Interface	The interface on which the DHCP client is authorized.
MAC Address	The MAC address associated with the DHCP client. This is the Key to the binding database.
VLAN ID	The ID of the VLAN the client is authorized to use.
IP Address	The IP address of the client.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a static entry to the DHCP snooping bindings table.
Remove	Click **Remove** to remove the selected entries.

To add a static entry to the DHCP snooping bindings table:

Click **Switching** > **DHCP Snooping** > **Base** > **Static Bindings** > **Add**.

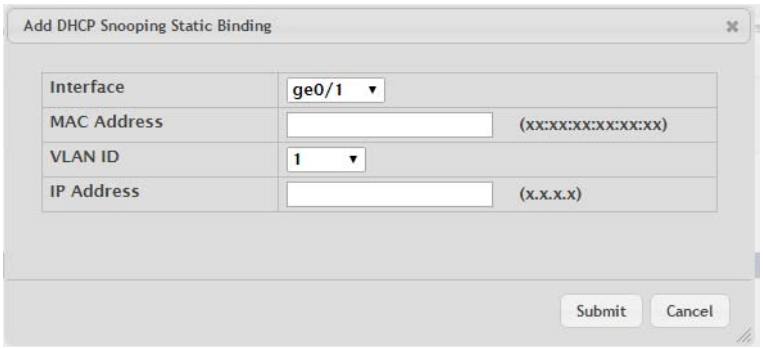


Figure 4.157 Switching > DHCP Snooping > Base > Static Bindings > Add

The following table describes the items in the previous figure.

Item	Description
Interface	The interface on which the DHCP client is authorized.
MAC Address	The MAC address associated with the DHCP client. This is the Key to the binding database.
VLAN ID	The ID of the VLAN the client is authorized to use.
IP Address	The IP address of the client.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Dynamic Bindings

Use the DHCP Snooping Dynamic Bindings page to view and clear dynamic bindings in the DHCP snooping bindings database. The DHCP snooping feature uses DHCP messages to build and maintain the bindings database. The bindings database includes data for clients only on untrusted ports. DHCP snooping creates a tentative binding from DHCP DISCOVER and REQUEST messages. Tentative bindings tie a client to an interface (the interface where the DHCP client message was received). Tentative bindings are completed when DHCP snooping learns the client's IP address from a DHCP ACK message on a trusted port. DHCP snooping removes bindings in response to DECLINE, RELEASE, and NACK messages. The DHCP snooping feature ignores the ACK messages as a reply to the DHCP Inform messages received on trusted ports.

To access this page, click **Switching** > **DHCP Snooping** > **Base** > **Dynamic Bindings**.

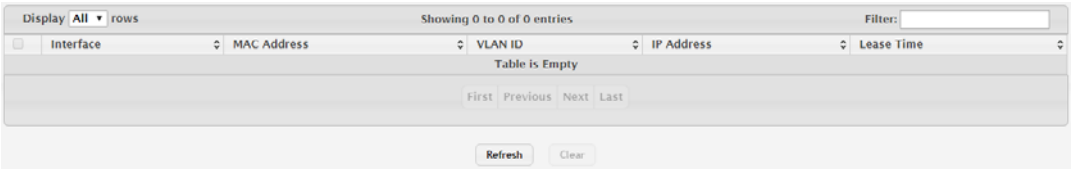


Figure 4.158 Switching > DHCP Snooping > Base > Dynamic Bindings

The following table describes the items in the previous figure.

Item	Description
Interface	The interface on which the DHCP client message was received.
MAC Address	The MAC address associated with the DHCP client that sent the message. This is the Key to the binding database.
VLAN ID	The VLAN ID of the client interface.
IP Address	The IP address assigned to the client by the DHCP server.
Lease Time	The remaining IP address lease time for the client.
Refresh	Click **Refresh** to update the screen.
Clear	Click **Clear** to remove the selected entries in the database.

Persistent

Use the DHCP Snooping Persistent Configuration page to configure the persistent location of the DHCP snooping bindings database. The bindings database can be stored locally on the device or on a remote system somewhere else in the network. The device must be able to reach the IP address of the remote system to send bindings to a remote database.

To access this page, click **Switching** > **DHCP Snooping** > **Base** > **Persistent**.

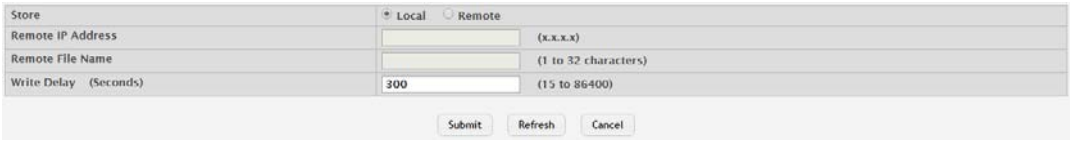


Figure 4.159 Switching > DHCP Snooping > Base > Persistent

The following table describes the items in the previous figure.

Item	Description
Store	The location of the DHCP snooping bindings database, which is either locally on the device (Local) or on a remote system (Remote).
Remote IP Address	The IP address of the system on which the DHCP snooping bindings database will be stored. This field is available only if Remote is selected in the Store field.
Remote File Name	The file name of the DHCP snooping bindings database in which the bindings are stored. This field is available only if Remote is selected in the Store field.
Write Delay (Seconds)	The amount of time to wait between writing bindings information to persistent storage. This allows the device to collect as many entries as possible (new and removed) before writing them to the persistent file.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

Statistics

Use the DHCP Snooping Statistics page to view and clear per-interface statistics about the DHCP messages filtered by the DHCP snooping feature. Only interfaces that are enabled for DHCP snooping and are untrusted appear in the table.

To access this page, click **Switching** > **DHCP Snooping** > **Base** > **Statistics**.

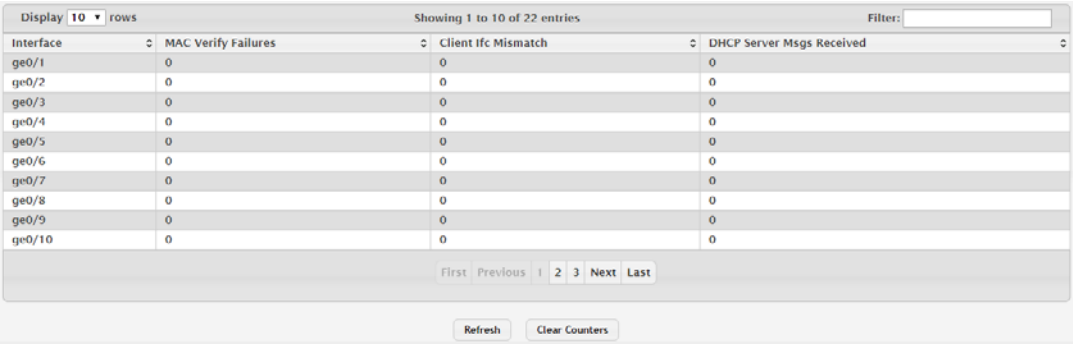


Figure 4.160 Switching > DHCP Snooping > Base > Statistics

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row.
MAC Verify Failures	The number of DHCP messages that were dropped because the source MAC address and client hardware address did not match. MAC address verification is performed only if it is globally enabled.
Client Ifc Mismatch	The number of packets that were dropped by DHCP snooping because the interface and VLAN on which the packet was received does not match the client's interface and VLAN information stored in the binding database.

Item	Description
DHCP Server Msgs Received	The number of DHCP server messages (DHCPOFFER, DHCPACK, DHCPNAK, DHCPRELEASEQUERY) that have been dropped on an untrusted port.
Refresh	Click **Refresh** to update the screen.
Clear Counters	Click **Clear Counters** to reset all statistics to zero for all interfaces.

4.4.2.2 L2 Relay

Global

Use the DHCP L2 Relay Global Configuration page to control the administrative mode of DHCP Layer 2 Relay on the device. In Layer 2 switched networks, there may be one or more infrastructure devices (for example, a switch) between the client and the L3 Relay agent/DHCP server. In this instance, some of the client device information required by the L3 Relay agent may not be visible to it. When this happens, an L2 Relay agent can be used to add the information that the L3 Relay Agent and DHCP server need to perform their roles in IP address configuration and assignment.

To access this page, click **Switching** > **DHCP Snooping** > **L2 Relay** > **Global**.

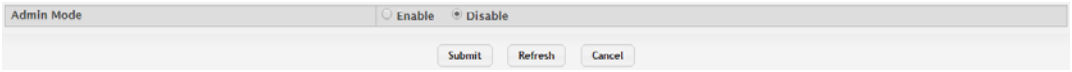


Figure 4.161 Switching > DHCP Snooping > L2 Relay > Global

The following table describes the items in the previous figure.

Item	Description
Admin Mode	The global mode of DHCP L2 relay on the device. When enabled, the device can act as a DHCP L2 relay agent. This functionality must also be enabled on each port you want this service to operate on.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

Interface Configuration

Use the DHCP L2 Relay Interface Configuration page to enable L2 DHCP relay on individual ports. Note that L2 DHCP relay must also be enabled globally on the device. To change the DHCP L2 relay settings for one or more interfaces, select each entry to modify and click Edit. The same settings are applied to all selected interfaces.

To access this page, click **Switching** > **DHCP Snooping** > **L2 Relay** > **Interface Configuration**.

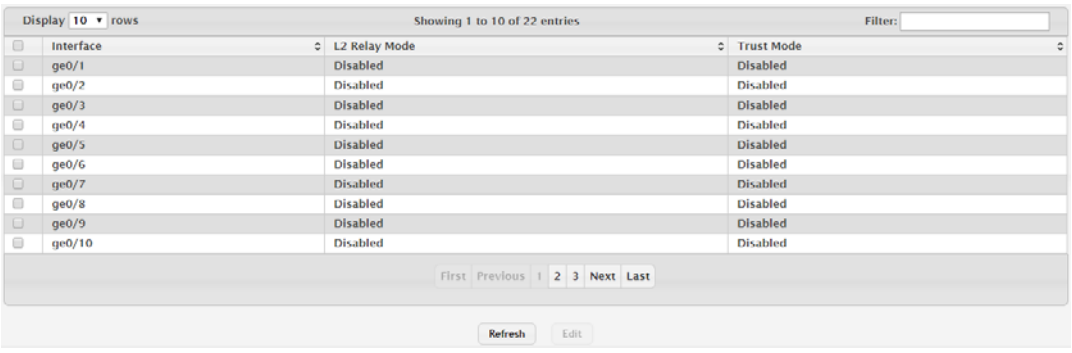


Figure 4.162 Switching > DHCP Snooping > L2 Relay > Interface Configuration

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When configuring the settings for one or more interfaces, this field identifies each interface that is being configured.
L2 Relay Mode	The administrative mode of L2 relay mode on the interface. When enabled, the interface can act as a DHCP relay agent and add information that the L3 relay agent and DHCP server need to perform their roles in IP address configuration and assignment.
Trust Mode	The L2 relay trust mode for the interface, which is one of the following: ■ Trusted: A trusted interface usually connects to other agents or servers participating in the DHCP interaction (e.g. other L2 or L3 relay agents or servers). An interface in this mode always expects to receive DHCP packets that include Option 82 information. If Option 82 information is not included, these packets are discarded. ■ Untrusted: An untrusted interface is generally connected to clients. DHCP packets arriving on an untrusted interface are never expected to carry Option 82 and are discarded if they do.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

VLAN Configuration

Use the DHCP L2 Relay VLAN Configuration page to control the DHCP L2 relay settings on a particular VLAN. The VLAN is identified by a service VLAN ID (S-VID), which a service provider uses to identify a customer's traffic while traversing the provider network to multiple remote sites. The device uses the VLAN membership of the switch port client (the customer VLAN ID, or C-VID) to perform a lookup on a corresponding S-VID.

To access this page, click **Switching** > **DHCP Snooping** > **L2 Relay** > **VLAN Configuration**.

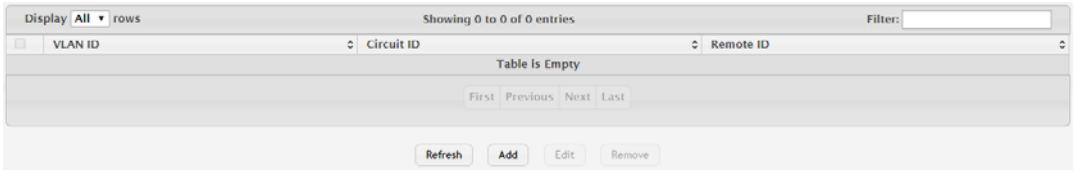


Figure 4.163 Switching > DHCP Snooping > L2 Relay > VLAN Configuration

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN associated with the rest of the data in the row. When configuring the settings for one or more VLANs, this field identifies each VLAN that is being configured.
Circuit ID	The administrative mode of the circuit ID. When enabled, if a client sends a DHCP request to the device and the client is in a VLAN that corresponds to the S-VID, the device adds the client's interface number to the Circuit ID sub-option of Option 82 in the DHCP request packet. This enables the device to reduce the broadcast domain to which the server replies are switched when the broadcast bit is set for DHCP packets. When this bit is set, the server is required to echo Option 82 in replies. Since the circuit-id field contains the client interface number, the L2 relay agent can forward the response to the requesting interface only, rather to all ports in the VLAN).

Item	Description
Remote ID	The DHCP remote identifier string. When a string is entered here, if a client sends a DHCP request to the device and the client is in a VLAN that corresponds to the S-VID, the device adds the string to the Remote-ID suboption of Option 82 in the DHCP request packet. This suboption can be used by the server for parameter assignment. The content of this option is vendor-specific.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new DHCP L2 relay VLAN configuration.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new DHCP L2 relay VLAN configuration:

Click **Switching** > **DHCP Snooping** > **L2 Relay** > **VLAN Configuration** > **Add**.

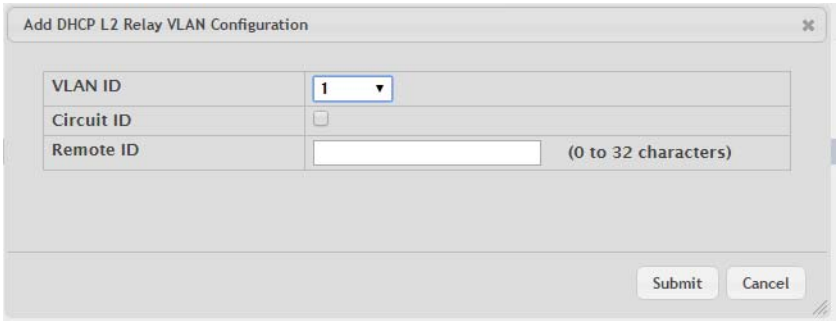


Figure 4.164 Switching > DHCP Snooping > L2 Relay > VLAN Configuration > Add

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN associated with the rest of the data in the row. When configuring the settings for one or more VLANs, this field identifies each VLAN that is being configured.
Circuit ID	The administrative mode of the circuit ID. When enabled, if a client sends a DHCP request to the device and the client is in a VLAN that corresponds to the S-VID, the device adds the client's interface number to the Circuit ID sub-option of Option 82 in the DHCP request packet. This enables the device to reduce the broadcast domain to which the server replies are switched when the broadcast bit is set for DHCP packets. When this bit is set, the server is required to echo Option 82 in replies. Since the circuit-id field contains the client interface number, the L2 relay agent can forward the response to the requesting interface only, rather to all ports in the VLAN).
Remote ID	The DHCP remote identifier string. When a string is entered here, if a client sends a DHCP request to the device and the client is in a VLAN that corresponds to the S-VID, the device adds the string to the Remote-ID suboption of Option 82 in the DHCP request packet. This suboption can be used by the server for parameter assignment. The content of this option is vendor-specific.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Statistics

The DHCP L2 Relay Interface Statistics page shows statistical information about the L2 DHCP Relay requests received on trusted and untrusted interfaces. An interface is untrusted when the DHCP L2 relay trust mode is disabled.

To access this page, click **Switching** > **DHCP Snooping** > **L2 Relay** > **Statistics**.

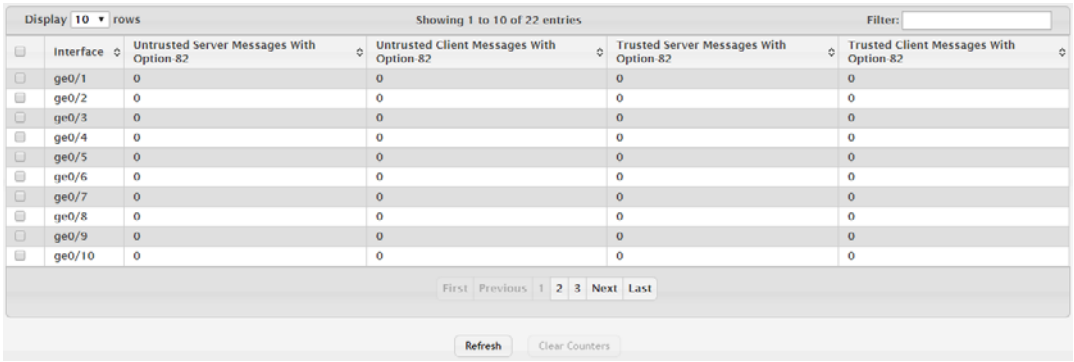


Figure 4.165 Switching > DHCP Snooping > L2 Relay > Statistics

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row.
Untrusted Server Messages With Option-82	The number of messages received on an untrusted interface from a DHCP server that contained Option 82 data. These messages are dropped.
Untrusted Client Messages With Option-82	The number of messages received on an untrusted interface from a DHCP client that contained Option 82 data. These messages are dropped.
Trusted Server Messages With Option-82	The number of messages received on a trusted interface from a DHCP server that contained Option 82 data. These messages are forwarded.
Trusted Client Messages With Option-82	The number of messages received on a trusted interface from a DHCP client that contained Option 82 data. These messages are forwarded.
Refresh	Click **Refresh** to update the screen.
Clear Counters	Click **Clear** Counters to reset all counters to zero.

4.4.3 IPv6 DHCP Snooping

4.4.3.1 Base

Global

Use the IPv6 DHCP Snooping Configuration page to view and configure the global settings for IPv6 DHCP snooping. IPv6 DHCP snooping is a security feature that monitors DHCPv6 messages between a DHCPv6 client and DHCPv6 servers to filter harmful DHCPv6 messages and to build a bindings database of {MAC address, IPv6 address, VLAN ID, port} tuples that are considered authorized. You can enable IPv6 DHCP snooping globally and on specific VLANs, and configure ports within the VLAN to be trusted or untrusted. If a DHCPv6 message arrives on an untrusted port, IPv6 DHCP snooping filters messages that are not from authorized DHCPv6 clients. DHCPv6 server messages are forwarded only through trusted ports.

To access this page, click **Switching** > **IPv6 DHCP Snooping** > **Base** > **Global**.

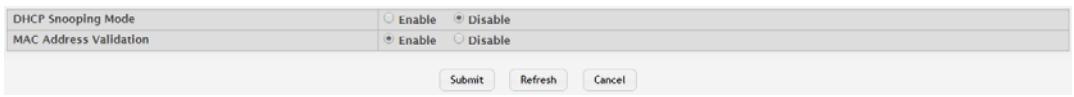


Figure 4.166 Switching > IPv6 DHCP Snooping > Base > Global

The following table describes the items in the previous figure.

Item	Description
DHCP Snooping Mode	The administrative mode of IPv6 DHCP snooping on the device.
MAC Address Validation	Enables or Disables the verification of the sender MAC address for IPv6 DHCP snooping. When enabled, the device checks packets that are received on untrusted interfaces to verify that the MAC address and the DHCPv6 client hardware address match. If the addresses do not match, the device drops the packet.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

VLAN Configuration

Use the IPv6 DHCP Snooping VLAN Configuration page to view and configure the IPv6 DHCP snooping settings on VLANs that exist on the device. IPv6 DHCP snooping can be configured on switching VLANs and routing VLANs. For Layer 2 (non-routing) VLANs, IPv6 DHCP snooping forwards valid DHCPv6 client messages received on the VLANs. The message is forwarded on all trusted interfaces in the VLAN. When a DHCPv6 packet is received on a routing VLAN, the IPv6 DHCP snooping application applies its filtering rules and updates the bindings database. If a client message passes filtering rules, the message is placed into the software forwarding path, where it may be processed by the DHCPv6 relay agent, the local DHCPv6 server, or forwarded as an IPv6 packet.

To access this page, click **Switching** > **IPv6 DHCP Snooping** > **Base** > **VLAN Configuration**.

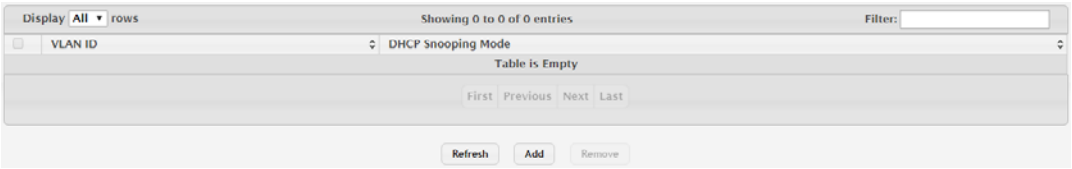


Figure 4.167 Switching > IPv6 DHCP Snooping > Base > VLAN Configuration

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN ID that is enabled for IPv6 DHCP snooping. In the Add IPv6 DHCP Snooping VLAN Configuration window, this field lists the VLAN ID of all VLANs that exist on the device.
DHCP Snooping Mode	The current administrative mode of IPv6 DHCP snooping for the VLAN. Only VLANs that are enabled for IPv6 DHCP snooping appear in the list.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to enable a VLAN for IPv6 DHCP snooping. To select multiple VLANs, CTRL + click each VLAN to select.
Remove	Click **Remove** to disable IPv6 DHCP snooping for the selected entries.

To enable a VLAN for IPv6 DHCP snooping:

Click **Switching** > **IPv6 DHCP Snooping** > **Base** > **VLAN Configuration** > **Add**.

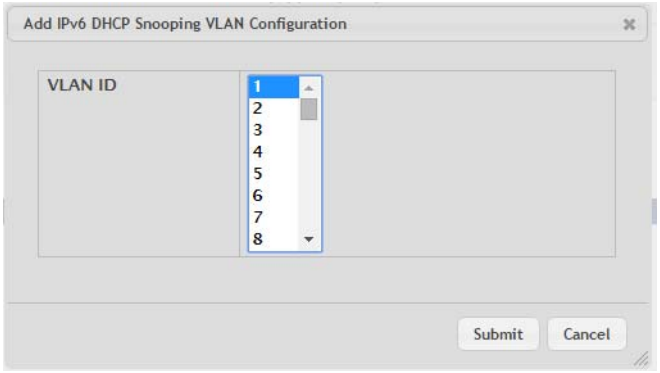


Figure 4.168 Switching > IPv6 DHCP Snooping > Base > VLAN Configuration > Add

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN ID that is enabled for IPv6 DHCP snooping. In the Add IPv6 DHCP Snooping VLAN Configuration window, this field lists the VLAN ID of all VLANs that exist on the device.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Interface Configuration

Use the IPv6 DHCP Snooping Interface Configuration page to view and configure the IPv6 DHCP snooping settings for each interface. The IPv6 DHCP snooping feature processes incoming DHCPv6 messages. For RELEASE and DECLINE messages, the feature compares the receive interface and VLAN with the client's interface and VLAN in the binding database. If the interfaces do not match, the application logs the event (when logging of invalid packets is enabled) and drops the message. If MAC address validation is globally enabled, messages that pass the initial validation are checked to verify that the source MAC address and the DHCPv6 client hardware address match. Where there is a mismatch, IPv6 DHCP snooping logs the event (when logging of invalid packets is enabled) and drops the packet.

To access this page, click **Switching** > **IPv6 DHCP Snooping** > **Base** > **Interface Configuration**.

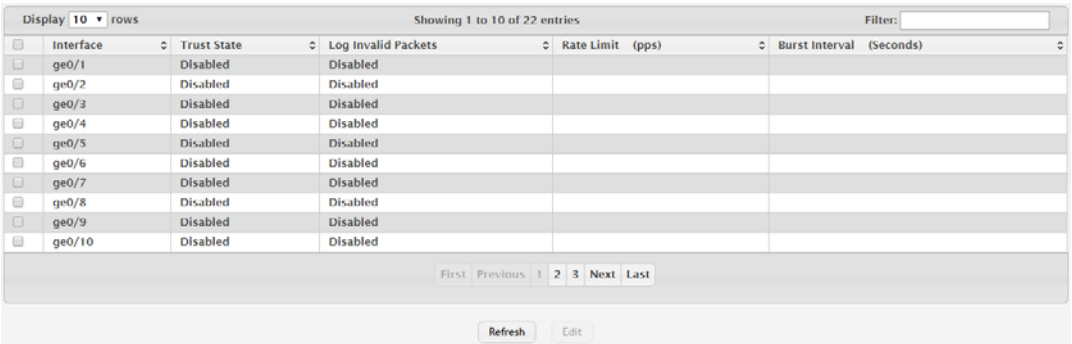


Figure 4.169 Switching > IPv6 DHCP Snooping > Base > Interface Configuration

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When configuring the settings for one or more interfaces, this field identifies each interface that is being configured.

Item	Description
Trust State	The trust state configured on the interface. The trust state is one of the following: ■ Disabled: The interface is considered to be untrusted and could potentially be used to launch a network attack. DHCPv6 server messages are checked against the bindings database. On untrusted ports, IPv6 DHCP snooping enforces the following security rules: – DHCPv6 packets from a DHCPv6 server (ADVERTISE, REPLY, and RECONFIGURE) are dropped. – RELEASE and DECLINE messages are dropped if the MAC address is in the snooping database but the binding's interface is other than the interface where the message was received. – DHCPv6 packets are dropped when the source MAC address does not match the client hardware address if MAC Address Validation is globally enabled. ■ Enabled: The interface is considered to be trusted and forwards DHCPv6 server messages without validation.
Log Invalid Packets	The administrative mode of invalid packet logging on the interface. When enabled, the IPv6 DHCP snooping feature generates a log message when an invalid packet is received and dropped by the interface.
Rate Limit (pps)	The rate limit value for DHCPv6 packets received on the interface. To prevent DHCPv6 packets from being used as a DoS attack when IPv6 DHCP snooping is enabled, the snooping application enforces a rate limit for DHCPv6 packets received on untrusted interfaces. If the incoming rate of DHCPv6 packets exceeds the value of this object during the amount of time specified for the burst interval, the port will be shutdown. You must administratively enable the port to allow it to resume traffic forwarding.
Burst Interval (Seconds)	The burst interval value for rate limiting on this interface. If the rate limit is unspecified, then burst interval has no meaning.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

Static Bindings

Use the IPv6 DHCP Snooping Static Bindings page to view, add, and remove static bindings in the IPv6 DHCP snooping bindings database.

To access this page, click **Switching** > **IPv6 DHCP Snooping** > **Base** > **Static Bindings**.

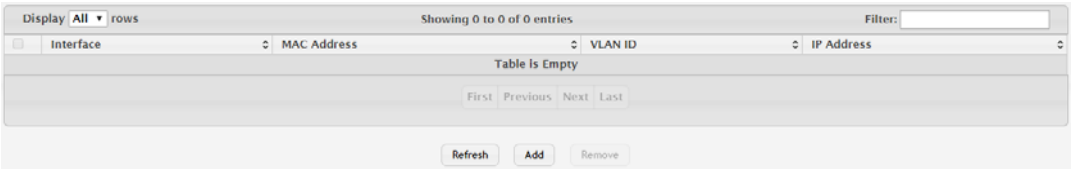


Figure 4.170 Switching > IPv6 DHCP Snooping > Base > Static Bindings

The following table describes the items in the previous figure.

Item	Description
Interface	The interface on which the DHCPv6 client is authorized.
MAC Address	The MAC address associated with the DHCP client. This is the key to the binding database.
VLAN ID	The ID of the VLAN the client is authorized to use.
IP Address	The IPv6 address of the client.

Item	Description
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new static entry to the IPv6 DHCP snooping bindings table.
Remove	Click **Remove** to remove the selected entries.

To add a new static entry to the IPv6 DHCP snooping bindings table:

Click **Switching** > **IPv6 DHCP Snooping** > **Base** > **Static Bindings** > **Add**.

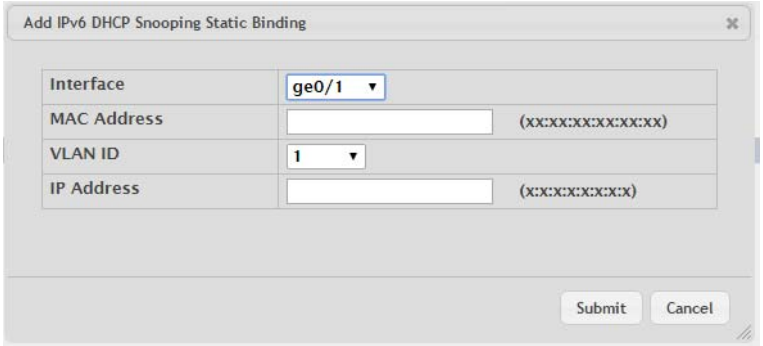


Figure 4.171 Switching > IPv6 DHCP Snooping > Base > Static Bindings > Add

The following table describes the items in the previous figure.

Item	Description
Interface	The interface on which the DHCPv6 client is authorized.
MAC Address	The MAC address associated with the DHCP client. This is the key to the binding database.
VLAN ID	The ID of the VLAN the client is authorized to use.
IP Address	The IPv6 address of the client.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

Dynamic Bindings

Use the IPv6 DHCP Snooping Dynamic Bindings page to view and clear dynamic bindings in the IPv6 DHCP snooping bindings database. The IPv6 DHCP snooping feature uses DHCPv6 messages to build and maintain the bindings database. The bindings database includes data for clients only on untrusted ports. IPv6 DHCP snooping creates a tentative binding from DHCPv6 SOLICIT and REQUEST messages. Tentative bindings tie a client to an interface (the interface where the DHCPv6 client message was received). Tentative bindings are completed when IPv6 DHCP snooping learns the client's IPv6 address from a REPLY message on a trusted port. DHCP snooping removes bindings in response to DECLINE and RELEASE messages.

To access this page, click **Switching** > **IPv6 DHCP Snooping** > **Base** > **Dynamic Bindings**.

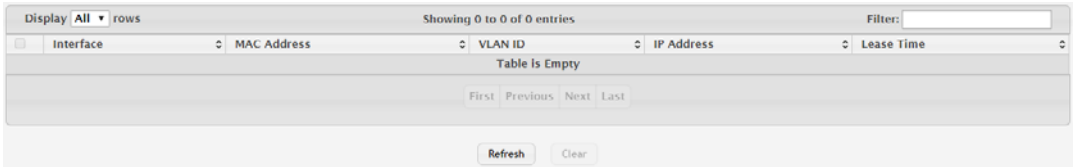


Figure 4.172 Switching > IPv6 DHCP Snooping > Base > Dynamic Bindings

The following table describes the items in the previous figure.

Item	Description
Interface	The interface on which the DHCPv6 client message was received.
MAC Address	The MAC address associated with the DHCPv6 client that sent the message. This is the key to the binding database.
VLAN ID	The VLAN ID of the client interface.
IP Address	The IPv6 address assigned to the client by the DHCPv6 server.
Lease Time	The remaining IPv6 address lease time for the client.
Refresh	Click **Refresh** to update the screen.
Clear	Click **Clear** to remove the selected entries in the database.

Persistent

Use the IPv6 DHCP Snooping Persistent Configuration page to configure the persistent location of the IPv6 DHCP snooping bindings database. The bindings database can be stored locally on the device or on a remote system somewhere else in the network. The device must be able to reach the IP address of the remote system to send bindings to a remote database.

To access this page, click **Switching** > **IPv6 DHCP Snooping** > **Base** > **Persistent**.

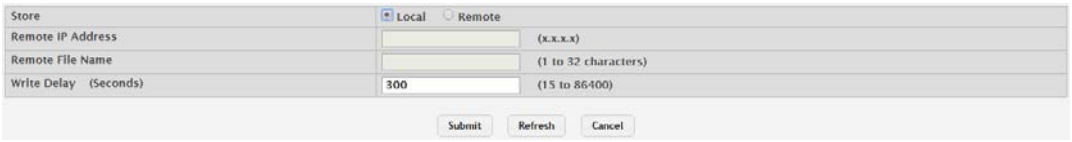


Figure 4.173 Switching > IPv6 DHCP Snooping > Base > Persistent

The following table describes the items in the previous figure.

Item	Description
Store	The location of the IPv6 DHCP snooping bindings database, which is either locally on the device (Local) or on a remote system (Remote).
Remote IP Address	The IP address of the system on which the IPv6 DHCP snooping bindings database will be stored. This field is available only if Remote is selected in the Store field.
Remote File Name	The file name of the IPv6 DHCP snooping bindings database in which the bindings are stored. This field is available only if Remote is selected in the Store field.
Write Delay (Seconds)	The amount of time to wait between writing bindings information to persistent storage. This allows the device to collect as many entries as possible (new and removed) before writing them to the persistent file.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

Statistics

Use the IPv6 DHCP Snooping Statistics page to view and clear per-interface statistics about the DHCPv6 messages filtered by the IPv6 DHCP snooping feature. Only interfaces that are enabled for IPv6 DHCP snooping and are untrusted appear in the table.

To access this page, click **Switching** > **IPv6 DHCP Snooping** > **Base** > **Statistics**.

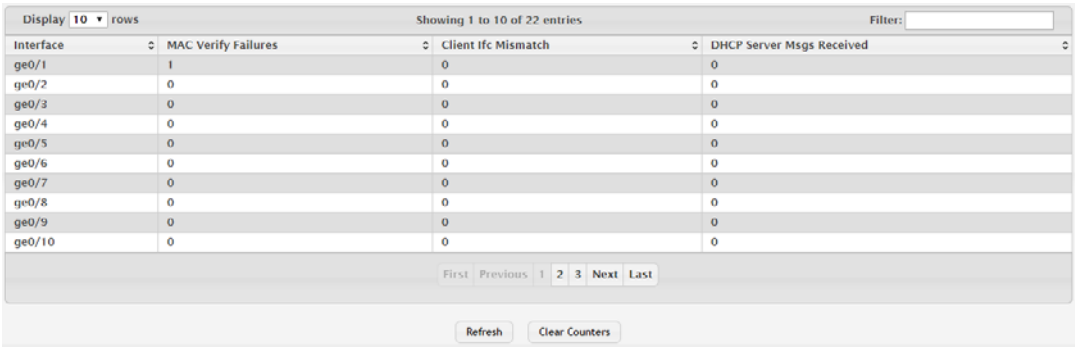


Figure 4.174 Switching > IPv6 DHCP Snooping > Base > Statistics

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row.
MAC Verify Failures	The number of DHCPv6 messages that were dropped because the source MAC address and client hardware address did not match. MAC address verification is performed only if it is globally enabled.
Client Ifc Mismatch	The number of packets that were dropped by IPv6 DHCP snooping because the interface and VLAN on which the packet was received does not match the client's interface and VLAN information stored in the binding database.
DHCP Server Msgs Received	The number of DHCPv6 server messages (ADVERTISE, REPLY, RECONFIGURE, RELAY-REPL) that have been dropped on an untrusted port.
Refresh	Click **Refresh** to update the screen.
Clear Counters	Click **Clear** Counters to reset all counters to zero.

4.4.4 DVLAN

DVLAN Tunneling allows the use of a second tag on network traffic. The additional tag helps differentiate between customers in the Metropolitan Area Networks (MAN) while preserving individual customer's VLAN identification when they enter their own 802.1Q domain.

With the introduction of this second tag, you do not need to divide the 4k VLAN ID space to send traffic on an Ethernet-based MAN.

With DVLAN Tunneling enabled, every frame that is transmitted from an interface has a new VLAN tag (S-tag) attached while every packet that is received from an interface has a VLAN tag (S-tag) removed (if one or more tags are present).

DVLAN also supports up to 4 Tag Protocol Identifier (TPID) values per switch and the ability to map these values to ports. This allows you to configure the same or different TPIDs for different ports.

4.4.4.1 Configuration

The DVLAN Configuration page allows you to configure the Tag Protocol Identifier (TPID) to include in frames transmitted by interfaces that are enabled for double VLAN (DVLAN) tagging. DVLAN tagging allows the device to add a second (outer) VLAN tag to the frame while preserving the original (inner) VLAN tagging information.

To access this page, click **Switching** > **DVLAN** > **Configuration**.

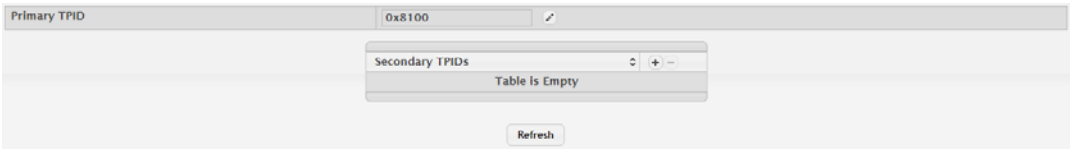


Figure 4.175 Switching > DVLAN > Configuration

The following table describes the items in the previous figure.

Item	Description
Primary TPID	The two-byte hex EtherType value to be used as the first 16 bits of the DVLAN tag. The value configured in this field is used as the primary TPID for all interfaces that are enabled for DVLAN tagging. The Primary TPID can be one of the following: ■ 0x8100: IEEE 802.1Q customer VLAN tag type ■ 0x88a8: Virtual Metropolitan Area Network (VMAN) tag type ■ Custom Tag: User-defined EtherType value
Secondary TPIDs	The two-byte hex EtherType values available to be configured as secondary TPIDs. Only the options you configure as Secondary TPIDs can be selected as the Primary TPID. To add Secondary TPIDs to the list, click + button and select one or more of the following options: ■ 802.1Q Tag: IEEE 802.1Q customer VLAN tag type, represented by the EtherType value 0x8100. This value indicates that the frame includes a VLAN tag. If this value is already configured as a primary or secondary TPID, it cannot be selected. ■ vMAN Tag: Virtual Metropolitan Area Network (VMAN) tag type, represented by the EtherType value 0x88a8. This value indicates that the frame is DVLAN tagged. If this value is already configured as a primary or secondary TPID, it cannot be selected. ■ Custom Tag: User-defined EtherType value. If you select this option, specify the EtherType value in the available field.
Refresh	Click **Refresh** to update the screen.

4.4.4.2 Summary

The DVLAN Summary page allows you to view the Global and Default TPIDs configured for all ports on the system.

To access this page, click **Switching** > **DVLAN** > **Summary**.

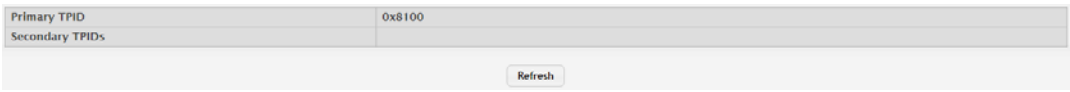


Figure 4.176 Switching > DVLAN > Summary

The following table describes the items in the previous figure.

Item	Description
Primary TPID	The two-byte hex EtherType value used as the first 16 bits of the DVLAN tag. This value identifies the frame as one of the following types: ■ 0x8100: IEEE 802.1Q VLAN tag type. This value indicates that the frame includes a VLAN tag. ■ 0x88a8: Virtual Metropolitan Area Network (VMAN) tag type. This value indicates that the frame is double VLAN tagged. ■ Custom Tag: Any TPID value other than 0x8100 or 0x88a8 is a user-defined EtherType value.

Item	Description
Secondary TPIDs	The two-byte hex EtherType values configured as secondary TPIDs.
Refresh	Click **Refresh** to update the screen.

4.4.4.3 Interface Summary

Use the DVLAN Interface Summary page to view and configure the double VLAN (DVLAN) tag settings for each interface. Double VLAN tagging allows service providers to create Virtual Metropolitan Area Networks (VMANs). With DVLAN tagging, service providers can pass VLAN traffic from one customer domain to another through a metro core. By using an additional tag on the traffic, the interface can differentiate between customers in the MAN while preserving an individual customer's VLAN identification that is used when the traffic enters the customer's 802.1Q domain.

To access this page, click **Switching** > **DVLAN** > **Interface Summary**.

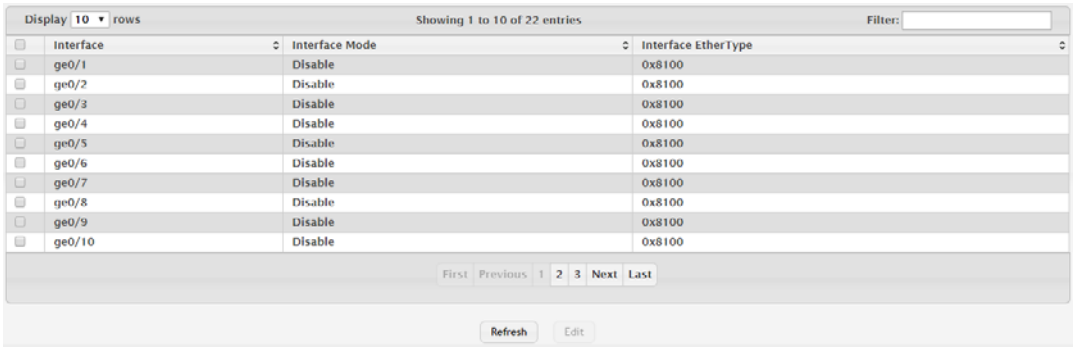


Figure 4.177 Switching > DVLAN > Interface Summary

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row.
Interface Mode	The administrative mode of double VLAN tagging on the interface. When DVLAN tagging is enabled, every frame that is transmitted from the interface has a DVLAN tag attached, and every packet that is received from the interface has a tag removed (if one or more tags are present).
Interface EtherType	The EtherType value to be used as the first 16 bits of the DVLAN tag. If one or more secondary TPIDs have been configured for the interface, these EtherType values are also displayed.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.4.5 Dynamic ARP Inspection

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

DAI relies on DHCP snooping. DHCP snooping listens to DHCP message exchanges and builds a binding database of valid {MAC address, IP address, VLAN, and interface} tuples.

When DAI is enabled, the switch drops ARP packets whose sender MAC address and sender IP address do not match an entry in the DHCP snooping bindings database. You can optionally configure additional ARP packet validation.

4.4.5.1 Global

Use the Global Configuration page to configure global DAI settings.

To access this page, click **Switching** > **Dynamic ARP Inspection** > **Global**.

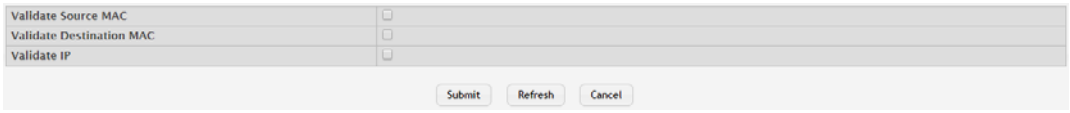


Figure 4.178 Switching > Dynamic ARP Inspection > Global

The following table describes the items in the previous figure.

Item	Description
Validate Source MAC	When this option is selected, DAI verifies that the sender hardware address in the ARP packet equals the source MAC address in the Ethernet header. If the addresses do not match, the ARP packet is dropped.
Validate Destination MAC	When this option is selected, DAI verifies that the target hardware address in the ARP packet equals the destination MAC address in the Ethernet header. If the addresses do not match, the ARP packet is dropped. This check applies only to ARP responses because the target MAC address is unspecified in ARP requests.
Validate IP	When this option is selected, DAI drops ARP packets with an invalid IP address. The following IP addresses are considered invalid: ■ 0.0.0.0 ■ 255.255.255.255 ■ All IP multicast addresses ■ All class E addresses (240.0.0.0/4) ■ Loopback addresses (in the range 127.0.0.0/8)
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.5.2 VLAN

Use the Dynamic ARP Inspection VLAN Configuration page to view and configure Dynamic ARP Inspection (DAI) settings for VLANs. When DAI is enabled on a VLAN, DAI is enabled on all interfaces that are members of that VLAN.

To access this page, click **Switching** > **Dynamic ARP Inspection** > **VLAN**.

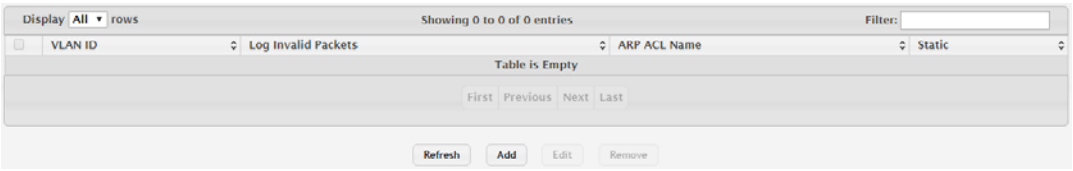


Figure 4.179 Switching > Dynamic ARP Inspection > VLAN

The following table describes the items in the previous figure.

Item	Description
VLAN ID	Lists each VLAN that has been enabled for DAI. After you click Add, use the VLAN ID menu to select the VLAN on which to enable DAI. A VLAN does not need to exist on the system to be enabled for DAI.
Log Invalid Packets	Indicates whether DAI logging is enabled on this VLAN. When logging is enabled, DAI generates a log message whenever an invalid ARP packet is discovered and dropped.

Item	Description
ARP ACL Name	The name of the of ARP access control list (ACL) that the VLAN uses as the filter for ARP packet validation. The ARP ACL must already exist on the system to associate it with a DAI-enabled VLAN. ARP ACLs include permit rules only.
Static	Determines whether to use the DHCP snooping database for ARP packet validation if the packet does not match any ARP ACL rules. The options are as follows: ■ Enable: The ARP packet will be validated by the ARP ACL rules only. Packets that do not match any ARP ACL rules are dropped without consulting the DHCP snooping database. ■ Disable: The ARP packet needs further validation by using the entries in the DHCP Snooping database.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to enable DAI on a VLAN and configure the optional DAI settings.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to disable DAI for the selected entries.

To DAI on a VLAN and configure the optional DAI settings:

Click **Switching** > **Dynamic ARP Inspection** > **VLAN** > **Add**.

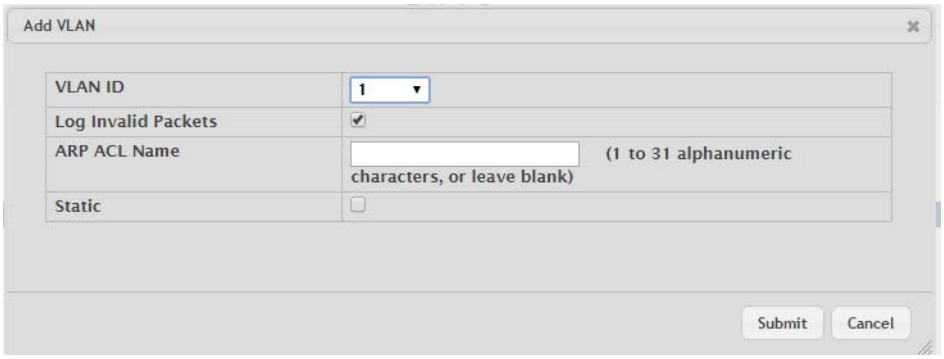


Figure 4.180 Switching > Dynamic ARP Inspection > VLAN > Add

The following table describes the items in the previous figure.

Item	Description
VLAN ID	Lists each VLAN that has been enabled for DAI. After you click Add, use the VLAN ID menu to select the VLAN on which to enable DAI. A VLAN does not need to exist on the system to be enabled for DAI.
Log Invalid Packets	Indicates whether DAI logging is enabled on this VLAN. When logging is enabled, DAI generates a log message whenever an invalid ARP packet is discovered and dropped.
ARP ACL Name	The name of the of ARP access control list (ACL) that the VLAN uses as the filter for ARP packet validation. The ARP ACL must already exist on the system to associate it with a DAI-enabled VLAN. ARP ACLs include permit rules only.
Static	Determines whether to use the DHCP snooping database for ARP packet validation if the packet does not match any ARP ACL rules. The options are as follows: ■ Enable: The ARP packet will be validated by the ARP ACL rules only. Packets that do not match any ARP ACL rules are dropped without consulting the DHCP snooping database. ■ Disable: The ARP packet needs further validation by using the entries in the DHCP Snooping database.

Item	Description
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.5.3 Interface

Use the Interface Configuration page to configure the per-interface Dynamic ARP Inspection (DAI) settings.

To access this page, click **Switching** > **Dynamic ARP Inspection** > **Interface**.

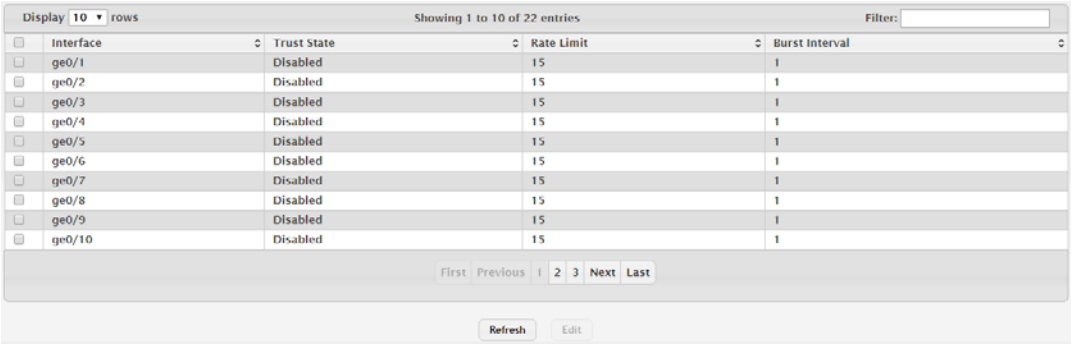


Figure 4.181 Switching > Dynamic ARP Inspection > Interface

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. In the Edit Interface Configuration window, this field identifies the interface that is being configured.
Trust State	Indicates whether the DAI feature should check traffic on the interface for possible ARP packet violations. Trust state can be enabled or disabled after you select an interface and click **Edit**. This field has one of the following values: ■ Enabled: The interface is trusted. ARP packets arriving on this interface are forwarded without DAI validation. ■ Disabled: The interface is not trusted. ARP packets arriving on this interface are subjected to ARP inspection.
Rate Limit	The maximum rate for incoming ARP packets on the interface, in packets per second (pps). If the incoming rate exceeds the configured limit, the ARP packets are dropped. Rate limiting can be enabled or disabled after you select an interface and click **Edit**.
Burst Interval	The number of consecutive seconds the interface is monitored for incoming ARP packet rate limit violations.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.4.5.4 ACL

Use the Dynamic ARP Inspection ACL Configuration page to configure ARP Access Control Lists (ACLs). An ARP ACL can contain one or more permit rules. Each rule contains the IP address and MAC address of a system allowed to send ARP packets. When an ARP ACL is associated with a DAI-enabled VLAN, and an ARP packet is received on an interface that is a member of that VLAN, DAI validates the address information in the ARP packet against the rules in the ACL. If the sender information in the ARP packet matches a rule in the ARP ACL, DAI considers the packet to be valid, and the packet is forwarded.

To access this page, click **Switching** > **Dynamic ARP Inspection** > **ACL**.

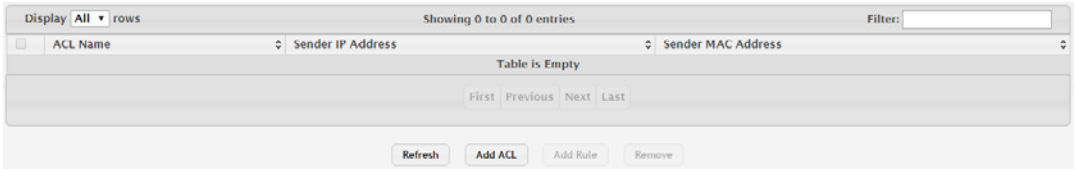


Figure 4.182 Switching > Dynamic ARP Inspection > ACL

The following table describes the items in the previous figure.

Item	Description
ACL Name	The name of the ACL. Only the ACLs that appear in this column can be referenced by DNI-enabled VLANs. When adding a rule to an existing ACL, use the ACL Name menu to select the ACL to update.
Sender IP Address	The IP address of a system that is permitted to send ARP packets. The ARP packet must match on both the Sender IP Address and Sender MAC Address values in the rule to be considered valid.
Sender MAC Address	The MAC address of a system that is permitted to send ARP packets. The ARP packet must match on both the Sender IP Address and Sender MAC Address values in the rule to be considered valid.
Refresh	Click **Refresh** to update the screen.
Add ACL	Click **Add ACL** to add a new ARP ACL.
Add Rule	Click **Add Rule** to add a new rule to an existing ACL.
Remove	Click **Remove** to remove the selected entries.

To add a new ARP ACL:

Click **Switching** > **Dynamic ARP Inspection** > **ACL** > **Add ACL**.

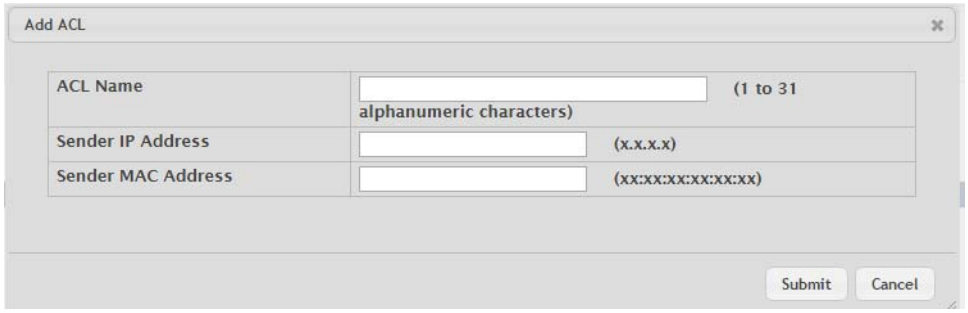


Figure 4.183 Switching > Dynamic ARP Inspection > ACL > Add ACL

The following table describes the items in the previous figure.

Item	Description
ACL Name	The name of the ACL. Only the ACLs that appear in this column can be referenced by DNI-enabled VLANs. When adding a rule to an existing ACL, use the ACL Name menu to select the ACL to update.
Sender IP Address	The IP address of a system that is permitted to send ARP packets. The ARP packet must match on both the Sender IP Address and Sender MAC Address values in the rule to be considered valid.
Sender MAC Address	The MAC address of a system that is permitted to send ARP packets. The ARP packet must match on both the Sender IP Address and Sender MAC Address values in the rule to be considered valid.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

To add a new rule to an existing ACL:

Click **Switching** > **Dynamic ARP Inspection** > **ACL** > **Add Rule**.

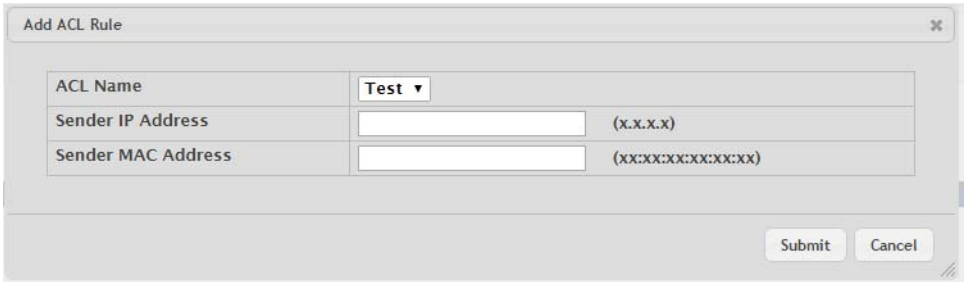


Figure 4.184 Switching > Dynamic ARP Inspection > ACL > Add Rule

The following table describes the items in the previous figure.

Item	Description
ACL Name	The name of the ACL. Only the ACLs that appear in this column can be referenced by DNI-enabled VLANs. When adding a rule to an existing ACL, use the ACL Name menu to select the ACL to update.
Sender IP Address	The IP address of a system that is permitted to send ARP packets. The ARP packet must match on both the Sender IP Address and Sender MAC Address values in the rule to be considered valid.
Sender MAC Address	The MAC address of a system that is permitted to send ARP packets. The ARP packet must match on both the Sender IP Address and Sender MAC Address values in the rule to be considered valid.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.5.5 Statistics

Use the Dynamic ARP Inspection Statistics page to view information about the number of ARP packets that have been forwarded or dropped after being processed by the Dynamic ARP Inspection (DAI) feature. The statistics are shown for each DAI-enabled VLAN.

To access this page, click **Switching** > **Dynamic ARP Inspection** > **Statistics**.

Figure 4.185 Switching > Dynamic ARP Inspection > Statistics

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The DAI-enabled VLAN associated with the rest of the information in the row. When DAI is enabled on a VLAN, DAI is enabled on all interfaces that are members of that VLAN.
DHCP Drops	The number of ARP packets that have been dropped by DAI because no matching DHCP snooping binding entry was found in the DHCP snooping database.
ACL Drops	The number of ARP packets that have been dropped by DAI because the sender IP address and sender MAC address in the ARP packet did not match any rules in the ARP ACL associated with this VLAN. The static flag on this VLAN is enabled, which means ARP packets that fail to match an ARP ACL rule are dropped immediately and are not checked against the DHCP snooping database for further validation.

Item	Description
DHCP Permits	The number of ARP packets that were forwarded by DAI because a matching DHCP snooping binding entry was found in the DHCP snooping database.
ACL Permits	The number of ARP packets that were forwarded by DAI because the sender IP address and sender MAC address in the ARP packet matched a rule in the ARP ACL associated with this VLAN.
Bad Source MAC	The number of ARP packets that were dropped by DAI because the sender MAC address in ARP packet did not match the source MAC address in the Ethernet header.
Bad Dest MAC	The number of ARP packets that were dropped by DAI because the target MAC address in the ARP reply packet did not match the destination MAC address in the Ethernet header.
Invalid IP	The number of ARP packets that were dropped by DAI because the sender IP address in the ARP packet or target IP address in the ARP reply packet was invalid. The following IP addresses are considered invalid: ■ 0.0.0.0 ■ 255.255.255.255 ■ All IP multicast addresses ■ All class E addresses (240.0.0.0/4) ■ Loopback addresses (in the range 127.0.0.0/8)
Forwarded	The total number of valid ARP packets forwarded by DAI.
Dropped	The total number of invalid ARP packets dropped by DAI.
Refresh	Click **Refresh** to update the screen.

4.4.6 Filters

Static MAC filtering allows you to associate a MAC address with a VLAN and set of source ports and destination ports. (The availability of source and destination port filters is subject to platform restrictions). Any packet with a static MAC address in a specific VLAN is admitted only if the ingress port is included in the set of source ports; otherwise the packet is dropped. If admitted, the packet is forwarded to all the ports in the destination list.

4.4.6.1 MAC Filters

Use the Static MAC Filter Summary page to view, create, edit, and remove static MAC filters on the device. A MAC filter is a security mechanism that allows Ethernet frames that match the filter criteria (destination MAC address and VLAN ID) to be received and transmitted only on certain ports.

To access this page, click **Switching** > **Filters** > **MAC Filters**.

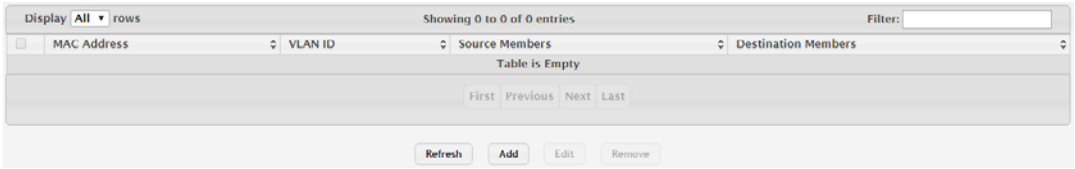


Figure 4.186 Switching > Filters > MAC Filters

The following table describes the items in the previous figure.

Item	Description
MAC Address	The MAC address of the filter. The destination MAC address of an Ethernet frame must match this value to be considered for the filter. When adding or editing a filter, note that you cannot configure the following MAC addresses in this field: ■ 00:00:00:00:00:00 ■ 01:80:C2:00:00:00 to 01:80:C2:00:00:10 ■ 01:80:C2:00:00:20 to 01:80:C2:00:00:2F ■ FF:FF:FF:FF:FF:FF
VLAN ID	The VLAN ID associated with the filter. The VLAN ID is used with the MAC address to fully identify the frames to filter.
Source Members	The port(s) included in the inbound filter. If a frame with the MAC address and VLAN ID combination specified in the filter is received on a port in the Source Members list, it is forwarded to a port in the Destination Members list. If the frame that meets the filter criteria is received on a port that is not in the Source Members list, it is dropped. To add source ports to the filter, select one or more ports from the Available Port List field (CTRL + click to select multiple ports). Then, use the appropriate arrow icon to move the selected ports to the Source Members field.
Destination Members	The port(s) included in the outbound filter. A frame with the MAC address and VLAN ID combination specified in the filter is transmitted only out of ports in the list. To add destination ports to the filter, select one or more ports from the Available Port List field (CTRL + click to select multiple ports). Then, use the appropriate arrow icon to add the selected ports to the Source Members field.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to enable DAI on a VLAN and configure the optional DAI settings.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to disable DAI for the selected entries.

To enable DAI on a VLAN and configure the optional DAI settings:

Click **Switching** > **Filters** > **MAC Filters** > **Add**.

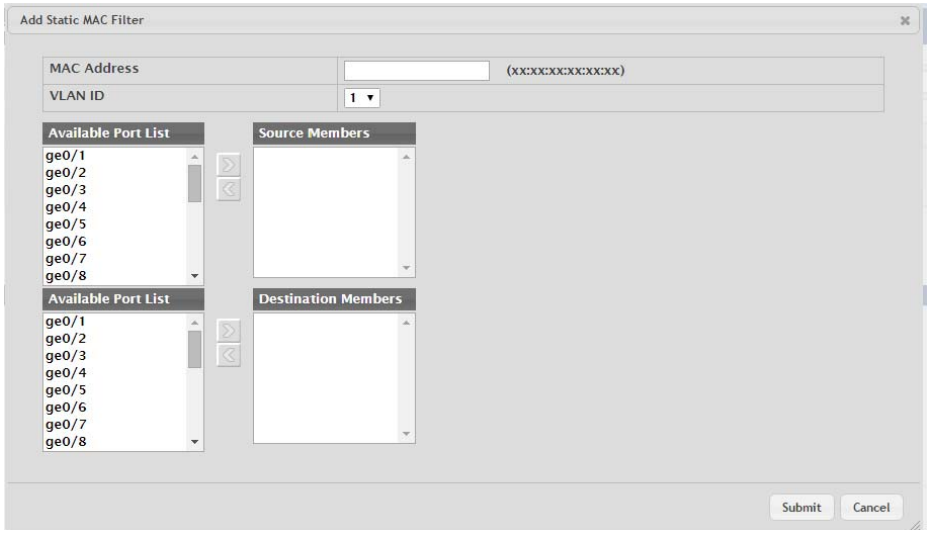


Figure 4.187 Switching > Filters > MAC Filters > Add

The following table describes the items in the previous figure.

Item	Description
MAC Address	The MAC address of the filter. The destination MAC address of an Ethernet frame must match this value to be considered for the filter. When adding or editing a filter, note that you cannot configure the following MAC addresses in this field: ■ 00:00:00:00:00:00 ■ 01:80:C2:00:00:00 to 01:80:C2:00:00:10 ■ 01:80:C2:00:00:20 to 01:80:C2:00:00:2F ■ FF:FF:FF:FF:FF:FF
VLAN ID	The VLAN ID associated with the filter. The VLAN ID is used with the MAC address to fully identify the frames to filter.
Source Members	The port(s) included in the inbound filter. If a frame with the MAC address and VLAN ID combination specified in the filter is received on a port in the Source Members list, it is forwarded to a port in the Destination Members list. If the frame that meets the filter criteria is received on a port that is not in the Source Members list, it is dropped. To add source ports to the filter, select one or more ports from the Available Port List field (CTRL + click to select multiple ports). Then, use the appropriate arrow icon to move the selected ports to the Source Members field.
Destination Members	The port(s) included in the outbound filter. A frame with the MAC address and VLAN ID combination specified in the filter is transmitted only out of ports in the list. To add destination ports to the filter, select one or more ports from the Available Port List field (CTRL + click to select multiple ports). Then, use the appropriate arrow icon to add the selected ports to the Source Members field.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.7 GARP

4.4.7.1 Switch

Use the GARP Switch Configuration page to set the administrative mode for the features that use the Generic Attribute Registration Protocol (GARP), including GARP VLAN Registration Protocol (GVRP) and GARP Multicast Registration Protocol (GMRP). GARP is a general-purpose protocol that registers any network connectivity or membership-style information. GARP defines a set of switches interested in a given network attribute, such as VLAN ID or multicast address.

To access this page, click **Switching** > **GARP** > **Switch**.

Figure 4.188 Switching > GARP > Switch

The following table describes the items in the previous figure.

Item	Description
GVRP Mode	The administrative mode of GVRP on the system. When enabled, GVRP can help dynamically manage VLAN memberships on trunk ports.

Item	Description
GMRP Mode	The administrative mode of GMRP on the system. When enabled, GMRP can help control the flooding of multicast traffic by keeping track of group membership information. GMRP is similar to IGMP snooping in its purpose, but IGMP snooping is more widely used. GMRP must be running on both the host and the switch to function properly.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.7.2 Port

Use the GARP Port Configuration page to set the per-interface administrative mode for GARP VLAN Registration Protocol (GVRP) and GARP Multicast Registration Protocol (GMRP). On this page, you can also set the GARP timers for each interface. GVRP and GMRP use the same set of GARP timers to specify the amount of time to wait before transmitting various GARP messages.

To access this page, click **Switching** > **GARP** > **Port**.

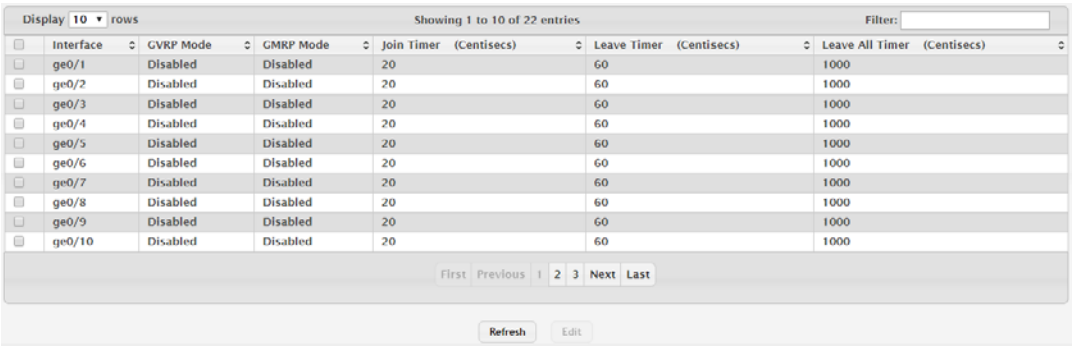


Figure 4.189 Switching > GARP > Port

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When configuring one or more interfaces in the Edit GARP Port Configuration window, this field identifies the interfaces that are being configured.
GVRP Mode	The administrative mode of GVRP on the interface. When enabled, GVRP can help dynamically manage VLAN memberships on trunk ports. GVRP must also be enabled globally for the protocol to be active on the interface. When disabled, the protocol will not be active on the interface, and the GARP timers have no effect.
GMRP Mode	The administrative mode of GMRP on the interface. When enabled, GMRP can help control the flooding of multicast traffic by keeping track of group membership information. GMRP must also be enabled globally for the protocol to be active on the interface. When disabled, the protocol will not be active on the interface, and the GARP timers have no effect.
Join Timer (Centisecs)	The amount of time between the transmission of GARP PDUs registering (or re-registering) membership for a VLAN or multicast group.
Leave Timer (Centisecs)	The amount of time to wait after receiving an unregister request for a VLAN or multicast group before deleting the associated entry. This timer allows time for another station to assert registration for the same attribute in order to maintain uninterrupted service.

Item	Description
Leave All Timer (Centisecs)	The amount of time to wait before sending a LeaveAll PDU after the GARP application has been enabled on the interface or the last LeaveAll PDU was sent. A LeaveAll PDU indicates that all registrations will shortly be deregistered. Participants will need to rejoin in order to maintain registration.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.4.8 IGMP Snooping

Internet Group Management Protocol (IGMP) Snooping is a feature that allows a switch to forward multicast traffic intelligently on the switch. Multicast IP traffic is traffic that is destined to a host group. Host groups are identified by class D IP addresses, which range from 224.0.0.0 to 239.255.255.255. Based on the IGMP query and report messages, the switch forwards traffic only to the ports that request the multicast traffic. This prevents the switch from broadcasting the traffic to all ports and possibly affecting network performance.

A traditional Ethernet network may be separated into different network segments to prevent placing too many devices onto the same shared media. Bridges and switches connect these segments. When a packet with a broadcast or multicast destination address is received, the switch will forward a copy into each of the remaining network segments in accordance with the IEEE MAC Bridge standard. Eventually, the packet is made accessible to all nodes connected to the network.

This approach works well for broadcast packets that are intended to be seen or processed by all connected nodes. In the case of multicast packets, however, this approach could lead to less efficient use of network bandwidth, particularly when the packet is intended for only a small number of nodes. Packets will be flooded into network segments where no node has any interest in receiving the packet. While nodes will rarely incur any processing overhead to filter packets addressed to un-requested group addresses, they are unable to transmit new packets onto the shared media for the period of time that the multicast packet is flooded. The problem of wasting bandwidth is even worse when the LAN segment is not shared, for example in Full Duplex links.

Allowing switches to snoop IGMP packets is a creative effort to solve this problem. The switch uses the information in the IGMP packets as they are being forwarded throughout the network to determine which segments should receive packets directed to the group address.

4.4.8.1 Configuration

Use the IGMP Snooping Global Configuration and Status page to enable IGMP snooping on the switch and view information about the current IGMP configuration.

To access this page, click **Switching** > **IGMP Snooping** > **Configuration**.

Figure 4.190 Switching > IGMP Snooping > Configuration

The following table describes the items in the previous figure.

Item	Description
Admin Mode	The administrative mode of IGMP snooping on the device.

Item	Description
Multicast Control Frame Count	The number of data frames forwarded by the CPU.
Interface(s) Enabled for IGMP Snooping	The interface(s) on which IGMP snooping is administratively enabled. IGMP snooping must be enabled globally and on an interface for the interface to be able to snoop IGMP packets to determine which segments should receive multicast packets directed to the group address.
Data Frames Forwarded by CPU	The number of multicast control frames that have been processed by the CPU.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.8.2 Interface Configuration

Use the IGMP Snooping Interface Configuration page to configure IGMP snooping settings on specific interfaces. To configure the settings for one or more interfaces, select each entry to modify and click Edit. The same IGMP snooping settings are applied to all selected interfaces.

To access this page, click **Switching** > **IGMP Snooping** > **Interface Configuration**.

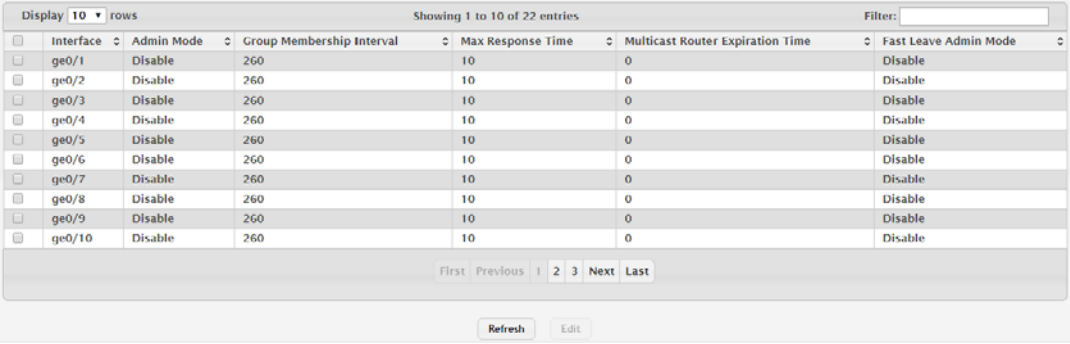


Figure 4.191 Switching > IGMP Snooping > Interface Configuration

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When configuring IGMP snooping settings, this field identifies the interface(s) that are being configured.
Admin Mode	The administrative mode of IGMP snooping on the interface. IGMP snooping must be enabled globally and on an interface for the interface to be able to snoop IGMP packets to determine which segments should receive multicast packets directed to the group address.
Group Membership Interval	The number of seconds the interface should wait for a report for a particular group on the interface before the IGMP snooping feature deletes the interface from the group.
Max Response Time	The number of seconds the interface should wait after sending a query if it does not receive a report for a particular group. The specified value should be less than the Group Membership Interval.
Multicast Router Expiration Time	The number of seconds the interface should wait to receive a query before it is removed from the list of interfaces with multicast routers attached.
Fast Leave Admin Mode	The administrative mode of Fast Leave on the interface. If Fast Leave is enabled, the interface can be immediately removed from the layer 2 forwarding table entry upon receiving an IGMP leave message for a multicast group without first sending out MAC-based general queries.

Item	Description
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.4.8.3 VLAN Status

Use the IGMP Snooping VLAN Status page to enable or disable IGMP snooping on system VLANs and to view and configure per-VLAN IGMP snooping settings. Only VLANS that are enabled for IGMP snooping appear in the table.

To access this page, click **Switching** > **IGMP Snooping** > **VLAN Status**.

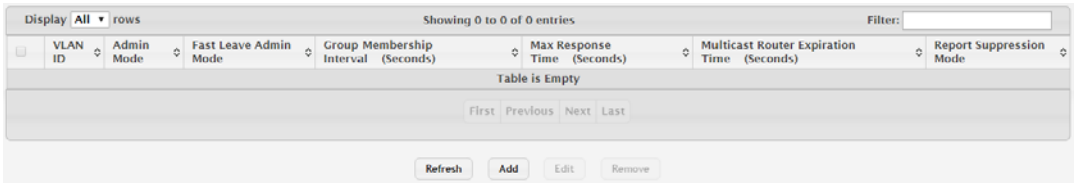


Figure 4.192 Switching > IGMP Snooping > VLAN Status

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN associated with the rest of the data in the row. When enabling IGMP snooping on a VLAN, use this menu to select the desired VLAN. Only VLANs that have been configured on the system and are not already enabled for IGMP snooping appear in the menu. When modifying IGMP snooping settings, this field identifies the VLAN that is being configured.
Admin Mode	The administrative mode of IGMP snooping on the VLAN. IGMP snooping must be enabled globally and on an VLAN for the VLAN to be able to snoop IGMP packets to determine which network segments should receive multicast packets directed to the group address.
Fast Leave Admin Mode	The administrative mode of Fast Leave on the VLAN. If Fast Leave is enabled, the VLAN can be immediately removed from the layer 2 forwarding table entry upon receiving an IGMP leave message for a multicast group without first sending out MAC-based general queries.
Group Membership Interval (Seconds)	The number of seconds the VLAN should wait for a report for a particular group on the VLAN before the IGMP snooping feature deletes the VLAN from the group.
Max Response Time (Seconds)	The number of seconds the VLAN should wait after sending a query if it does not receive a report for a particular group. The specified value should be less than the Group Membership Interval.
Multicast Router Expiration Time (Seconds)	The number of seconds the VLAN should wait to receive a query before it is removed from the list of VLANs with multicast routers attached.
Report Suppression Mode	The IGMPv1 and IGMPv2 report suppression mode. The device uses IGMP report suppression to limit the membership report traffic sent to multicast-capable routers. When this mode is enabled, the device does not send duplicate reports to the multicast router. Note that this mode is supported only when the multicast query has IGMPv1 and IGMPv2 reports. This feature is not supported when the query includes IGMPv3 reports. The options are as follows: ■ Enabled: Only the first IGMP report from all hosts for a group IGMP report is forwarded to the multicast routers. ■ Disabled: The device forwards all IGMP reports from all hosts in a multicast group to the multicast routers.
Refresh	Click **Refresh** to update the screen.

Item	Description
Add	Click **Add** to enable IGMP snooping on a VLAN.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to disable IGMP snooping for the selected entries.

To enable IGMP snooping on a VLAN:

Click **Switching** > **IGMP Snooping** > **VLAN Status** > **Add**.

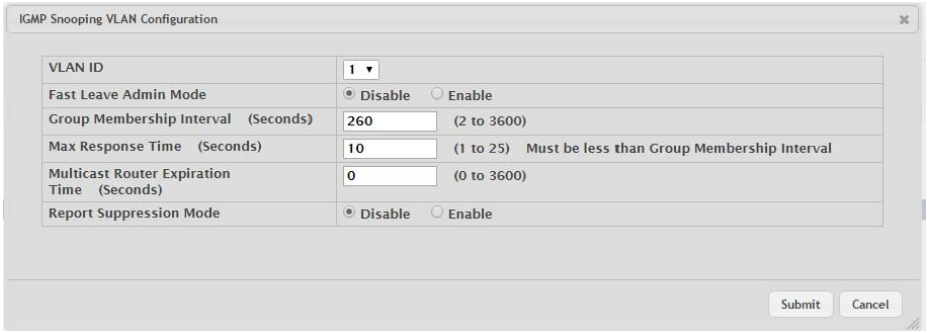


Figure 4.193 Switching > IGMP Snooping > VLAN Status > Add

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN associated with the rest of the data in the row. When enabling IGMP snooping on a VLAN, use this menu to select the desired VLAN. Only VLANs that have been configured on the system and are not already enabled for IGMP snooping appear in the menu. When modifying IGMP snooping settings, this field identifies the VLAN that is being configured.
Fast Leave Admin Mode	The administrative mode of Fast Leave on the VLAN. If Fast Leave is enabled, the VLAN can be immediately removed from the layer 2 forwarding table entry upon receiving an IGMP leave message for a multicast group without first sending out MAC-based general queries.
Group Membership Interval (Seconds)	The number of seconds the VLAN should wait for a report for a particular group on the VLAN before the IGMP snooping feature deletes the VLAN from the group.
Max Response Time (Seconds)	The number of seconds the VLAN should wait after sending a query if it does not receive a report for a particular group. The specified value should be less than the Group Membership Interval.
Multicast Router Expiration Time (Seconds)	The number of seconds the VLAN should wait to receive a query before it is removed from the list of VLANs with multicast routers attached.
Report Suppression Mode	The IGMPv1 and IGMPv2 report suppression mode. The device uses IGMP report suppression to limit the membership report traffic sent to multicast-capable routers. When this mode is enabled, the device does not send duplicate reports to the multicast router. Note that this mode is supported only when the multicast query has IGMPv1 and IGMPv2 reports. This feature is not supported when the query includes IGMPv3 reports. The options are as follows: ■ Enabled: Only the first IGMP report from all hosts for a group IGMP report is forwarded to the multicast routers. ■ Disabled: The device forwards all IGMP reports from all hosts in a multicast group to the multicast routers.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.8.4 Multicast Router Configuration

If a multicast router is attached to the switch, its existence can be learned dynamically. You can also statically configure a switch port as a multicast router interface. Use the IGMP Snooping Multicast Router Configuration page to manually configure an interface as a static multicast router interface.

To access this page, click **Switching** > **IGMP Snooping** > **Multicast Router Configuration**.

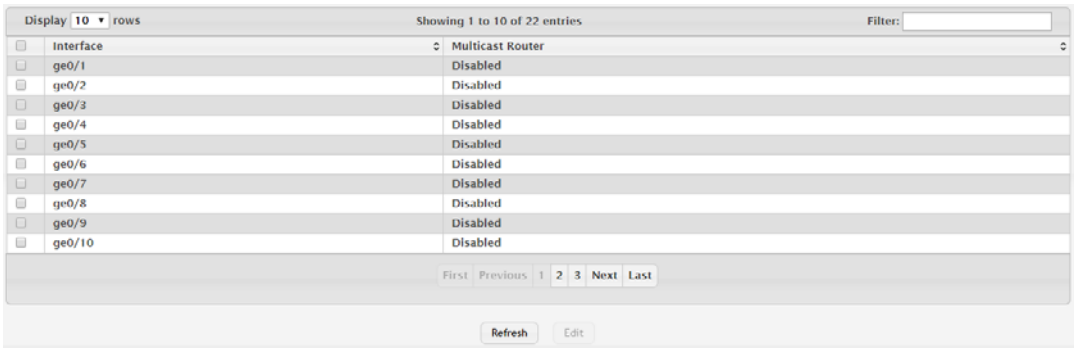


Figure 4.194 Switching > IGMP Snooping > Multicast Router Configuration

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When configuring the IGMP snooping multicast router settings, this field identifies the interface(s) that are being configured.
Multicast Router	Indicates whether the interface is enabled or disabled as a multicast router interface.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.4.8.5 Multicast Router VLAN Status

If a multicast router is attached to the switch, its existence can be learned dynamically. You can also statically configure one or more VLANs on each interface to act as a multicast router interface, which is an interface that faces a multicast router or IGMP querier and receives multicast traffic.

To access this page, click **Switching** > **IGMP Snooping** > **Multicast Router VLAN Status**.

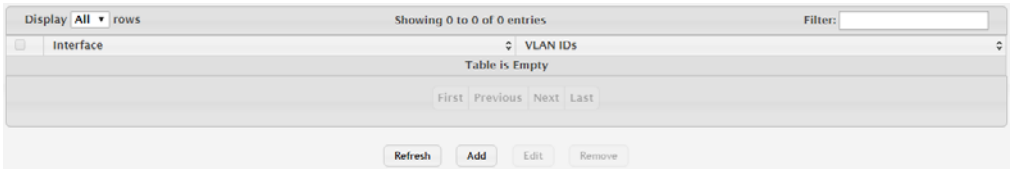


Figure 4.195 Switching > IGMP Snooping > Multicast Router VLAN Status

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. Only interfaces that are configured with multicast router VLANs appear in the table.
VLAN IDs	The ID of the VLAN configured as enabled for multicast routing on the associated interface.
Refresh	Click **Refresh** to update the screen.

Item	Description
Add	Click **Add** to enable IGMP snooping on a VLAN. The Multicast Router VLAN Configuration Menu displays. Click a VLAN ID to select it (or CTRL + click to select multiple VLAN IDs). Click the appropriate arrow to move the selected VLAN ID or VLAN IDs to the Configured VLAN IDs window. Click **Submit** to save the values and update the screen.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to disable IGMP snooping for the selected entries.

4.4.8.6 Multicast Router VLAN Configuration

Use the IGMP Snooping Multicast Router VLAN Configuration page to enable or disable specific VLANs as multicast router interfaces for a physical port or LAG. A multicast router interface faces a multicast router or IGMP querier and receives multicast traffic.

To access this page, click **Switching** > **IGMP Snooping** > **Multicast Router VLAN Configuration**.

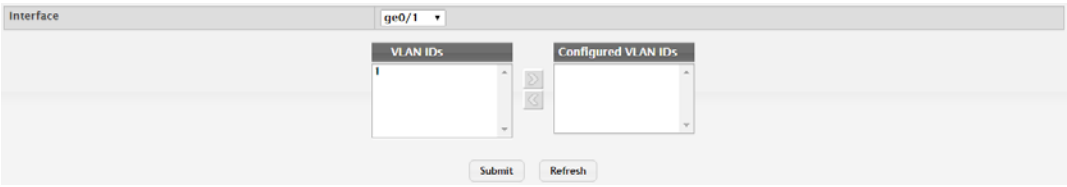


Figure 4.196 Switching > IGMP Snooping > Multicast Router VLAN Configuration

The following table describes the items in the previous figure.

Item	Description
Interface	Click the drop-down menu to select the port or LAG on which to enable or disable a VLAN multicast routing interface.
VLAN IDs	The VLANs configured on the system that are not currently enabled as multicast router interfaces on the selected port or LAG. To enable a VLAN as a multicast router interface, click the VLAN ID to select it (or CTRL + click to select multiple VLAN IDs). Then, click the appropriate arrow to move the selected VLAN or VLANs to the Configured VLAN IDs window.
Configured VLAN IDs	The VLANs that are enabled as multicast router interfaces on the selected port or LAG. To disable a VLAN as a multicast router interface, click the VLAN ID to select it (or CTRL + click to select multiple VLAN IDs). Then, click the appropriate arrow to move the selected VLAN or VLANs to the VLAN IDs window.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.

4.4.9 IGMP Snooping Querier

4.4.9.1 Configuration

Use the IGMP Snooping Querier Configuration page to configure the global IGMP snooping querier settings on the device. IGMP snooping requires that one central switch or router periodically query all end-devices on the network to announce their multicast memberships. This central device is the IGMP querier. When layer 3 IP multicast routing protocols are enabled in a network with IP multicast routing, the IP multicast router acts as the IGMP querier. However, if the IP- multicast traffic in a

VLAN needs to be layer 2 switched only, an IP-multicast router is not required. The IGMP snooping querier can perform the IGMP snooping functions on the VLAN.

To access this page, click **Switching** > **IGMP Snooping Querier** > **Configuration**.

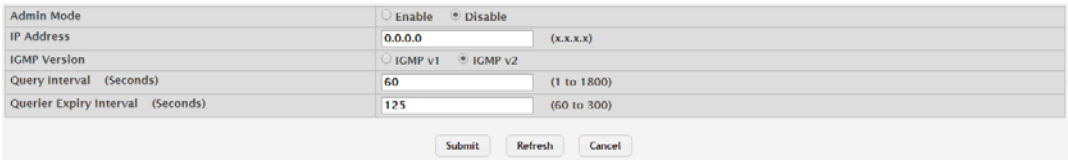


Figure 4.197 Switching > IGMP Snooping Querier > Configuration

The following table describes the items in the previous figure.

Item	Description
Admin Mode	The administrative mode for the IGMP snooping querier on the device. When enabled, the IGMP snooping querier sends out periodic IGMP queries that trigger IGMP report messages from the switches that want to receive IP multicast traffic. The IGMP snooping feature listens to these IGMP reports to establish appropriate forwarding.
IP Address	The snooping querier address to be used as source address in periodic IGMP queries. This address is used when no IP address is configured on the VLAN on which the query is being sent.
IGMP Version	The IGMP protocol version used in periodic IGMP queries.
Query Interval (Seconds)	The amount of time the IGMP snooping querier on the device should wait between sending periodic IGMP queries.
Querier Expiry Interval (Seconds)	The amount of time the device remains in non-querier mode after it has discovered that there is a multicast querier in the network.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.9.2 VLAN Configuration

Use the IGMP Snooping Querier VLAN Configuration page to enable the IGMP snooping querier feature on one or more VLANs and to configure per-VLAN IGMP snooping querier settings. Only VLANS that have the IGMP snooping querier feature enabled appear in the table.

To access this page, click **Switching** > **IGMP Snooping Querier** > **VLAN Configuration**.

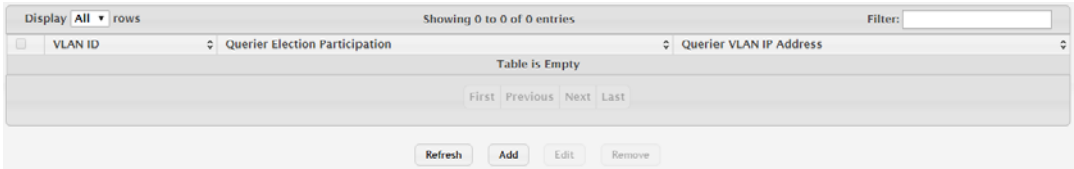


Figure 4.198 Switching > IGMP Snooping Querier > VLAN Configuration

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN on which the IGMP snooping querier is enabled. When enabling the IGMP snooping querier on a VLAN, use this menu to select the desired VLAN. Only VLANs that have been configured on the system and are not already enabled for the IGMP snooping querier appear in the menu. When modifying IGMP snooping querier settings, this field identifies the VLAN that is being configured.

Item	Description
Querier Election Participation	The participation mode for the IGMP snooping querier election process: ■ Enabled: The IGMP snooping querier on this VLAN participates in the querier election process when it discovers the presence of another querier in the VLAN. If the snooping querier finds that the other querier source IP address is lower than its own address, it stops sending periodic queries. If the snooping querier wins the election (because it has the lowest IP address), then it continues sending periodic queries. ■ Disabled: When the IGMP snooping querier on this VLAN sees other queriers of the same version in the VLAN, the snooping querier moves to the non-querier state and stops sending periodic queries.
Querier VLAN IP Address	The IGMP snooping querier address the VLAN uses as the source IP address in periodic IGMP queries sent on the VLAN. If this value is not configured, the VLAN uses the global IGMP snooping querier IP address.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to enable the IGMP snooping querier feature on a VLAN.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to disable the IGMP snooping querier feature for the selected entries.

To enable the IGMP snooping querier feature on a VLAN:

Click **Switching** > **IGMP Snooping Querier** > **VLAN Configuration** > **Add**.

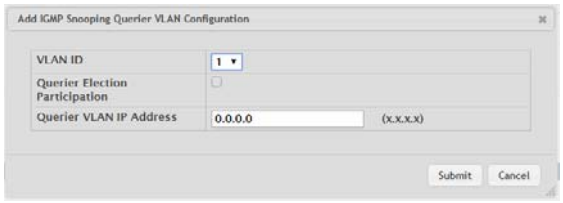


Figure 4.199 Switching > IGMP Snooping Querier > VLAN Configuration > Add

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN on which the IGMP snooping querier is enabled. When enabling the IGMP snooping querier on a VLAN, use this menu to select the desired VLAN. Only VLANs that have been configured on the system and are not already enabled for the IGMP snooping querier appear in the menu. When modifying IGMP snooping querier settings, this field identifies the VLAN that is being configured.
Querier Election Participation	The participation mode for the IGMP snooping querier election process: ■ Enabled: The IGMP snooping querier on this VLAN participates in the querier election process when it discovers the presence of another querier in the VLAN. If the snooping querier finds that the other querier source IP address is lower than its own address, it stops sending periodic queries. If the snooping querier wins the election (because it has the lowest IP address), then it continues sending periodic queries. ■ Disabled: When the IGMP snooping querier on this VLAN sees other queriers of the same version in the VLAN, the snooping querier moves to the non-querier state and stops sending periodic queries.

Item	Description
Querier VLAN IP Address	The IGMP snooping querier address the VLAN uses as the source IP address in periodic IGMP queries sent on the VLAN. If this value is not configured, the VLAN uses the global IGMP snooping querier IP address.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.9.3 VLAN Status

Use the IGMP Snooping Querier VLAN Status page to view information about the IGMP snooping querier status for all VLANs that have the snooping querier enabled.

To access this page, click **Switching** > **IGMP Snooping Querier** > **VLAN Status**.

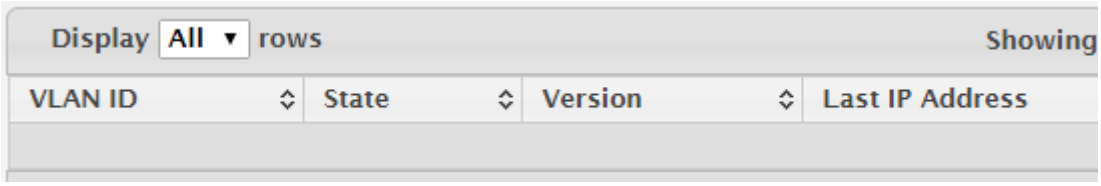


Figure 4.200 Switching > IGMP Snooping Querier > VLAN Status

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN associated with the rest of the data in the row. The table includes only VLANs that have the snooping querier enabled.
State	The operational state of the IGMP snooping querier on the VLAN, which is one of the following: ■ Querier: The snooping switch is the querier in the VLAN. The snooping switch will send out periodic queries with a time interval equal to the configured querier query interval. If the snooping switch sees a better querier (numerically lower) in the VLAN, it moves to non-querier mode. ■ Non-Querier: The snooping switch is in non-querier mode in the VLAN. If the querier expiry interval timer expires, the snooping switch moves into querier mode. ■ Disabled: The snooping querier is not operational on the VLAN. The snooping querier moves to the disabled mode when IGMP snooping is not operational on the VLAN, when the querier address is not configured, or the network management address is not configured.
Version	The operational IGMP protocol version of the querier.
Last IP Address	The IP address of the last querier from which a query was snooped on the VLAN.
Last Version	The IGMP protocol version of the last querier from which a query was snooped on the VLAN.
Max Response Time (Seconds)	The maximum response time to be used in the queries that are sent by the snooping querier.
Refresh	Click **Refresh** to update the screen.

4.4.10 MLD Snooping

4.4.10.1 Configuration

Use the MLD Snooping Configuration and Status page to enable Multicast Listener Discovery (MLD) snooping on the device and to view global status information. In

IPv4, Layer 2 switches can use IGMP snooping to limit the flooding of multicast traffic by dynamically configuring Layer 2 interfaces so that multicast traffic is forwarded to only those interfaces associated with IP multicast address. In IPv6 networks, MLD snooping performs a similar function. With MLD snooping, IPv6 multicast data is selectively forwarded to a list of ports intended to receive the data (instead of being flooded to all of the ports in a VLAN). This list is constructed by snooping IPv6 multicast control packets.

To access this page, click **Switching** > **MLD Snooping** > **Configuration**.

Figure 4.201 Switching > MLD Snooping > Configuration

The following table describes the items in the previous figure.

Item	Description
MLD Snooping Admin Mode	The administrative mode of MLD snooping on the device.
Multicast Control Frame Count	The number of multicast control frames that have been processed by the CPU.
Data Frames Forwarded by CPU	The number of data frames forwarded by the CPU.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.10.2 Interface Configuration

Use the MLD Snooping Interface Configuration page to configure MLD snooping settings on specific interfaces.

To access this page, click **Switching** > **MLD Snooping** > **Interface Configuration**.

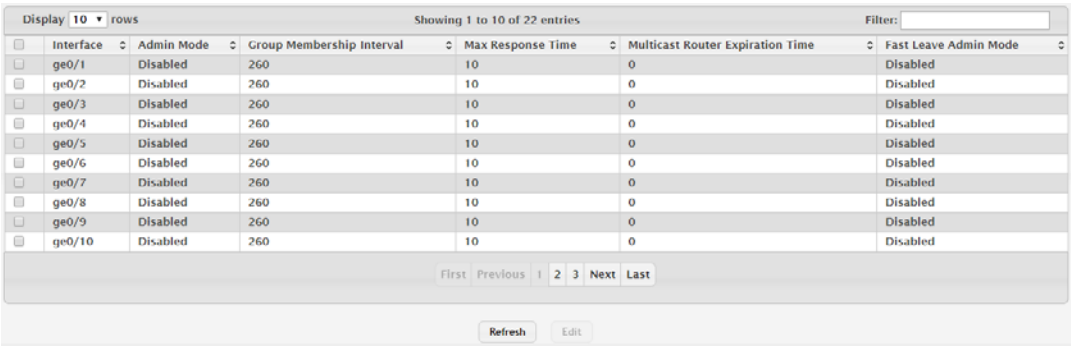


Figure 4.202 Switching > MLD Snooping > Interface Configuration

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When configuring MLD snooping settings, this field identifies each interface that is being configured.
Admin Mode	The administrative mode of MLD snooping on the interface. MLD snooping must be enabled globally and on an interface for the interface to be able to snoop MLD packets to determine which segments should receive multicast packets directed to the group address.

Item	Description
Group Membership Interval	The number of seconds the interface should wait for a report for a particular group on the interface before the MLD snooping feature deletes the interface from the group.
Max Response Time	The number of seconds the interface should wait after sending a query if it does not receive a report for a particular group. The specified value should be less than the Group Membership Interval.
Multicast Router Expiration Time	The number of seconds the interface should wait to receive a query before it is removed from the list of interfaces with multicast routers attached.
Fast Leave Admin Mode	The administrative mode of Fast Leave on the interface. If Fast Leave is enabled, the interface can be immediately removed from the Layer 2 forwarding table entry upon receiving an MLD leave message for a multicast group without first sending out MAC-based general queries.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.4.10.3 Source Specific Multicast

The MLD Snooping Source Specific Multicast page displays Source Specific Multicast (SSM) information learned by snooping MLDv2 reports. MLDv2 includes support for SSM, in which a receiver can request to receive multicast packets from one or more specific source address or from all addresses except one or more specified source addresses. If a host sends an MLDv2 report, the MLD snooping feature records the information and adds an entry to the table on this page.

To access this page, click **Switching** > **MLD Snooping** > **Source Specific Multicast**.

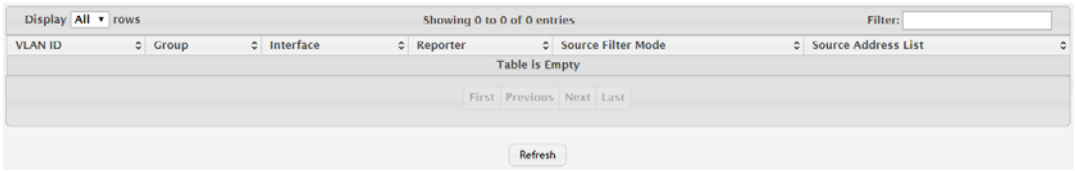


Figure 4.203 Switching > MLD Snooping > Source Specific Multicast

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN on which the MLDv2 report is received.
Group	The IPv6 multicast group address of the multicast group the host belongs to.
Interface	The interface on which the MLD v2 report is received.
Reporter	The IPv6 address of the host that sent the MLDv2 report.
Source Filter Mode	The source filter mode for the specified group, which is one of the following: ■ Include: The receiver has expressed interest in receiving multicast traffic for the multicast group from the source or sources in the Source Address List. ■ Exclude: The receiver has expressed interest in receiving multicast traffic for the multicast group from any source except the source or sources in the Source Address List.
Source Address List	The source IPv6 address or addresses for which source filtering is requested.
Refresh	Click **Refresh** to update the screen.

4.4.10.4 VLAN Status

Use the MLD Snooping VLAN Status page to enable or disable MLD snooping on system VLANs and to view and configure per-VLAN MLD snooping settings. Only VLANS that are enabled for MLD snooping appear in the table.

To access this page, click **Switching** > **MLD Snooping** > **VLAN Status**.

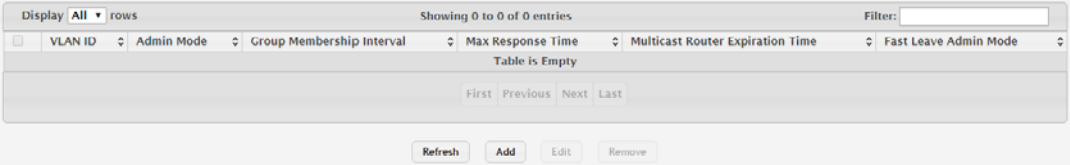


Figure 4.204 Switching > MLD Snooping > VLAN Status

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN associated with the rest of the data in the row. When enabling MLD snooping on a VLAN, use this menu to select the desired VLAN. Only VLANs that have been configured on the system and are not already enabled for MLD snooping appear in the menu. When modifying MLD snooping settings, this field identifies the VLAN that is being configured.
Admin Mode	The administrative mode of MLD snooping on the VLAN. MLD snooping must be enabled globally and on a VLAN for the VLAN to be able to snoop MLD packets and determine which network segments should receive multicast packets directed to the group address.
Group Membership Interval	The number of seconds the VLAN should wait for a report for a particular group on the VLAN before the MLD snooping feature deletes the VLAN from the group.
Max Response Time	The number of seconds the VLAN should wait after sending a query if does not receive a report for a particular group. The specified value should be less than the Group Membership Interval.
Multicast Router Expiration Time	The number of seconds the VLAN should wait to receive a query before it is removed from the list of VLANs with multicast routers attached.
Fast Leave Admin Mode	The administrative mode of Fast Leave on the VLAN. If Fast Leave is enabled, the VLAN can be immediately removed from the Layer 2 forwarding table entry upon receiving an MLD leave message for a multicast group without first sending out MAC-based general queries.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to enable MLD snooping on a VLAN.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to disable MLD snooping for the selected entries.

To enable MLD snooping on a VLAN:

Click **Switching** > **MLD Snooping** > **VLAN Status** > **Add**.

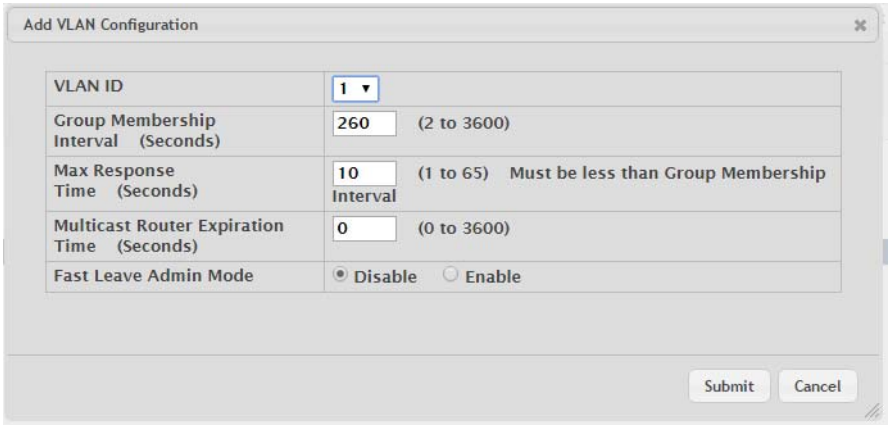


Figure 4.205 Switching > MLD Snooping > VLAN Status > Add

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN associated with the rest of the data in the row. When enabling MLD snooping on a VLAN, use this menu to select the desired VLAN. Only VLANs that have been configured on the system and are not already enabled for MLD snooping appear in the menu. When modifying MLD snooping settings, this field identifies the VLAN that is being configured.
Group Membership Interval (Seconds)	The number of seconds the VLAN should wait for a report for a particular group on the VLAN before the MLD snooping feature deletes the VLAN from the group.
Max Response Time (Seconds)	The number of seconds the VLAN should wait after sending a query if does not receive a report for a particular group. The specified value should be less than the Group Membership Interval.
Multicast Router Expiration Time (Seconds)	The number of seconds the VLAN should wait to receive a query before it is removed from the list of VLANs with multicast routers attached.
Fast Leave Admin Mode	The administrative mode of Fast Leave on the VLAN. If Fast Leave is enabled, the VLAN can be immediately removed from the Layer 2 forwarding table entry upon receiving an MLD leave message for a multicast group without first sending out MAC-based general queries.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.10.5 Multicast Router Configuration

Use the MLD Snooping Multicast Router Configuration page to manually configure an interface as a static MLD snooping multicast router interface. If a multicast router is attached to the switch, its existence can be learned dynamically. You can also statically configure an interface as a multicast router interface, which is an interface that faces a multicast router or MLD querier and receives multicast traffic.

To access this page, click **Switching** > **MLD Snooping** > **Multicast Router Configuration**.

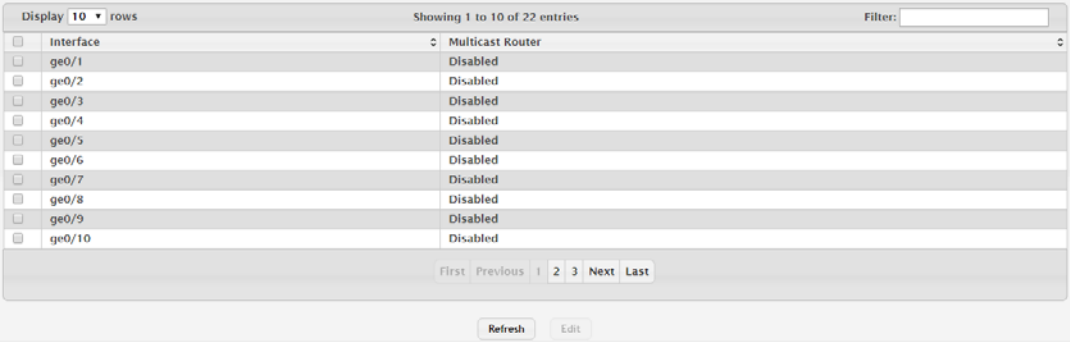


Figure 4.206 Switching > MLD Snooping > Multicast Router Configuration

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When configuring the MLD snooping multicast router settings, this field identifies each interface that is being configured.
Multicast Router	Indicates whether the interface is enabled or disabled as a multicast router interface.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.4.10.6 Multicast Router VLAN Status

Use the MLD Snooping Multicast Router VLAN Status page to enable or disable specific VLANs as static multicast router interfaces for a physical port or LAG and to view the multicast router VLAN status for each interface. A multicast router interface faces a multicast router or MLD querier and receives multicast traffic. If a multicast router is attached to the switch, its existence can be learned dynamically. You can also statically configure one or more VLANs on each interface to act as multicast router interfaces.

To access this page, click **Switching** > **MLD Snooping** > **Multicast Router VLAN Status**.

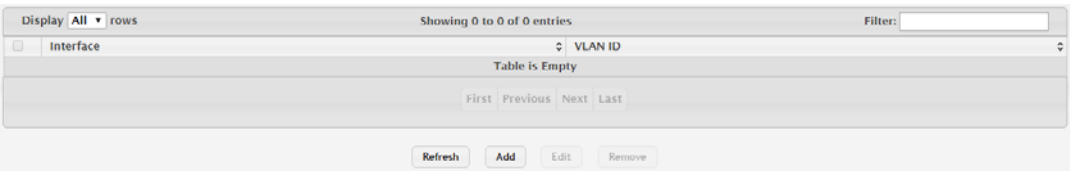


Figure 4.207 Switching > MLD Snooping > Multicast Router VLAN Status

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. Only interfaces that are configured with multicast router VLANs appear in the table. When adding multicast router VLAN information for an interface, use the Interface menu to select the interface on which to enable one or more multicast router VLAN interfaces. When editing multicast router VLAN information, this field shows the interface that is being configured.

Item	Description
VLAN ID	The ID of each VLAN configured as enabled as a multicast router interface on the associated interface. When changing the multicast routing VLAN interfaces that are associated with an interface, click the VLAN ID to select it (or CTRL + click to select multiple VLAN IDs).
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to enable VLANs as multicast router interfaces on a port or LAG.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to disable all VLAN multicast routing interfaces for the selected entries.

To enable VLANs as multicast router interfaces on a port or LAG:

Click **Switching** > **MLD Snooping** > **Multicast Router VLAN Status** > **Add**.

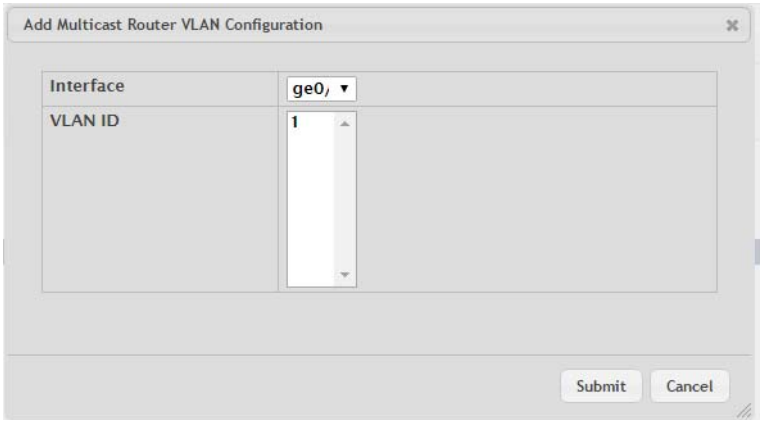


Figure 4.208 Switching > MLD Snooping > Multicast Router VLAN Status > Add

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. Only interfaces that are configured with multicast router VLANs appear in the table. When adding multicast router VLAN information for an interface, use the Interface menu to select the interface on which to enable one or more multicast router VLAN interfaces. When editing multicast router VLAN information, this field shows the interface that is being configured.
VLAN ID	The ID of each VLAN configured as enabled as a multicast router interface on the associated interface. When changing the multicast routing VLAN interfaces that are associated with an interface, click the VLAN ID to select it (or CTRL + click to select multiple VLAN IDs).
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.11 MLD Snooping Querier

4.4.11.1 Configuration

Use the MLD Snooping Querier Configuration page to configure the global MLD snooping querier settings on the device. MLD snooping requires that one central switch or router periodically query all end-devices on the network to announce their multicast memberships. This central device is the MLD querier. When Layer 3 IP multicast routing protocols are enabled in a network with IP multicast routing, the IP multicast router acts as the MLD querier. However, if the IP- multicast traffic in a VLAN

needs to be Layer 2 switched only, an IP-multicast router is not required. The MLD snooping querier can perform the MLD snooping functions on the VLAN.

To access this page, click **Switching** > **MLD Snooping Querier** > **Configuration**.

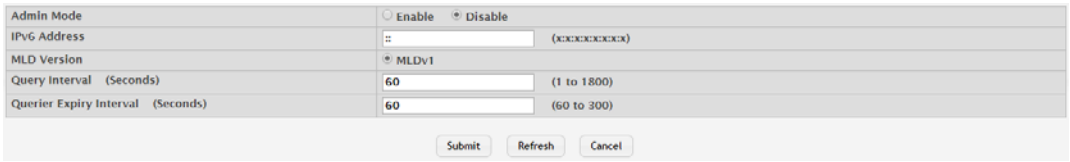


Figure 4.209 Switching > MLD Snooping Querier > Configuration

The following table describes the items in the previous figure.

Item	Description
Admin Mode	The administrative mode for the MLD snooping querier on the device. When enabled, the MLD snooping querier sends out periodic MLD queries that trigger MLD report messages from the switches that want to receive IP multicast traffic. The MLD snooping feature listens to these MLD reports to establish appropriate forwarding.
IPv6 Address	The snooping querier unicast link-local IPv6 address to be used as the source address in periodic MLD queries. This address is used when no IPv6 address is configured on the VLAN on which the query is being sent.
MLD Version	The MLD protocol version used in periodic MLD queries.
Query Interval (Seconds)	The amount of time the MLD snooping querier should wait between sending periodic MLD queries.
Querier Expiry Interval (Seconds)	The amount of time the device remains in non-querier mode after it has discovered that there is a multicast querier in the network.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.11.2 VLAN Configuration

Use the MLD Snooping Querier VLAN Configuration page to enable the MLD snooping querier feature on one or more VLANs and to configure per-VLAN MLD snooping querier settings. Only VLANS that have the MLD snooping querier feature enabled appear in the table.

To access this page, click **Switching** > **MLD Snooping Querier** > **VLAN Configuration**.

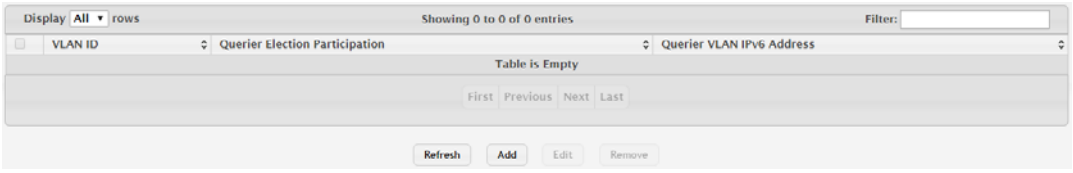


Figure 4.210 Switching > MLD Snooping Querier > VLAN Configuration

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN on which the MLD snooping querier is enabled. When enabling the MLD snooping querier on a VLAN, use this menu to select the desired VLAN. Only VLANs that have been configured on the system and are not already enabled for the MLD snooping querier appear in the menu. When modifying MLD snooping querier settings, this field identifies the VLAN that is being configured.

Item	Description
Querier Election Participation	The participation mode for the MLD snooping querier election process: ■ Enabled: The MLD snooping querier on this VLAN participates in the querier election process when it discovers the presence of another querier in the VLAN. If the snooping querier finds that the other querier source IPv6 address is lower than its own address, it stops sending periodic queries. If the snooping querier wins the election (because it has the lowest IPv6 address), then it continues sending periodic queries. ■ Disabled: When the MLD snooping querier on this VLAN sees other queriers of the same version in the VLAN, the snooping querier moves to the non-querier state and stops sending periodic queries.
Querier VLAN IPv6 Address	The MLD snooping querier unicast link-local IPv6 address the VLAN uses as the source address in periodic MLD queries sent on the VLAN. If this value is not configured, the VLAN uses the global MLD snooping querier IPv6 address.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to enable the MLD snooping querier feature on a VLAN.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to disable the MLD snooping querier feature for the selected entries.

To enable the MLD snooping querier feature on a VLAN:

Click **Switching** > **MLD Snooping Querier** > **VLAN Configuration** > **Add**.

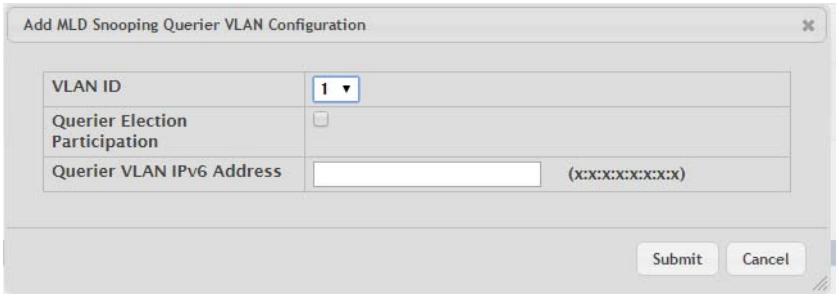


Figure 4.211 Switching > MLD Snooping Querier > VLAN Configuration > Add

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN on which the MLD snooping querier is enabled. When enabling the MLD snooping querier on a VLAN, use this menu to select the desired VLAN. Only VLANs that have been configured on the system and are not already enabled for the MLD snooping querier appear in the menu. When modifying MLD snooping querier settings, this field identifies the VLAN that is being configured.

Item	Description
Querier Election Participation	The participation mode for the MLD snooping querier election process: ■ Enabled: The MLD snooping querier on this VLAN participates in the querier election process when it discovers the presence of another querier in the VLAN. If the snooping querier finds that the other querier source IPv6 address is lower than its own address, it stops sending periodic queries. If the snooping querier wins the election (because it has the lowest IPv6 address), then it continues sending periodic queries. ■ Disabled: When the MLD snooping querier on this VLAN sees other queriers of the same version in the VLAN, the snooping querier moves to the non-querier state and stops sending periodic queries.
Querier VLAN IPv6 Address	The MLD snooping querier unicast link-local IPv6 address the VLAN uses as the source address in periodic MLD queries sent on the VLAN. If this value is not configured, the VLAN uses the global MLD snooping querier IPv6 address.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.11.3 VLAN Status

Use the MLD Snooping Querier VLAN Status page to view information about the MLD snooping querier status for all VLANs that have the snooping querier enabled.

To access this page, click **Switching** > **MLD Snooping Querier** > **VLAN Status**.

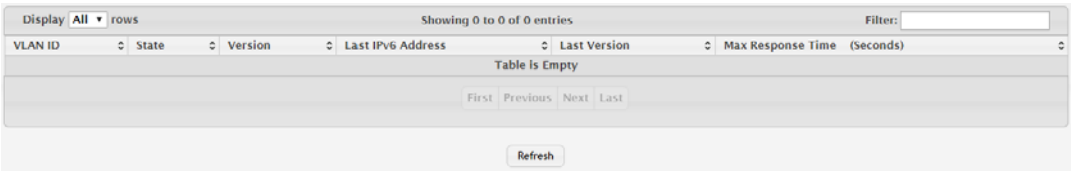


Figure 4.212 Switching > MLD Snooping Querier > VLAN Status

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN associated with the rest of the data in the row. The table includes only VLANs that have the snooping querier enabled.
State	The operational state of the MLD Snooping Querier on a VLAN, which is one of the following: ■ Querier: The snooping switch is the querier in the VLAN. The snooping switch will send out periodic queries with a time interval equal to the configured querier query interval. If the snooping switch sees a better querier (numerically lower) in the VLAN, it moves to non-querier mode. ■ Non-Querier: The snooping switch is in non-querier mode in the VLAN. If the querier expiry interval timer expires, the snooping switch moves into querier mode. ■ Disabled: The snooping querier is not operational on the VLAN. The snooping querier moves to the disabled mode when MLD snooping is not operational on the VLAN, when the querier address is not configured, or the network management address is not configured.
Version	The operational MLD protocol version of the querier.
Last IPv6 Address	The IPv6 address of the last querier from which a query was snooped on the VLAN.

Item	Description
Last Version	The MLD protocol version of the last querier from which a query was snooped on the VLAN.
Max Response Time (Seconds)	The maximum response time to be used in the queries that are sent by the snooping querier.
Refresh	Click **Refresh** to update the screen.

4.4.12 Multicast Forwarding Database

The Layer 2 Multicast Forwarding Database (MFDB) is used by the switch to make forwarding decisions for packets that arrive with a multicast destination MAC address. By limiting multicasts to only certain ports in the switch, traffic is prevented from going to parts of the network where that traffic is unnecessary.

When a packet enters the switch, the destination MAC address is combined with the VLAN ID and a search is performed in the Layer 2 Multicast Forwarding Database. If no match is found, the packet is either flooded to all ports in the VLAN or discarded, depending on the switch configuration. If a match is found, the packet is forwarded only to the ports that are members of that multicast group.

4.4.12.1 Summary

The Multicast Forwarding Database Summary page displays the entries in the multicast forwarding database (MFDB) on the device. The MFDB holds the port membership information for all active multicast address entries and is used to make forwarding decisions for frames that arrive with a multicast destination MAC address. The key for an entry consists of a VLAN ID and MAC address pair. Entries may contain data for more than one protocol.

To access this page, click **Switching** > **Multicast Forwarding Database** > **Summary**.

Figure 4.213 Switching > Multicast Forwarding Database > Summary

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN ID associated with the entry in the MFDB.
MAC Address	The multicast MAC address that has been added to the MFDB.
Component	The feature on the device that was responsible for adding the entry to the multicast forwarding database, which is one of the following: ■ IGMP Snooping: A layer 2 feature that allows the device to dynamically add or remove ports from IPv4 multicast groups by listening to IGMP join and leave requests. ■ MLD Snooping: A layer 2 feature that allows the device to dynamically add or remove ports from IPv6 multicast groups by listening to MLD join and leave requests. ■ GMRP: Generic Address Resolution Protocol (GARP) Multicast Registration Protocol, which helps control the flooding of multicast traffic by keeping track of group membership information. ■ Static Filtering: A static MAC filter that was manually added to the address table by an administrator.

Item	Description
Type	The type of entry, which is one of the following: ■ Static: The entry has been manually added to the MFDB by an administrator. ■ Dynamic: The entry has been added to the MFDB as a result of a learning process or protocol.
Description	A text description of this multicast table entry.
Interface(s)	The list of interfaces that will forward or filter traffic sent to the multicast MAC address.
Forwarding Interface(s)	The list of forwarding interfaces. This list does not include any interfaces that are listed as static filtering interfaces.
Refresh	Click **Refresh** to update the screen.

4.4.12.2 GMRP

Use the Multicast Forwarding Database GMRP Table page to display the entries in the multicast forwarding database (MFDB) that were added by using the GARP Multicast Registration Protocol (GMRP).

To access this page, click **Switching** > **Multicast Forwarding Database** > **GMRP**.

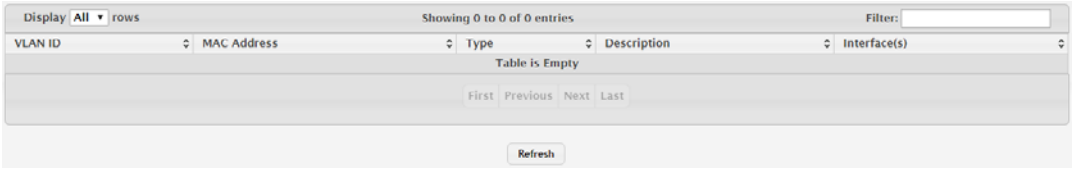


Figure 4.214 Switching > Multicast Forwarding Database > GMRP

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN ID associated with the entry in the MFDB.
MAC Address	The multicast MAC address associated with the entry in the MFDB.
Type	The type of entry, which is one of the following: ■ Static: The entry has been manually added to the MFDB by an administrator. ■ Dynamic: The entry has been added to the MFDB as a result of a learning process or protocol. Entries that appear on this page have been added by using GARP.
Description	A text description of this multicast table entry.
Interface(s)	The list of interfaces that will forward or filter traffic sent to the multicast MAC address.
Refresh	Click **Refresh** to update the screen.

4.4.12.3 IGMP Snooping

The Multicast Forwarding Database IGMP Snooping Table page displays the entries in the multicast forwarding database (MFDB) that were added because they were discovered by the IGMP snooping feature. IGMP snooping allows the device to dynamically add or remove ports from IPv4 multicast groups by listening to IGMP join and leave requests.

To access this page, click **Switching** > **Multicast Forwarding Database** > **IGMP Snooping**.

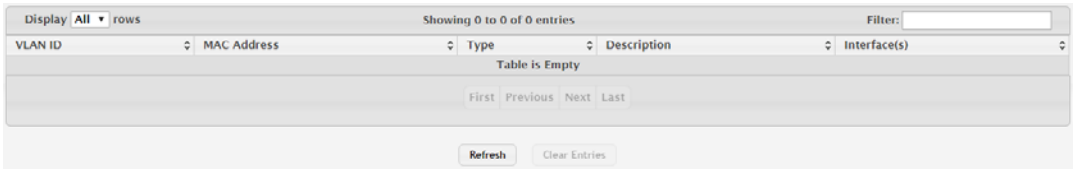


Figure 4.215 Switching > Multicast Forwarding Database > IGMP Snooping

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN ID associated with the entry in the MFDB.
MAC Address	The multicast MAC address associated with the entry in the MFDB.
Type	The type of entry, which is one of the following: ■ Static: The entry has been manually added to the MFDB by an administrator. ■ Dynamic: The entry has been added to the MFDB as a result of a learning process or protocol. Entries that appear on this page have been learned by examining IGMP messages.
Description	A text description of this multicast table entry.
Interface(s)	The list of interfaces that will forward or filter traffic sent to the multicast MAC address.
Refresh	Click **Refresh** to update the screen.
Clear Entries	Click **Clear Entries** to remove all IGMP snooping entries from the MFDB table.

4.4.12.4 MLD Snooping

The Multicast Forwarding Database MLD Snooping Table page displays the entries in the multicast forwarding database (MFDB) that were added because they were discovered by the MLD snooping feature. MLD snooping allows the device to dynamically add or remove ports from IPv6 multicast groups by listening to MLD join and leave requests.

To access this page, click **Switching** > **Multicast Forwarding Database** > **MLD Snooping**.

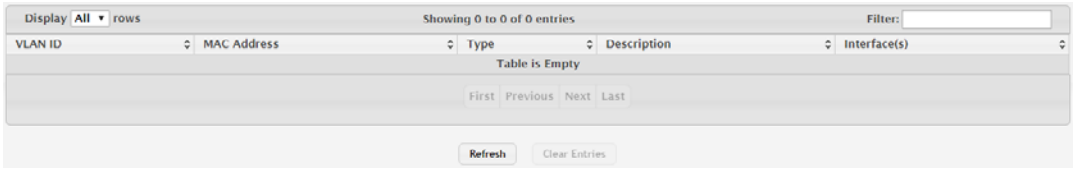


Figure 4.216 Switching > Multicast Forwarding Database > MLD Snooping

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The VLAN ID associated with the entry in the MFDB.
MAC Address	The multicast MAC address associated with the entry in the MFDB.
Type	The type of entry, which is one of the following: ■ Static: The entry has been manually added to the MFDB by an administrator. ■ Dynamic: The entry has been added to the MFDB as a result of a learning process or protocol. Entries that appear on this page have been learned by examining IGMP messages.

Item	Description
Description	A text description of this multicast table entry.
Interface(s)	The list of interfaces that will forward or filter traffic sent to the multicast MAC address.
Refresh	Click **Refresh** to update the screen.
Clear Entries	Click **Clear Entries** to remove all IGMP snooping entries from the MFDB table.

4.4.12.5 Statistics

The Multicast Forwarding Database Statistics page displays statistical information about the multicast forwarding database (MFDB).

To access this page, click **Switching** > **Multicast Forwarding Database** > **Statistics**.

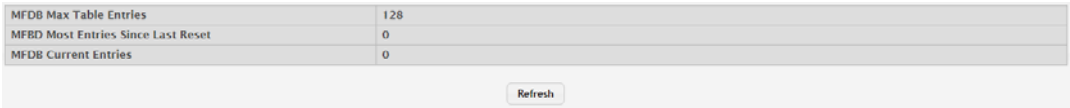


Figure 4.217 Switching > Multicast Forwarding Database > Statistics

The following table describes the items in the previous figure.

Item	Description
MFDB Max Table Entries	The maximum number of entries that the multicast forwarding database can hold.
MFBD Most Entries Since Last Reset	The largest number of entries that have been present in the multicast forwarding database since the device was last reset. This value is also known as the MFDB high-water mark.
MFDB Current Entries	The current number of entries in the multicast forwarding database.
Refresh	Click **Refresh** to update the screen.

4.4.13 MVR

Multicast VLAN Registration (MVR) allows the switch to listen to the Internet Group Management Protocol (IGMP) frames. Both protocols operate independently from each other and can be enabled on the switch interfaces. In such case, MVR listens to the Join and Report messages only for the statically configured groups. All other groups are managed by IGMP snooping. MVR uses the multicast VLAN, a dedicated VLAN used to transfer multicast traffic over the network avoiding duplication of multicast streams for clients in different VLANs.

4.4.13.1 Global

Use the MVR Global Configuration page to view and configure the global settings for MVR.

To access this page, click **Switching** > **MVR** > **Global**.

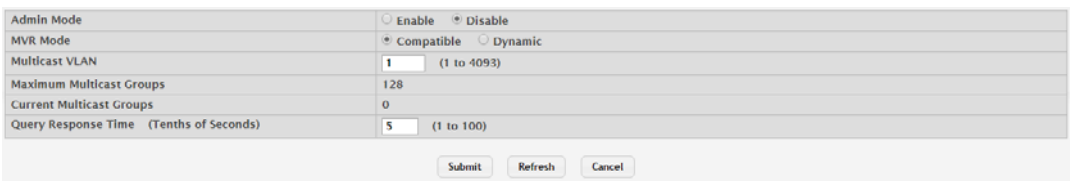


Figure 4.218 Switching > MVR > Global

The following table describes the items in the previous figure.

Item	Description
Admin Mode	The administrative mode of MVR on the device.
MVR Mode	The MVR learning mode, which can be one of the following: ■ Compatible: MVR does not learn source ports membership, instead all source ports are members of all groups by default. MVR does not forward IGMP Joins and Leaves from the hosts to the router. ■ Dynamic: MVR learns source ports membership from IGMP queries. MVR forwards the IGMP Joins and Leaves from the hosts to the router. The multicast traffic is forwarded only to the receiver ports that joined the group, either by IGMP Joins or MVR static configuration.
Multicast VLAN	A dedicated VLAN used to transfer multicast traffic over the network avoiding duplication of multicast streams for clients in different VLANs.
Maximum Multicast Groups	The maximum number of membership groups that can be statically configured in the MVR database.
Current Multicast Groups	The current number of membership groups that are statically configured in the MVR database.
Query Response Time (Tenths of Seconds)	The maximum time to wait for an IGMP membership report on a receiver port before removing the port from the multicast group. The query time is specified in tenths of a second.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.13.2 Group

Use the MVR Group Status page to view or configure MVR groups. MVR maintains two types of group entries in its database, Static and Dynamic. Static entries are configured by the administrator and Dynamic entries are learned by MVR on the source ports.

To access this page, click **Switching** > **MVR** > **Group**.

Figure 4.219 Switching > MVR > Group

The following table describes the items in the previous figure.

Item	Description
Group	The multicast group address.
Status	The status of the group, which can be one of the following: ■ Active: Group has one or more MVR ports participating. ■ Inactive: Group has no MVR ports participating.
Members	The list of interfaces which participate in the MVR group. In the compatible mode, all source ports are members of all groups by default.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new group.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new group:

Click **Switching** > **MVR** > **Group** > **Add**.

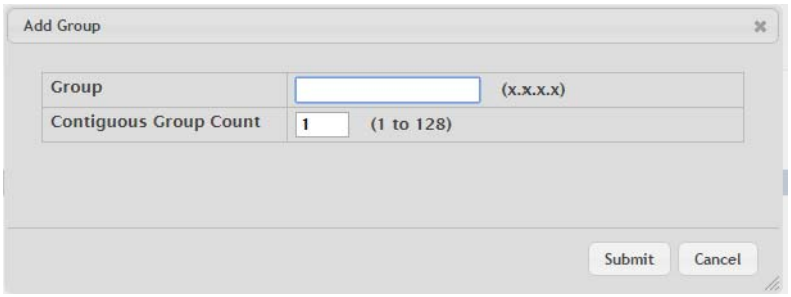


Figure 4.220 Switching > MVR > Group > Add

The following table describes the items in the previous figure.

Item	Description
Group	The multicast group address.
Contiguous Group Count	Specify the desired number of groups to be created starting with the entered group address. The default contiguous group count is 1.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.13.3 Interface

Use the MVR Interface Status page to configure MVR settings on specific interfaces. To configure the settings for one or more interfaces, select each entry to modify and click Edit. The same MVR settings are applied to all selected interfaces.

To access this page, click **Switching** > **MVR** > **Interface**.

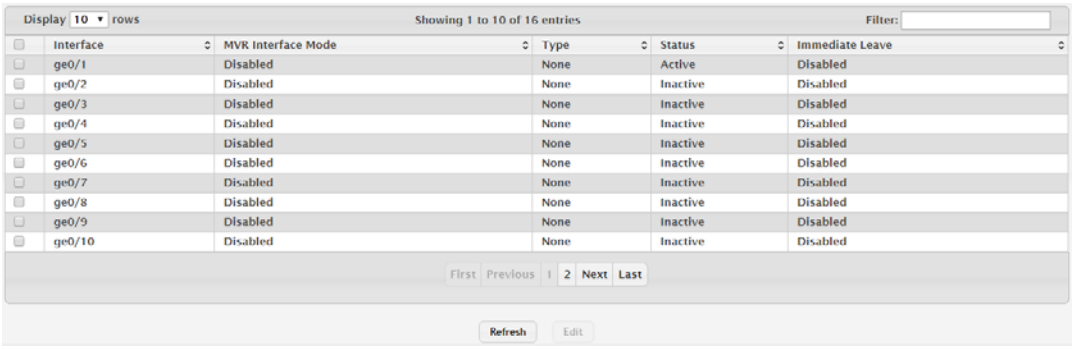


Figure 4.221 Switching > MVR > Interface

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When configuring MVR settings, this field identifies the interface(s) that are being configured.
MVR Interface Mode	The administrative mode of MVR on the interface. MVR must be enabled globally and on an interface in order to listen to the Join and Report messages for the configured groups.
Type	The type of interface, which can be one of the following: ■ Source: The port where multicast traffic is flowing to. It must be a member of the multicast VLAN. ■ Receiver: The port where listening host is connected to the switch. It must not be a member of the multicast VLAN. ■ None: The port is not an MVR port.

Item	Description
Status	The active state of the interface, which can be one of the following: ■ Active: The port has link up and is in the forwarding state. ■ Inactive: The port may not have link up, not be in the forwarding state, or both. The interface VLAN information is also displayed as part of the status and can be one of the following: ■ In VLAN: Interface is a member of one or more VLANs. ■ Not In VLAN: Interface is not a member of any VLAN.
Immediate Leave	The MVR immediate leave mode on the interface. It can only be configured on the receiver ports. MVR handles IGMP Leaves in Normal or Immediate leave mode. When a Leave message is received, in the normal mode a general IGMP query is sent from the switch to the receiver port, whereas in the immediate leave mode the switch is immediately reconfigured not to forward specific multicast stream to the receiver port. The immediate leave mode is used for ports where only one client may be connected.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.4.13.4 Statistics

Use the MVR Statistics page to view statistical information about IGMP packets intercepted by MVR.

To access this page, click **Switching** > **MVR** > **Statistics**.

Figure 4.222 Switching > MVR > Statistics

The following table describes the items in the previous figure.

Item	Description
IGMP Queries	The total number of IGMP Queries successfully transmitted or received by the processor.
IGMPv1 Reports	The total number of IGMPv1 Reports successfully transmitted or received by the processor.
IGMPv2 Reports	The total number of IGMPv2 Reports successfully transmitted or received by the processor.
IGMP Leaves	The total number of IGMP Leaves successfully transmitted or received by the processor.
Packet Failures	The total number of packets which failed to get transmitted or received by the processor.
Refresh	Click **Refresh** to update the screen.

4.4.14 LLDP

The IEEE 802.1AB defined standard, Link Layer Discovery Protocol (LLDP), allows stations residing on an 802 LAN to advertise major capabilities and physical descriptions. This information is viewed by a network manager to identify system topology and detect bad configurations on the LAN.

LLDP is a one-way protocol; there are no request/response sequences. Information is advertised by stations implementing the transmit function, and is received and pro-

cessed by stations implementing the receive function. The transmit and receive functions can be enabled/disabled separately per port. By default, both transmit and receive are disabled on all ports. The application is responsible for starting each transmit and receive state machine appropriately, based on the configured status and operational state of the port.

FASTPATH SMB allows LLDP to have multiple LLDP neighbors per interface. The number of such neighbors is limited by the memory constraints. A product-specific constant defines the maximum number of neighbors supported by the switch. There is no restriction on the number of neighbors supported on a per LLDP port. If all the remote entries on the switch are filled up, the new neighbors are ignored. In case of multiple VOIP devices on a single interface, the 802.1ab component sends the Voice VLAN configuration to all the VoIP devices.

4.4.14.1 Global

Use the LLDP Global Configuration page to specify LLDP parameters that are applied to the switch.

To access this page, click **Switching** > **LLDP** > **Global**.

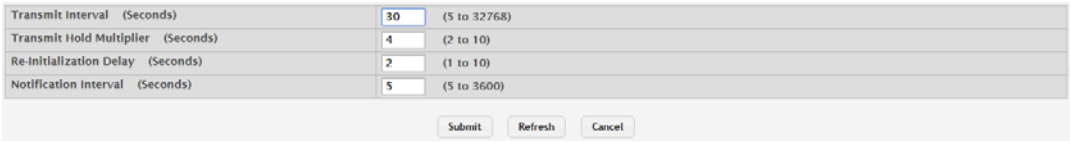


Figure 4.223 Switching > LLDP > Global

The following table describes the items in the previous figure.

Item	Description
Transmit Interval (Seconds)	The number of seconds between transmissions of LLDP advertisements.
Transmit Hold Multiplier (Seconds)	The Transmit Interval multiplier value, where Transmit Hold Multiplier - Transmit Interval = the time to live (TTL) value the device advertises to neighbors.
Re-Initialization Delay (Seconds)	The number of seconds to wait before attempting to reinitialize LLDP on a port after the LLDP operating mode on the port changes.
Notification Interval (Seconds)	The minimum number of seconds to wait between transmissions of remote data change notifications to the SNMP trap receiver(s) configured on the device.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.14.2 Interface

Use the LLDP Interface Summary page to specify LLDP parameters that are applied to a specific interface.

To access this page, click **Switching** > **LLDP** > **Interface**.

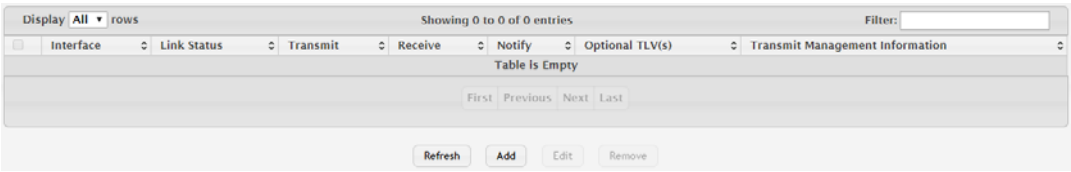


Figure 4.224 Switching > LLDP > Interface

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. Only interfaces that have at least one LLDP setting enabled appear in the table. In the Add LLDP Interface window, use this field to select the interface with the LLDP settings to configure. In the Edit LLDP Interface window, this field identifies the interface that is being configured.
Link Status	The link status of the interface, which is either Up or Down. An interface that is down does not forward traffic.
Transmit	The LLDP advertise (transmit) mode on the interface. If the transmit mode is enabled, the interface sends LLDP Data Units (LLDPDUs) that advertise the mandatory TLVs and any optional TLVs that are enabled.
Receive	The LLDP receive mode on the interface. If the receive mode is enabled, the device can receive LLDPDUs from other devices.
Notify	The LLDP remote data change notification status on the interface. If the notify mode is enabled, the interface sends SNMP notifications when a link partner device is added or removed.
Optional TLV(s)	Indicates which optional LLDP TLV(s) are included in the LLDPDUs that the interface transmits: ■ 0: Port Description ■ 1: System Name ■ 2: System Description ■ 3: System Capabilities
Transmit Management Information	Indicates whether management address information for the local device is transmitted in LLDPDUs. Other remote managers can obtain information about the device by using its advertised management address.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new LLDP interface.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new LLDP interface:

Click **Switching** > **LLDP** > **Interface** > **Add**.

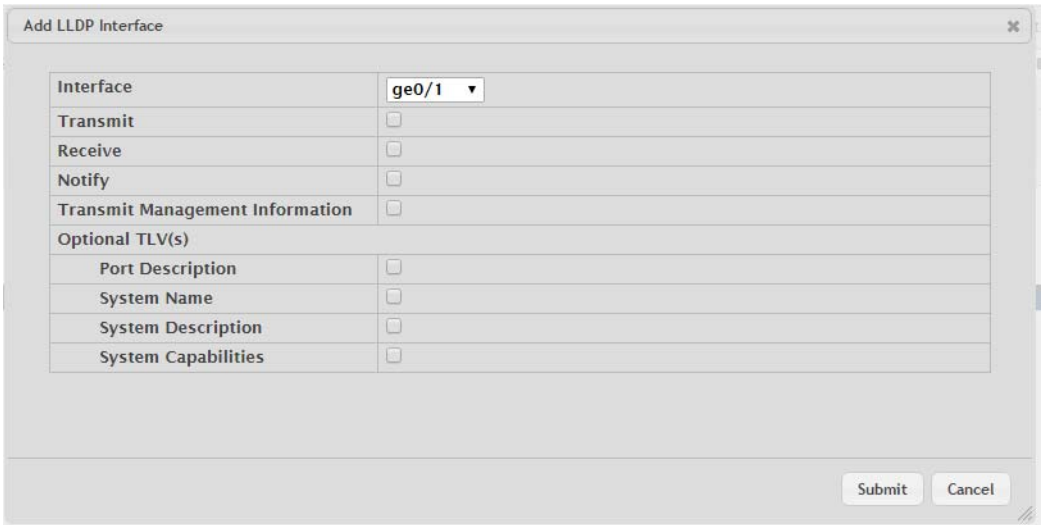


Figure 4.225 Switching > LLDP > Interface > Add

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. Only interfaces that have at least one LLDP setting enabled appear in the table. In the Add LLDP Interface window, use this field to select the interface with the LLDP settings to configure. In the Edit LLDP Interface window, this field identifies the interface that is being configured.
Transmit	The LLDP advertise (transmit) mode on the interface. If the transmit mode is enabled, the interface sends LLDP Data Units (LLDPDUs) that advertise the mandatory TLVs and any optional TLVs that are enabled.
Receive	The LLDP receive mode on the interface. If the receive mode is enabled, the device can receive LLDPDUs from other devices.
Notify	The LLDP remote data change notification status on the interface. If the notify mode is enabled, the interface sends SNMP notifications when a link partner device is added or removed.
Transmit Management Information	Indicates whether management address information for the local device is transmitted in LLDPDUs. Other remote managers can obtain information about the device by using its advertised management address.
Optional TLV (s)	
Port Description	Select this option to include the user-configured port description in the LLDPDU the interface transmits.
System Name	Select this option to include the user-configured system name in the LLDPDU the interface transmits. The system name is configured on the System Description page and is the SNMP server name for the device.
System Description	Select this option to include a description of the device in the LLDPDU the interface transmits. The description includes information about the product model and platform.
System Capabilities	Select this option to advertise the primary function(s) of the device in the LLDPDU the interface transmits.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.14.3 Local Devices

The LLDP Local Device Summary page displays summary information about the Link Layer Discovery Protocol (LLDP) data each interface advertises in the LLDP data units (LLDPDUs) it transmits. An interface appears in the table only if its LLDP transmit setting is enabled. To view additional LLDP information that the interface advertises, select the interface with the information to view and click Details.

To access this page, click **Switching** > **LLDP** > **Local Devices**.

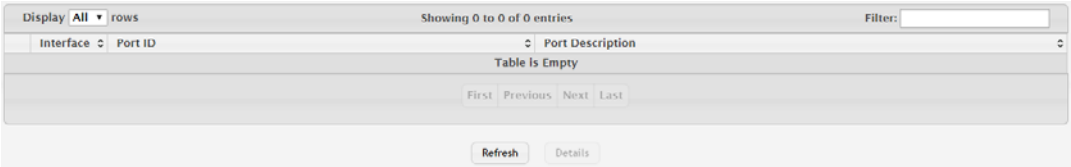


Figure 4.226 Switching > LLDP > Local Devices

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the LLDP - 802.1AB data in the row. When viewing the details for an interface, this field identifies the interface that is being viewed.
Port ID	The port identifier, which is the physical address associated with the interface.
Port Description	A description of the port. An administrator can configure this information on the Port Description page.
Refresh	Click **Refresh** to update the screen.
Details	Click **Details** to open a window and display additional information.

4.4.14.4 Remote Devices

The LLDP Remote Device Summary page displays information about the remote devices the local system has learned about through the Link Layer Discovery Protocol (LLDP) data units received on its interfaces. The table lists all interfaces that are enabled to receive LLDP data from remote devices. However, information is available about remote devices only if the interface receives an LLDP data unit (LLDPDU) from a device. To view additional information about a remote device, select the interface that received the LLDP data and click Details.

To access this page, click **Switching** > **LLDP** > **Remote Devices**.

Figure 4.227 Switching > LLDP > Remote Devices

The following table describes the items in the previous figure.

Item	Description
Interface	The local interface that is enabled to receive LLDPDUs from remote devices.
Remote ID	The client identifier assigned to the remote system that sent the LLDPDU.
Chassis ID	The information the remote device sent as the Chassis ID TVL. This identifies the hardware platform for the remote system.
Port ID	The port on the remote system that transmitted the LLDP data.
System Name	The system name configured on the remote device.
Refresh	Click **Refresh** to update the screen.
Details	Click **Details** to open a window and display additional information.

4.4.14.5 Statistics

The LLDP Statistics page displays statistical information about the Link Layer Discovery Protocol (LLDP) Data Units (LLDPDUs) the interfaces on the local device have sent and received. The table that shows per-interface statistics contains entries only for interfaces that have at least one LLDP setting enabled.

To access this page, click **Switching** > **LLDP** > **Statistics**.

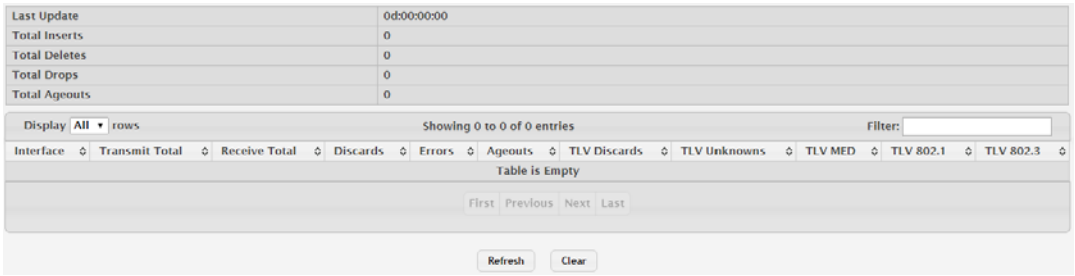


Figure 4.228 Switching > LLDP > Statistics

The following table describes the items in the previous figure.

Item	Description
Last Update	The amount of time that has passed since an entry was created, modified, or deleted in the local database that maintains LLDP information received from remote systems.
Total Inserts	The number of times the complete set of information advertised by a particular MAC Service Access Point (MSAP) has been inserted into tables associated with the remote systems.
Total Deletes	The number of times the complete set of information advertised by a particular MSAP has been deleted from tables associated with the remote systems.
Total Drops	The number of times the complete set of information advertised by a particular MSAP could not be entered into tables associated with the remote systems because of insufficient resources.
Total Ageouts	The number of times the complete set of information advertised by a particular MSAP has been deleted from tables associated with the remote systems because the information timeliness interval has expired.
Interface	The interface associated with the rest of the data in the row.
Transmit Total	The number of LLDPDUs transmitted by the LLDP agent on the interface.
Receive Total	The number of valid LLDPDUs received by this interface while the LLDP agent is enabled.
Discards	The number of LLDP TLVs discarded for any reason by the LLDP agent on the interface.
Errors	The number of invalid LLDPDUs received by the LLDP agent on the interface while the LLDP agent is enabled.
Ageouts	The number of age-outs that have occurred on the interface. An age-out occurs the complete set of information advertised by a particular MSAP has been deleted from tables associated with the remote entries because the information timeliness interval had expired.
TLV Discards	The number of LLDP TLVs discarded for any reason by the LLDP agent on the interface.
TLV Unknowns	The number of LLDP TLVs received on the interface that were not recognized by the LLDP agent.
TLV MED	The total number of LLDP-MED TLVs received on the interface.
TLV 802.1	The total number of LLDP TLVs received on the interface which are of type 802.1.
TLV 802.3	The total number of LLDP TLVs received on the interface which are of type 802.3.
Refresh	Click **Refresh** to update the screen.
Clear	Click **Clear** to reset all LLDP statistics counters to zero.

4.4.15 LLDP-MED

The Link Layer Discovery Protocol-Media Endpoint Discovery (LLDP-MED) is an enhancement to LLDP that features:

- Auto-discovery of LAN policies (such as VLAN, Layer 2 Priority and DiffServ settings), enabling plug and play networking.
- Device location discovery for creation of location databases.
- Extended and automated power management of Power over Ethernet endpoints.
- Inventory management, enabling network administrators to track their network devices and determine their characteristics (manufacturer, software and hardware versions, serial/asset number).

4.4.15.1 Global

Use the LLDP-MED Global Configuration page to set global parameters for LLDP-MED operation.

To access this page, click **Switching** > **LLDP-MED** > **Global**.

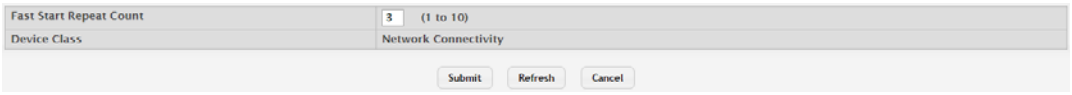


Figure 4.229 Switching > LLDP-MED > Global

The following table describes the items in the previous figure.

Item	Description
Fast Start Repeat Count	The number of LLDP-MED Protocol Data Units (PDUs) that will be transmitted when the protocol is enabled.
Device Class	The device's MED Classification. The following three classifications represent the actual endpoints: ■ Class I Generic (for example, IP Communication Controller) ■ Class II Media (for example, Conference Bridge) ■ Class III Communication (for example, IP Telephone) The fourth device is Network Connectivity Device, which is typically a device such as a LAN switch or router, IEEE 802.1 bridge, or IEEE 802.11 wireless access point.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.15.2 Interface

Use the LLDP-MED Interface Summary page to enable LLDP-MED mode on an interface and to configure its properties.

To access this page, click **Switching** > **LLDP-MED** > **Interface**.

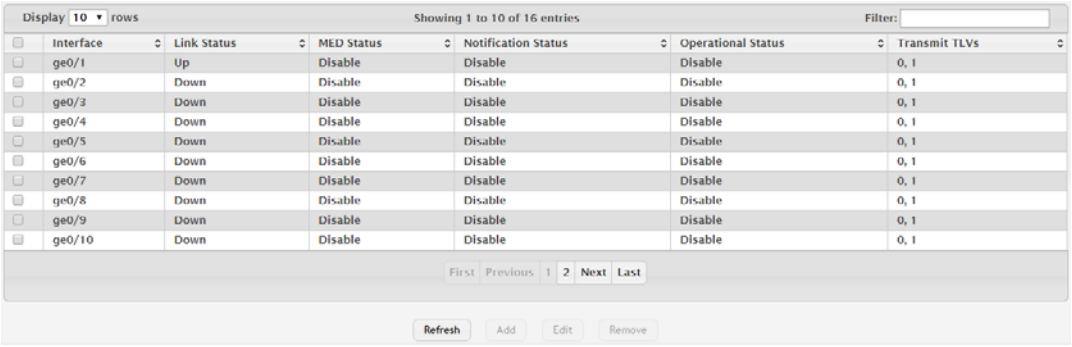


Figure 4.230 Switching > LLDP-MED > Interface

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When configuring LLDP-MED settings, this field identifies the interfaces that are being configured.
Link Status	The link status of the interface, which is either Up or Down. An interface that is down does not forward traffic.
MED Status / LLDP-MED Mode	The administrative status of LLDP-MED on the interface. When LLDP-MED is enabled, the transmit and receive function of LLDP is effectively enabled on the interface.
Notification Status / Configuration Notification Mode	Indicates whether LLDP-MED topology change notifications are enabled or disabled on the interface.
Operational Status	Indicates whether the interface will transmit TLVs.
Transmit TLVs	The LLDP-MED TLV(s) that the interface transmits: ■ Capabilities: 0 ■ Network Policy: 1 ■ Extended PSE: 3
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new LLDP interface.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new LLDP interface:

Click **Switching** > **LLDP-MED** > **Interface** > **Add**.

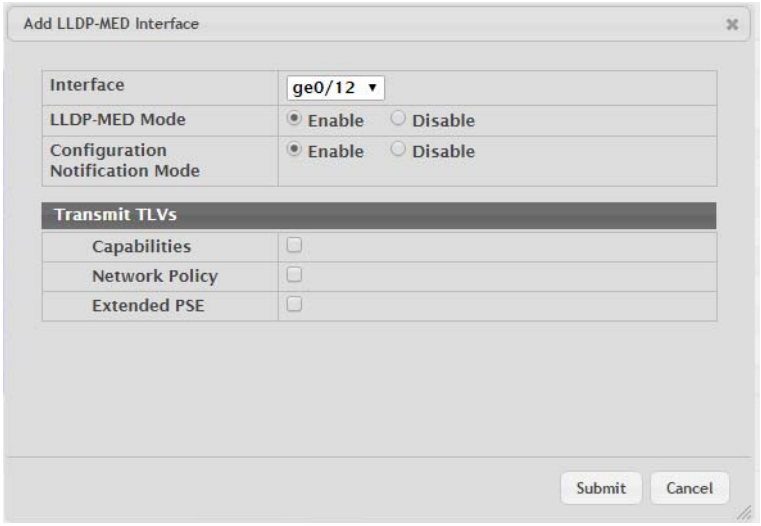


Figure 4.231 Switching > LLDP-MED > Interface > Add

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When configuring LLDP-MED settings, this field identifies the interfaces that are being configured.
MED Status / LLDP-MED Mode	The administrative status of LLDP-MED on the interface. When LLDP-MED is enabled, the transmit and receive function of LLDP is effectively enabled on the interface.
Notification Status / Configuration Notification Mode	Indicates whether LLDP-MED topology change notifications are enabled or disabled on the interface.
Transmit TLVs	The LLDP-MED TLV(s) that the interface transmits: ■ Capabilities: 0 ■ Network Policy: 1 ■ Extended PSE: 3
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.15.3 Local Devices

The LLDP-MED Local Device Summary page displays information on LLPD-MED information advertised on the selected local interface.

To access this page, click **Switching** > **LLDP-MED** > **Local Devices**.

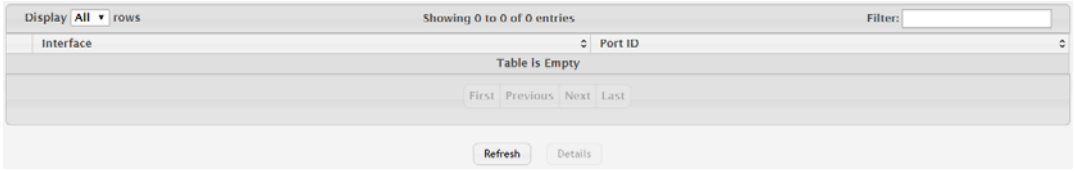


Figure 4.232 Switching > LLDP-MED > Local Devices

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When viewing LLDP-MED details for an interface, this field identifies the interface that is being viewed.

Item	Description
Port ID	The MAC address of the interface. This is the MAC address that is advertised in LLDP-MED PDUs.
Refresh	Click **Refresh** to update the screen.
Details	Click **Details** to open a window and display additional information.

4.4.15.4 Remote Devices

The LLDP-MED Remote Device Summary page displays information about the remote devices the local system has learned about through the LLDP- MED data units received on its interfaces. Information is available about remote devices only if an interface receives an LLDP-MED data unit from a device. To view additional information about a remote device, select the interface that received the LLDP-MED data and click Details. The information below is organized according to the order in which the fields appear in the LLDP-MED Remote Device Information window.

To access this page, click **Switching** > **LLDP-MED** > **Remote Devices**.

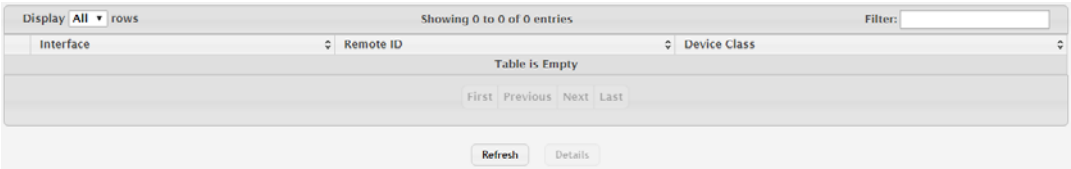


Figure 4.233 Switching > LLDP-MED > Remote Devices

The following table describes the items in the previous figure.

Item	Description
Interface	The local interface that has received LLDP-MED data units from remote devices.
Remote ID	The client identifier assigned to the remote system that sent the LLDP-MED data unit.
Device Class	The MED Classification advertised by the TLV from the remote device. The following three classifications represent the actual endpoints: ■ Class I Generic (for example, IP Communication Controller) ■ Class II Media (for example, Conference Bridge) ■ Class III Communication (for example, IP Telephone) The fourth device is Network Connectivity Device, which is typically a device such as a LAN switch or router, IEEE 802.1 bridge, or IEEE 802.11 wireless access point.
Refresh	Click **Refresh** to update the screen.
Details	Click **Details** to open a window and display additional information.

4.4.16 Port Channel

4.4.16.1 Summary

Use the Port Channel Summary page to view and manage port channels on the device. Port channels, also known as Link Aggregation Groups (LAGs), allow one or more full-duplex Ethernet links of the same speed to be aggregated together. This allows the device to treat the port channel as a single, logical link. The primary purpose of a port channel is to increase the bandwidth between two devices. Port channels can also provide redundancy.

To access this page, click **Switching** > **Port Channel** > **Summary**.

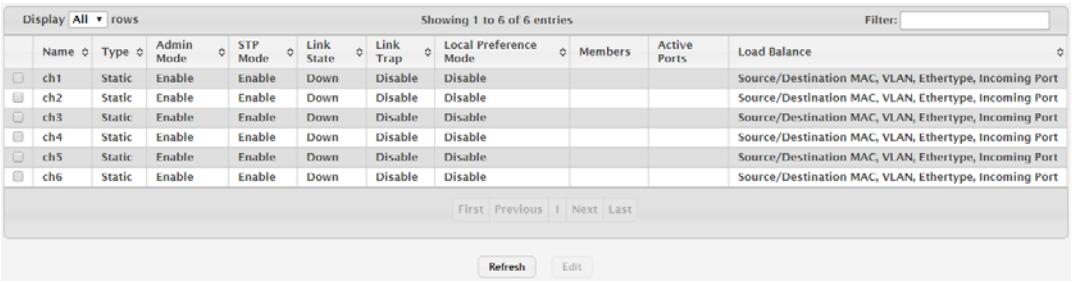


Figure 4.234 Switching > Port Channel > Summary

The following table describes the items in the previous figure.

Item	Description
Name	A unique name to identify the port channel. Depending on the type of port channel, this name is automatically assigned by the system or can be configured by a system administrator.
Type	The type of port channel: ■ Dynamic: Uses Link Aggregation Control Protocol (LACP) Protocol Data Units (PDUs) to exchange information with the link partners to help maintain the link state. To utilize Dynamic link aggregation on this port channel, the link partner must also support LACP. ■ Static: Does not require a partner system to be able to aggregate its member ports. When a port is added to a port channel as a static member, it neither transmits nor receives LACP PDUs. When configuring a port channel, use the Static Mode field to set the port channel type. If the Static Mode is disabled, the port channel type is Dynamic.
Admin Mode	The administrative mode of the port channel. When disabled, the port channel does not send and receive traffic.
STP Mode	The spanning tree protocol (STP) mode of the port channel. When enabled, the port channel participates in the STP operation to help prevent network loops.
Link State	The current link status of the port channel, which can be Up, Up (SFP), or Down.
Link Trap	The link trap mode of the port channel. When enabled, a trap is sent to any configured SNMP receiver(s) when the link state of the port channel changes.
Local Preference Mode	The local preference mode for the port channel: ■ Enabled: Known unicast traffic that is destined for a LAG egresses only out of members (if it has any) of the LAG interface on the local unit. This ensures that the LAG-destined known unicast traffic does not cross the external stack link when the LAG has members on the local unit. Unknown unicast, broadcast and multicast traffic behavior remains unchanged. ■ Disabled: Known unicast traffic that is destined for a LAG may egress out of any of the member ports depending upon the traffic pattern and the configured LAG hashing algorithm for the LAG interface. It is possible that this traffic may egress out of a member port on another unit. In this case, the traffic has to cross the external stacking link, which results in unnecessary bandwidth utilization of the external stack link.

Item	Description
Members	The ports that are members of a port channel. Each port channel can have a maximum of 8 member ports. To add ports to the port channel, select one or more ports from the Port List field (CTRL + click to select multiple ports). Then, use the appropriate arrow icon to move the selected ports to the Members field.
Active Ports	The ports that are actively participating members of a port channel. A member port that is operationally or administratively disabled or does not have a link is not an active port.
Load Balance	The algorithm used to distribute traffic load among the physical ports of the port channel while preserving the per-flow packet order. The packet attributes the load-balancing algorithm can use to determine the outgoing physical port include the following: ■ Source MAC, VLAN, Ethertype, Incoming Port ■ Destination MAC, VLAN, Ethertype, Incoming Port ■ Source/Destination MAC, VLAN, Ethertype, Incoming Port ■ Source IP and Source TCP/UDP Port Fields ■ Destination IP and Destination TCP/UDP Port Fields ■ Source/Destination IP and TCP/UDP Port Fields
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.4.16.2 Statistics

The Port Channel Statistics page displays the flap count for each port channel and their member ports. A flap occurs when a port-channel interface or port-channel member port goes down.

To access this page, click **Switching** > **Port Channel** > **Statistics**.

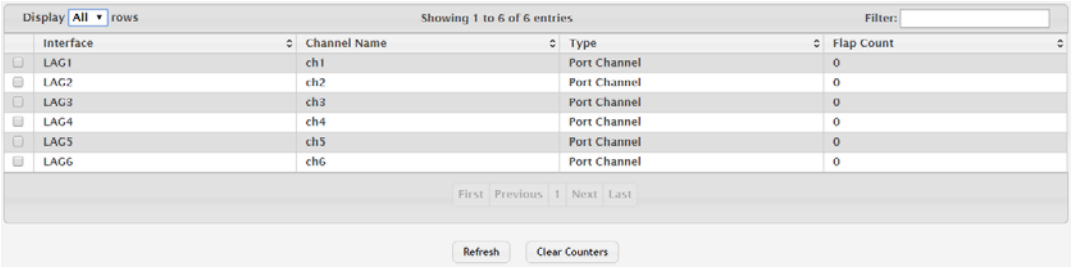


Figure 4.235 Switching > Port Channel > Statistics

The following table describes the items in the previous figure.

Item	Description
Interface	The port channel or member port (physical port) associated with the rest of the data in the row.
Channel Name	The port channel name associated with the port channel. For a physical port, this field identifies the name of the port channel of which the port is a member.
Type	The interface type, which is either Port Channel (logical link-aggregation group) or Member Port (physical port).
Flap Count	The number of times the interface has gone down. The counter for a member port is incremented when the physical port is either manually shut down by the administrator or when its link state is down. When a port channel is administratively shut down, the flap counter for the port channel is incremented, but the flap counters for its member ports are not affected. When all active member ports for a port channel are inactive (either administratively down or link down), then the port channel flap counter is incremented.

Item	Description
Refresh	Click **Refresh** to update the screen.
Clear Counters	Click **Clear Counters** to reset the flap counters for all port channels and member ports to zero.

4.4.17 Port Security

Port Security can be enabled on a per-port basis. When a port is locked, only packets with allowable source MAC addresses can be forwarded. All other packets are discarded. A MAC address can be defined as allowable by one of two methods: dynamically or statically. Note that both methods are used concurrently when a port is locked.

Dynamic locking implements a “first arrival” mechanism for Port Security. You specify how many addresses can be learned on the locked port. If the limit has not been reached, a packet with an unknown source MAC address is learned and forwarded normally. Once the limit is reached, no more addresses are learned on the port. Any packets with source MAC addresses that were not already learned are discarded. Note that you can effectively disable dynamic locking by setting the number of allowable dynamic entries to zero.

Static locking allows you to specify a list of MAC addresses that are allowed on a port. The behavior of packets is the same as for dynamic locking: only packets with an allowable source MAC address can be forwarded.

4.4.17.1 Global

Use the Port Security Global Administration page to configure the global administrative mode for the port security feature. Port security, which is also known as port MAC locking, allows you to limit the number of source MAC address that can be learned on a port. If a port reaches the configured limit, any other addresses beyond that limit are not learned, and the frames are discarded. Frames with a source MAC address that has already been learned will be forwarded. Port security can help secure the network by preventing unknown devices from forwarding packets into the network.

To access this page, click **Switching** > **Port Security** > **Global**.

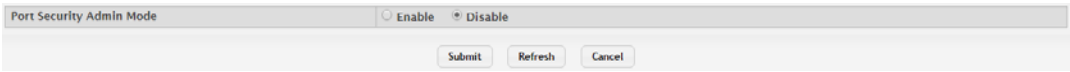


Figure 4.236 Switching > Port Security > Global

The following table describes the items in the previous figure.

Item	Description
Port Security Admin Mode	Enable or disable the global administrative mode for port security. The port security mode must be enabled both globally and on an interface to enforce the configured limits for the number of static and dynamic MAC addresses allowed on that interface.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.17.2 Interface

Use the Port Security Interface Status page to configure the port security feature on a selected interface.

To access this page, click **Switching** > **Port Security** > **Interface**.

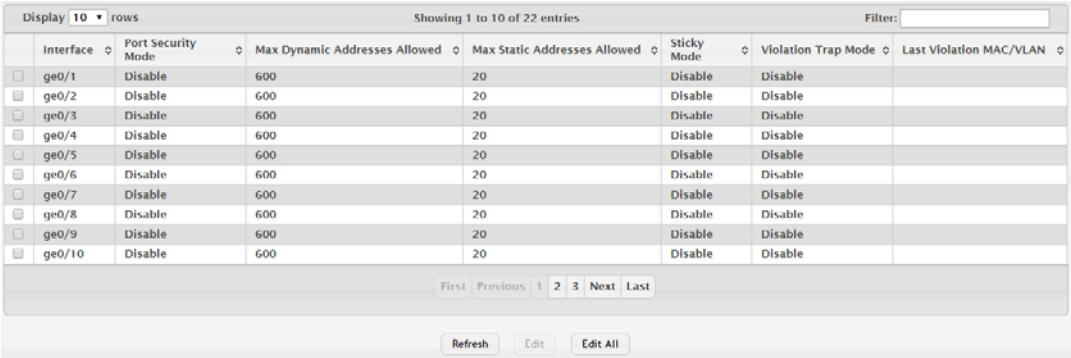


Figure 4.237 Switching > Port Security > Interface

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When configuring the port security settings for one or more interfaces, this field lists the interfaces that are being configured.
Port Security Mode	The administrative mode of the port security feature on the interface. The port security mode must be enabled both globally and on an interface to enforce the configured limits for the number of static and dynamic MAC addresses allowed on that interface.
Max Dynamic Addresses Allowed	The number of source MAC addresses that can be dynamically learned on an interface. If an interface reaches the configured limit, any other addresses beyond that limit are not learned, and the frames are discarded. Frames with a source MAC address that has already been learned will be forwarded. A dynamically-learned MAC address is removed from the MAC address table if the entry ages out, the link goes down, or the system resets. Note that the behavior of a dynamically-learned address changes if the sticky mode for the interface is enabled or the address is converted to a static MAC address.
Max Static Addresses Allowed	The number of source MAC addresses that can be manually added to the port security MAC address table for an interface. If the port link goes down, the statically configured MAC addresses remain in the MAC address table. The maximum number includes all dynamically-learned MAC addresses that have been converted to static MAC addresses.

Item	Description
Sticky Mode	The sticky MAC address learning mode, which is one of the following: ■ Enabled: MAC addresses learned or manually configured on this interface are learned in sticky mode. A sticky-mode MAC address is a MAC address that does not age out and is added to the running configuration. If the running configuration is saved to the startup configuration, the sticky addresses are saved to persistent storage and do not need to be relearned when the device restarts. Upon enabling sticky mode on an interface, all dynamically learned MAC addresses in the MAC address table for that interface are converted to sticky mode. Additionally, new addresses dynamically learned on the interface will also become sticky. ■ Disabled: When a link goes down on a port, all of the dynamically learned addresses are cleared from the source MAC address table the feature maintains. When the link is restored, the interface can once again learn addresses up to the specified limit. If sticky mode is disabled after being enabled on an interface, the sticky-mode addresses learned or manually configured on the interface are converted to dynamic entries and are automatically removed from persistent storage.
Violation Trap Mode	Indicates whether the port security feature sends a trap to the SNMP agent when a port is locked and a frame with a MAC address not currently in the table arrives on the port. A port is considered to be locked once it has reached the maximum number of allowed dynamic or static MAC address entries in the port security MAC address table.
Last Violation MAC/ VLAN	The source MAC address and, if applicable, associated VLAN ID of the last frame that was discarded at a locked port.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.
Edit All	Click **Edit** All to apply same settings to all interfaces.

4.4.17.3 Static MAC

Use the Port Security Static MAC Addresses page to add and remove the MAC addresses of hosts that are allowed to send traffic to specific interfaces on the device. The number of MAC addresses you can associate with each interface is determined by the maximum static MAC addresses allowed on a given interface.

To access this page, click **Switching** > **Port Security** > **Static MAC**.

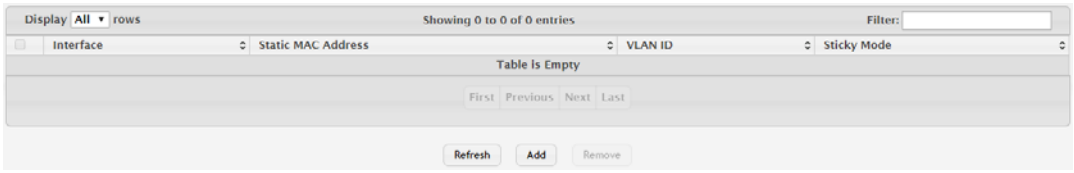


Figure 4.238 Switching > Port Security > Static MAC

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When adding a static MAC address entry, use the Interface menu to select the interface to associate with the permitted MAC address.
Static MAC Address	The MAC address of the host that is allowed to forward packets on the associated interface.
VLAN ID	The ID of the VLAN that includes the host with the specified MAC address.

Item	Description
Sticky Mode	Indicates whether the static MAC address entry is added in sticky mode. When adding a static MAC address entry, the Sticky Mode field can be selected only if it is enabled on the interface. If a static MAC address is added in sticky mode, and sticky mode is disabled on the interface, the MAC address entry is converted to a dynamic entry and will age out and be removed from the running (and saved) configuration if it is not relearned.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to associate a static MAC address with an interface.
Remove	Click **Remove** to remove the selected entries.

To associate a static MAC address with an interface:

Click **Switching** > **Port Security** > **Static MAC** > **Add**.

Figure 4.239 Switching > Port Security > Static MAC > Add

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When adding a static MAC address entry, use the Interface menu to select the interface to associate with the permitted MAC address.
Static MAC Address	The MAC address of the host that is allowed to forward packets on the associated interface.
VLAN ID	The ID of the VLAN that includes the host with the specified MAC address.
Sticky Mode	Indicates whether the static MAC address entry is added in sticky mode. When adding a static MAC address entry, the Sticky Mode field can be selected only if it is enabled on the interface. If a static MAC address is added in sticky mode, and sticky mode is disabled on the interface, the MAC address entry is converted to a dynamic entry and will age out and be removed from the running (and saved) configuration if it is not relearned.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.17.4 Dynamic MAC

Use the Port Security Dynamic MAC Addresses page to add and remove the MAC addresses of hosts that are allowed to send traffic to specific interfaces on the device. The number of MAC addresses you can associate with each interface is determined by the maximum static MAC addresses allowed on a given interface.

To access this page, click **Switching** > **Port Security** > **Dynamic MAC**.

Figure 4.240 Switching > Port Security > Dynamic MAC

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When converting dynamic addresses to static addresses, use the Interface menu to select the interface to associate with the MAC addresses.
Dynamic MAC Address	The MAC address that was learned on the device. An address is dynamically learned when a frame arrives on the interface and the source MAC address in the frame is added to the MAC address table.
VLAN ID	The VLAN ID specified in the Ethernet frame received by the interface.
Refresh	Click **Refresh** to update the screen.
Convert to Static	Click **Convert to Static** to convert all MAC addresses learned on an interface to static MAC address entries.

4.4.18 Protected Ports

4.4.18.1 Configuration

Use the Protected Ports Configuration page to configure and view protected ports groups. A port that is a member of a protected ports group is a protected port. A port that is not a member of any protected ports group is an unprotected port. Each port can be a member of only one protected ports group. Ports in the same protected ports group cannot forward traffic to other protected ports within the group, even if they are members of the same VLAN. However, a port in a protected ports group can forward traffic to ports that are in a different protected ports group. A protected port can also forward traffic to unprotected ports. Unprotected ports can forward traffic to both protected and unprotected ports.

To access this page, click **Switching** > **Protected Ports** > **Configuration**.

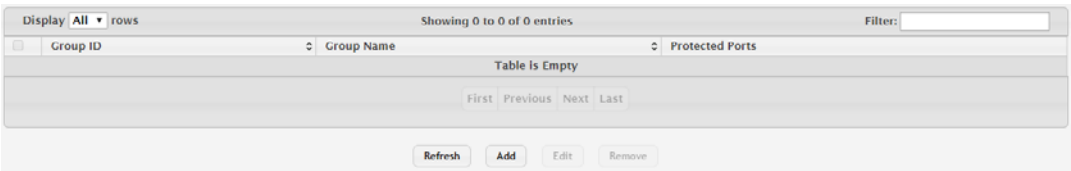


Figure 4.241 Switching > Protected Ports > Configuration

The following table describes the items in the previous figure.

Item	Description
Group Name	The user-configured name of the protected ports group.
Protected Ports	The ports that are members of the protected ports group. When adding a port to a protected ports group, the Available Interfaces field lists the ports that are not already members of a protected ports group. To move an interface between the Available Interfaces and Selected Interfaces fields, click the port (or CTRL + click to select multiple ports), and then click the appropriate arrow to move the port(s) to the desired field.

Item	Description
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new protected ports group and add ports to the group.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new protected ports group and add ports to the group:

Click **Switching** > **Protected Ports** > **Configuration** > **Add**.

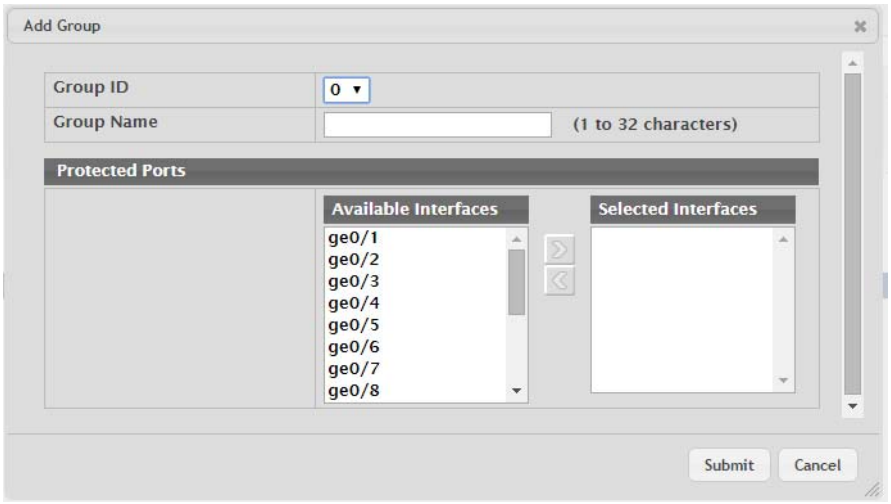


Figure 4.242 Switching > Protected Ports > Configuration > Add

The following table describes the items in the previous figure.

Item	Description
Group Name	The user-configured name of the protected ports group.
Protected Ports	The ports that are members of the protected ports group. When adding a port to a protected ports group, the Available Interfaces field lists the ports that are not already members of a protected ports group. To move an interface between the Available Interfaces and Selected Interfaces fields, click the port (or CTRL + click to select multiple ports), and then click the appropriate arrow to move the port(s) to the desired field.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.19 Spanning Tree

The Spanning Tree Protocol (STP) provides a tree topology for any arrangement of bridges. STP also provides one path between end stations on a network, eliminating loops. Spanning tree versions supported include Common STP, Multiple STP, and Rapid STP.

Classic STP provides a single path between end stations, avoiding and eliminating loops.

Multiple Spanning Tree Protocol (P) supports multiple instances of Spanning Tree to efficiently channel VLAN traffic over different interfaces. Each instance of the Spanning Tree behaves in the manner specified in IEEE 802.1w, Rapid Spanning Tree (RSTP), with slight modifications in the working but not the end effect (chief among the effects, is the rapid transitioning of the port to 'Forwarding'). The difference between the RSTP and the traditional STP (IEEE 802.1D) is the ability to configure and recognize full duplex connectivity and ports which are connected to end stations,

resulting in rapid transitioning of the port to 'Forwarding' state and the suppression of Topology Change Notification. These features are represented by the parameters 'pointtopoint' and 'edgeport'. MSTP is compatible to both RSTP and STP. It behaves appropriately to STP and RSTP bridges. A MSTP bridge can be configured to behave entirely as a RSTP bridge or a STP bridge.

Note! *For two bridges to be in the same region, the force version should be 802.1S and their configuration name, digest key, and revision level should match. For more information about regions and their effect on network topology, refer to the IEEE 802.1Q standard.*

4.4.19.1 Switch

The Spanning Tree Switch Configuration page contains fields for enabling STP on the switch.

To access this page, click **Switching** > **Spanning Tree** > **Switch**.

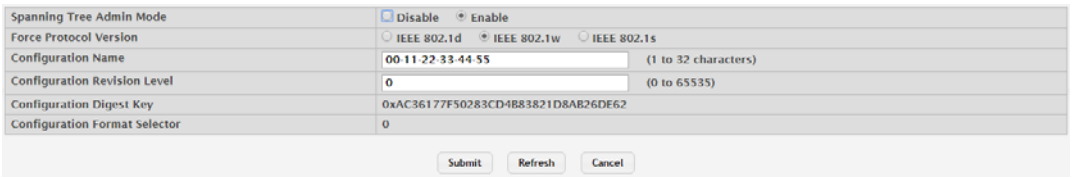


Figure 4.243 Switching > Spanning Tree > Switch

The following table describes the items in the previous figure.

Item	Description
Spanning Tree Admin Mode	The administrative mode of STP on the device. When enabled, the device participates in the root bridge election process and exchanges Bridge Protocol Data Units (BPDUs) with other switches in the spanning tree to determine the root path costs and maintain topology information.
Force Protocol Version	The STP version the device uses, which is one of the following: ■ IEEE 802.1d: Classic STP provides a single path between end stations, avoiding and eliminating loops. ■ IEEE 802.1w: Rapid Spanning Tree Protocol (RSTP) behaves like classic STP but also has the ability to configure and recognize full-duplex connectivity and ports that are connected to end stations, resulting in rapid transitioning of the port to the Forwarding state and the suppression of Topology Change Notifications. ■ IEEE 802.1s: Multiple Spanning Tree Protocol (MSTP) includes all the advantages of RSTP and also supports multiple spanning tree instances to efficiently channel VLAN traffic over different interfaces. MSTP is compatible with both RSTP and STP.
Configuration Name	The name of the MSTP region. Each switch that participates in the same MSTP region must share the same Configuration Name, Configuration Revision Level, and MST-to-VLAN mappings.
Configuration Revision Level	The revision number of the MSTP region. This number must be the same on all switches that participate in the MSTP region.
Configuration Digest Key	The 16 byte signature of type HMAC-MD5 created from the MST Configuration Table (a VLAN ID-to-MST ID mapping).
Configuration Format Selector	The version of the configuration format being used in the exchange of BPDUs.
Submit	Click **Submit** to save the values and update the screen.

Item	Description
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.19.2 MST

Use the Spanning Tree MST Summary page to view and configure the Multiple Spanning Tree Instances (MSTIs) on the device. Multiple Spanning Tree Protocol (MSTP) allows the creation of MSTIs based upon a VLAN or groups of VLANs. Configuring MSTIs creates an active topology with a better distribution of network traffic and an increase in available bandwidth when compared to classic STP.

To access this page, click **Switching** > **Spanning Tree** > **MST**.

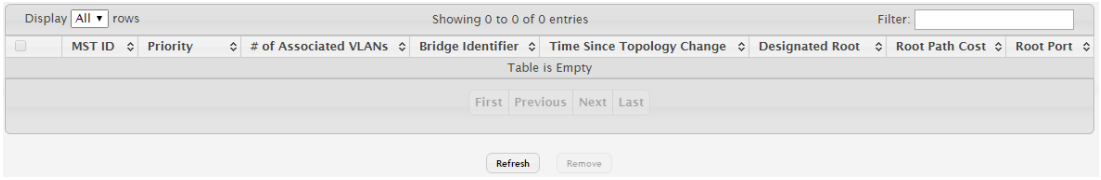


Figure 4.244 Switching > Spanning Tree > MST

The following table describes the items in the previous figure.

Item	Description
MST ID	The number that identifies the MST instance.
Priority	The bridge priority for the spanning-tree instance. This value affects the likelihood that the bridge is selected as the root bridge. A lower value increases the probability that the bridge is selected as the root bridge.
# of Associated VLANs	The number of VLANs that are mapped to the MSTI. This number does not contain any information about the VLAN IDs that are mapped to the instance.
Bridge Identifier	A unique value that is automatically generated based on the bridge priority value of the MSTI and the base MAC address of the bridge. When electing the root bridge for an MST instance, if the bridge priorities for multiple bridges are equal, the bridge with the lowest MAC address is elected as the root bridge.
Time Since Topology Change	The amount of time that has passed since the topology of the MSTI has changed.
Designated Root	The bridge identifier of the root bridge for the MST instance. The identifier is made up of the bridge priority and the base MAC address.
Root Path Cost	The path cost to the designated root for this MST instance. Traffic from a connected device to the root bridge takes the least-cost path to the bridge. If the value is 0, the cost is automatically calculated based on port speed.
Root Port	The port on the bridge with the least-cost path to the designated root for the MST instance.
Refresh	Click **Refresh** to update the screen.
Remove	Click **Remove** to remove the selected entries.

4.4.19.3 MST Port

Use the Spanning Tree MST Port Summary page to view and configure the Multiple Spanning Tree (MST) settings for each interface on the device.

To access this page, click **Switching** > **Spanning Tree** > **MST Port**.

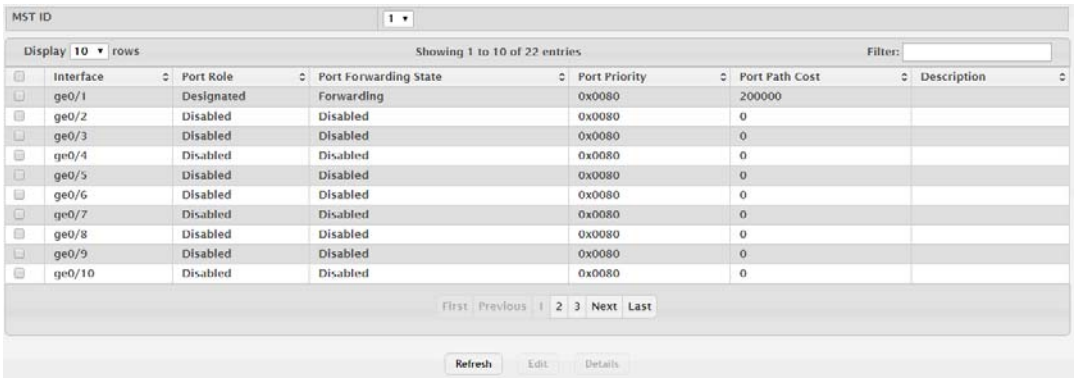


Figure 4.245 Switching > Spanning Tree > MST Port

The following table describes the items in the previous figure.

Item	Description
MST ID	The menu contains the ID of each MST instance that has been created on the device.
Interface	The port or link aggregation group (LAG) associated with the rest of the data in the row. When configuring MST settings for an interface, this field identifies the interface being configured.
Port Role	The role of the port within the MST, which is one of the following: ■ Root: A port on the non-root bridge that has the least-cost path to the root bridge. ■ Designated: A port that has the least-cost path to the root bridge on its segment. ■ Alternate: A blocked port that has an alternate path to the root bridge. ■ Backup: A blocked port that has a redundant path to the same network segment as another port on the bridge. ■ Master: The port on a bridge within an MST instance that links the MST instance to other STP regions. ■ Disabled: The port is administratively disabled and is not part of the spanning tree.
Port Forwarding State	■ Blocking: The port discards user traffic and receives, but does not send, BPDUs. During the election process, all ports are in the blocking state. The port is blocked to prevent network loops. ■ Listening: The port sends and receives BPDUs and evaluates information to provide a loop-free topology. This state occurs during network convergence and is the first state in transitioning to the forwarding state. ■ Learning: The port learns the MAC addresses of frames it receives and begins to populate the MAC address table. This state occurs during network convergence and is the second state in transitioning to the forwarding state. ■ Forwarding: The port sends and receives user traffic. ■ Disabled: The port is administratively disabled and is not part of the spanning tree.
Port Priority	The priority for the port within the MSTI. This value is used in determining which port on a switch becomes the root port when two ports have the same least-cost path to the root. The port with the lower priority value becomes the root port. If the priority values are the same, the port with the lower interface index becomes the root port.
Port Path Cost	The path cost from the port to the root bridge.

Item	Description
Description	A user-configured description of the port.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.
Details	Click **Details** to open a window and display additional information for the selected interface.

4.4.19.4 CST

Use the Spanning Tree CST Configuration page to configure the Common Spanning Tree (CST) settings. The settings and information on this page define the device within the spanning tree topology that connects all STP/RSTP bridges and MSTP regions.

To access this page, click **Switching** > **Spanning Tree** > **CST**.

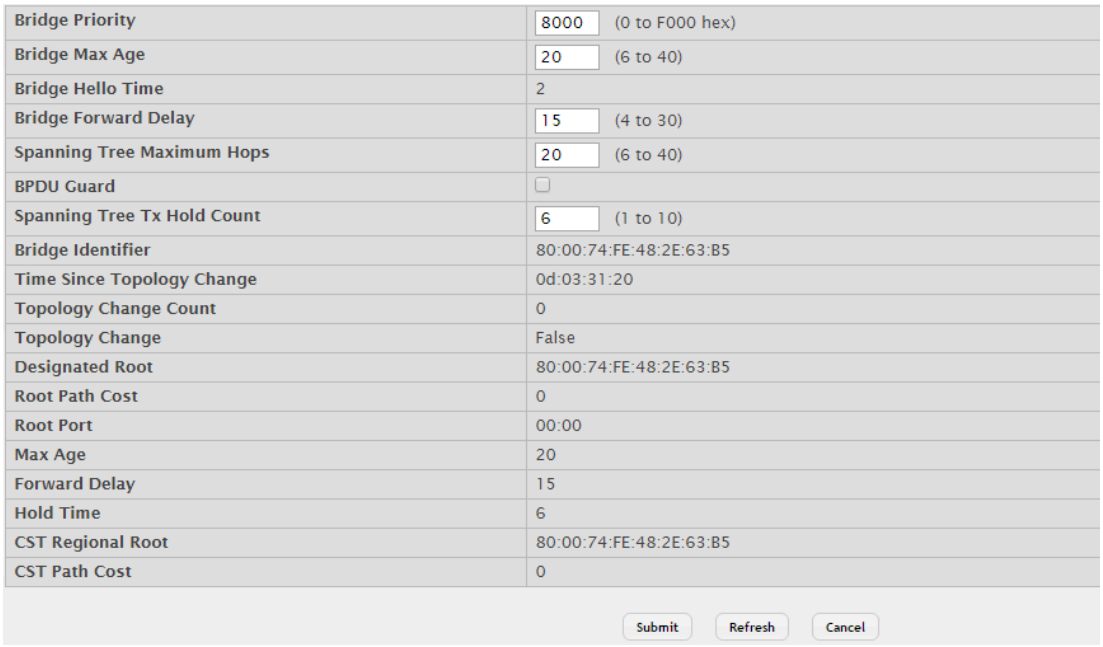


Figure 4.246 Switching > Spanning Tree > CST

The following table describes the items in the previous figure.

Item	Description
Bridge Priority	The value that helps determine which bridge in the spanning tree is elected as the root bridge during STP convergence. A lower value increases the probability that the bridge becomes the root bridge.
Bridge Max Age	The amount of time a bridge waits before implementing a topological change.
Bridge Hello Time	The amount of time the root bridge waits between sending hello BPDUs.
Bridge Forward Delay	The amount of time a bridge remains in a listening and learning state before forwarding packets.
Spanning Tree Maximum Hops	The maximum number of hops a Bridge Protocol Data Unit (BPDU) is allowed to traverse within the spanning tree region before it is discarded.
BPDU Guard	When enabled, BPDU Guard can disable edge ports that receive BPDU packets. This prevents a new device from entering the existing STP topology. Thus devices that were originally not a part of STP are not allowed to influence the STP topology.

Item	Description
Spanning Tree Tx Hold Count	The maximum number of BPDUs that a bridge is allowed to send within a hello time window.
Bridge Identifier	A unique value that is automatically generated based on the bridge priority value and the base MAC address of the bridge. When electing the root bridge for the spanning tree, if the bridge priorities for multiple bridges are equal, the bridge with the lowest MAC address is elected as the root bridge.
Time Since Topology Change	The amount of time that has passed since the topology of the spanning tree has changed since the device was last reset.
Topology Change Count	The number of times the topology of the spanning tree has changed.
Topology Change	Indicates whether a topology change is in progress on any port assigned to the CST. If a change is in progress the value is True; otherwise, it is False.
Designated Root	The bridge identifier of the root bridge for the CST. The identifier is made up of the bridge priority and the base MAC address.
Root Path Cost	The path cost to the designated root for the CST. Traffic from a connected device to the root bridge takes the least-cost path to the bridge. If the value is 0, the cost is automatically calculated based on port speed.
Root Port	The port on the bridge with the least-cost path to the designated root for the CST.
Max Age	The amount of time a bridge waits before implementing a topological change.
Forward Delay	The forward delay value for the root port bridge.
Hold Time	The minimum amount of time between transmissions of Configuration BPDUs.
CST Regional Root	The bridge identifier of the CST regional root. The identifier is made up of the priority value and the base MAC address of the regional root bridge.
CST Path Cost	The path cost to the CST tree regional root.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.19.5 CST Port

Use the Spanning Tree CST Port Summary page to view and configure the Common Spanning Tree (CST) settings for each interface on the device.

To access this page, click **Switching** > **Spanning Tree** > **CST Port**.

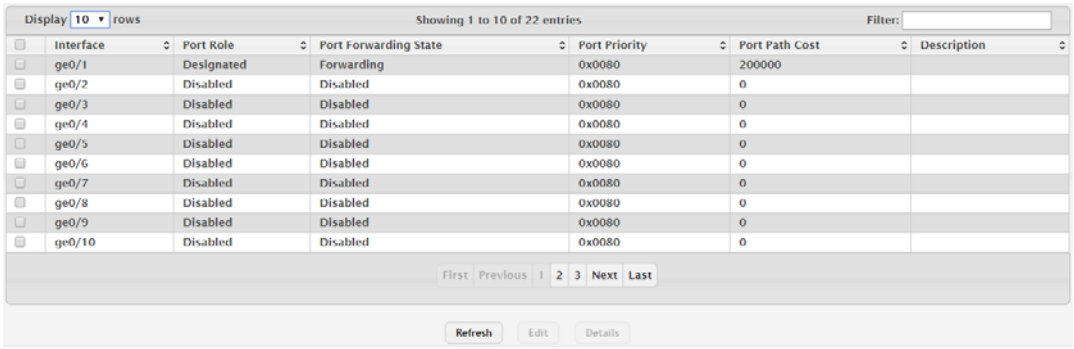


Figure 4.247 Switching > Spanning Tree > CST Port

The following table describes the items in the previous figure.

Item	Description
Interface	The port or link aggregation group (LAG) associated with the rest of the data in the row. When configuring CST settings for an interface, this field identifies the interface being configured.
Port Role	The role of the port within the CST, which is one of the following: ■ Root: A port on the non-root bridge that has the least-cost path to the root bridge. ■ Designated: A port that has the least-cost path to the root bridge on its segment. ■ Alternate: A blocked port that has an alternate path to the root bridge. ■ Backup: A blocked port that has a redundant path to the same network segment as another port on the bridge. ■ Master: The port on a bridge within an MST instance that links the MST instance to other STP regions. ■ Disabled: The port is administratively disabled and is not part of the spanning tree.
Port Forwarding State	■ Blocking: The port discards user traffic and receives, but does not send, BPDUs. During the election process, all ports are in the blocking state. The port is blocked to prevent network loops. ■ Listening: The port sends and receives BPDUs and evaluates information to provide a loop-free topology. This state occurs during network convergence and is the first state in transitioning to the forwarding state. ■ Learning: The port learns the MAC addresses of frames it receives and begins to populate the MAC address table. This state occurs during network convergence and is the second state in transitioning to the forwarding state. ■ Forwarding: The port sends and receives user traffic. ■ Disabled: The port is administratively disabled and is not part of the spanning tree.
Port Priority	The priority for the port within the CST. This value is used in determining which port on a switch becomes the root port when two ports have the same least-cost path to the root. The port with the lower priority value becomes the root port. If the priority values are the same, the port with the lower interface index becomes the root port.
Port Path Cost	The path cost from the port to the root bridge.
Description	A user-configured description of the port.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.
Details	Click **Details** to open a window and display additional information for the selected interface.

4.4.19.6 Statistics

Use the Spanning Tree Statistics page to view information about the number and type of bridge protocol data units (BPDUs) transmitted and received on each port.

To access this page, click **Switching** > **Spanning Tree** > **Statistics**.

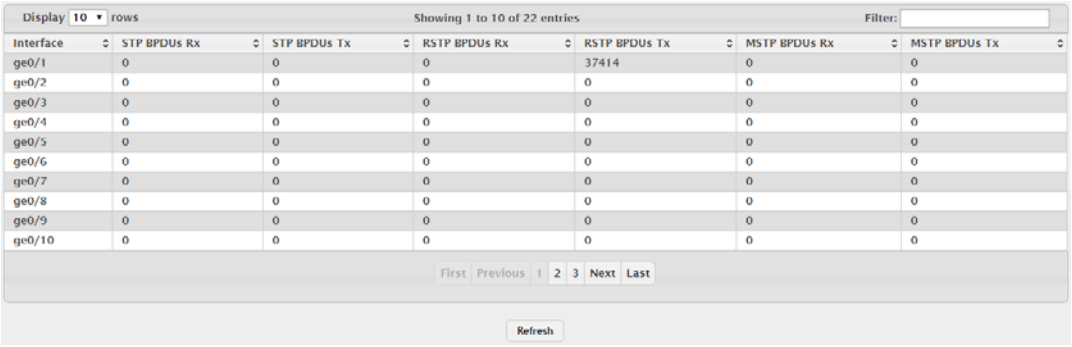


Figure 4.248 Switching > Spanning Tree > Statistics

The following table describes the items in the previous figure.

Item	Description
Interface	The port or link aggregation group (LAG) associated with the rest of the data in the row.
STP BPDUs Rx	The number of classic STP (IEEE 802.1d) BPDUs received by the interface.
STP BPDUs Tx	The number of classic STP BPDUs sent by the interface.
RSTP BPDUs Rx	The number of RSTP (IEEE 802.1w) BPDUs received by the interface.
RSTP BPDUs Tx	The number of RSTP BPDUs sent by the interface.
MSTP BPDUs Rx	The number of MSTP (IEEE 802.1s) BPDUs received by the interface.
MSTP BPDUs Tx	The number of MSTP BPDUs sent by the interface.
Refresh	Click **Refresh** to update the screen.

4.4.20 VLAN

Adding Virtual LAN (VLAN) support to a Layer 2 switch offers some of the benefits of both bridging and routing. Like a bridge, a VLAN switch forwards traffic based on the Layer 2 header, which is fast, and like a router, it partitions the network into logical segments, which provides better administration, security and management of multi-cast traffic.

A VLAN is a set of end stations and the switch ports that connect them. You may have many reasons for the logical division, such as department or project member-ship. The only physical requirement is that the end station and the port to which it is connected both belong to the same VLAN.

Each VLAN in a network has an associated VLAN ID, which appears in the IEEE 802.1Q tag in the Layer 2 header of packets transmitted on a VLAN. An end station may omit the tag, or the VLAN portion of the tag, in which case the first switch port to receive the packet may either reject it or insert a tag using its default VLAN ID. A given port may handle traffic for more than one VLAN, but it can only support one default VLAN ID.

4.4.20.1 Status

Use the VLAN Status page to view information about the VLANs configured on your system.

To access this page, click **Switching** > **VLAN** > **Status**.

Note! *You cannot remove or rename VLAN 1.*

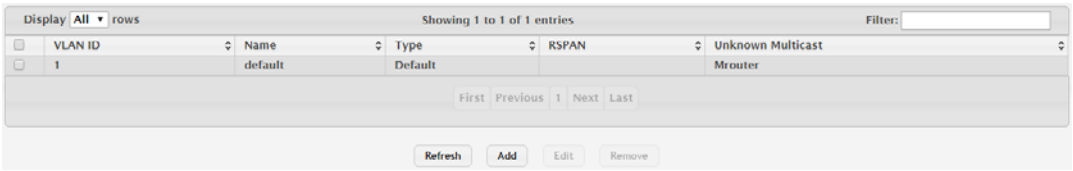


Figure 4.249 Switching > VLAN > Status

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The unique VLAN identifier (VID).
Name	A user-configurable name that identifies the VLAN.
Type	The type of VLAN, which can be one of the following: ■ Default: The default VLAN. This VLAN is always present, and the VLAN ID is 1. ■ Static: A user-configured VLAN. ■ Dynamic: A VLAN created by GARP VLAN Registration Protocol (GVRP).
RSPAN	Identifies whether the VLAN is configured (Enabled) as the Remote Switched Port Analyzer (RSPAN) VLAN. The RSPAN VLAN is used to carry mirrored traffic from source ports to a destination probe port on a remote device.
Unknown Multicast	Use this field to specify whether all the ports will forward unknown multicast frames in this VLAN. The factory default is “Mroute”. The possible values are: ■ Flooding: flood all unknown multicast frames to all the ports in this VLAN, except for the receiving port. ■ Discarding: discard all unknown multicast frames received from all the ports in this VLAN. ■ Mroute: flood the unknown multicast frames to multicast router ports in this VLAN.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new VLAN.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new VLAN:

Click **Switching** > **VLAN** > **Status** > **Add**.

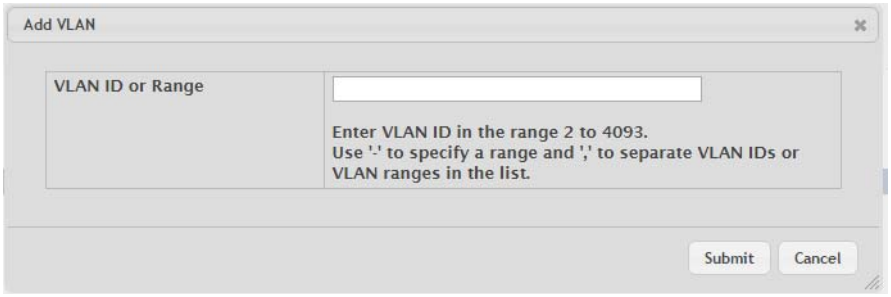


Figure 4.250 Switching > VLAN > Status > Add

The following table describes the items in the previous figure.

Item	Description
VLAN ID or Range	Specify VLAN ID(s). Use '-' to specify a range and ',' to separate VLAN IDs or VLAN ranges in the list.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.20.2 Port Configuration

Use the VLAN Port Configuration page to configure VLAN membership for the interfaces on the device and to specify whether traffic transmitted by the member ports should be tagged. The device supports IEEE 802.1Q tagging. Ethernet frames on a tagged VLAN have a 4-byte VLAN tag in the header.

To access this page, click **Switching** > **VLAN** > **Port Configuration**.

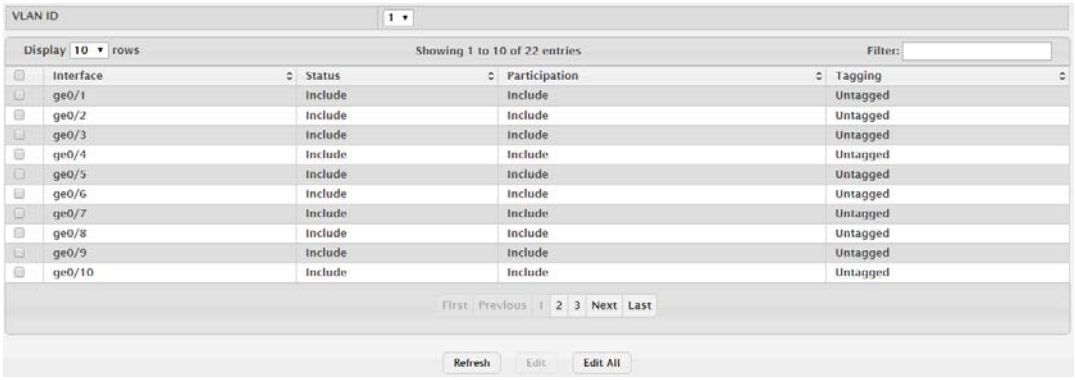


Figure 4.251 Switching > VLAN > Port Configuration

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The menu includes the VLAN ID for all VLANs configured on the device. Click the drop-down menu to select the correct VLAN to view or configure settings for a VLAN
Interface	The interface associated with the rest of the data in the row. When editing VLAN information for one or more interfaces, this field identifies the interfaces that are being configured.
Status	The current participation mode of the interface in the selected VLAN. The value of the Status field differs from the value of the Participation field only when the Participation mode is set to Auto Detect. The Status is one of the following: ■ Include: The port is a member of the selected VLAN. ■ Exclude: The port is not a member of the selected VLAN.

Item	Description
Participation	The participation mode of the interface in the selected VLAN, which is one of the following: ■ Include: The port is always a member of the selected VLAN. This mode is equivalent to registration fixed in the IEEE 802.1Q standard. ■ Exclude: The port is never a member of the selected VLAN. This mode is equivalent to registration forbidden in the IEEE 802.1Q standard. ■ Auto Detect: The port can be dynamically registered in the selected VLAN through GVRP or MVRP. The port will not participate in this VLAN unless it receives a GVRP or MVRP request and the device software supports the corresponding protocol. This mode is equivalent to registration normal in the IEEE 802.1Q standard.
Tagging	The tagging behavior for all the ports in this VLAN, which is one of the following: ■ Tagged: The frames transmitted in this VLAN will include a VLAN ID tag in the Ethernet header. ■ Untagged: The frames transmitted in this VLAN will be untagged.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected interfaces.
Edit All	Click **Edit All** to apply same settings to all interfaces.

4.4.20.3 Port Summary

Use the VLAN Port Summary page to configure the way interfaces handle VLAN-tagged, priority-tagged, and untagged traffic.

To access this page, click **Switching** > **VLAN** > **Port Summary**.

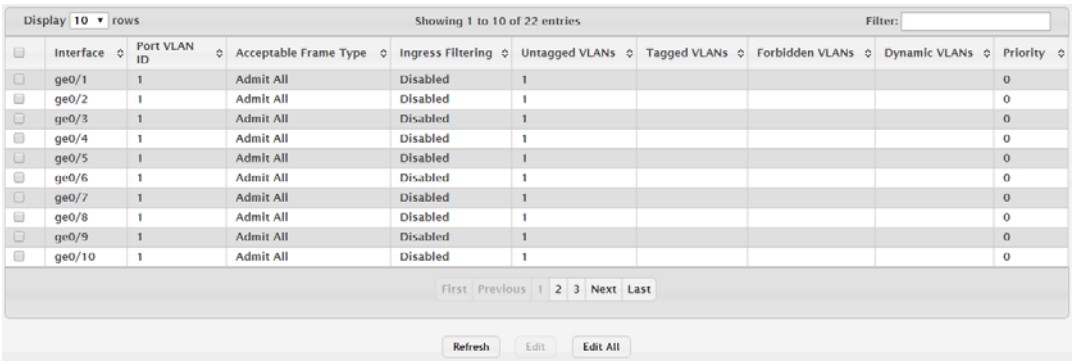


Figure 4.252 Switching > VLAN > Port Summary

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When editing information for one or more interfaces, this field identifies the interfaces that are being configured.
Port VLAN ID	The VLAN ID assigned to untagged or priority tagged frames received on this port. This value is also known as the Port VLAN ID (PVID). In a tagged frame, the VLAN is identified by the VLAN ID in the tag.

Item	Description
Acceptable Frame Type	Indicates how the interface handles untagged and priority tagged frames. The options include the following: ■ Admit All: Untagged and priority tagged frames received on the interface are accepted and assigned the value of the Port VLAN ID for this interface. ■ Only Tagged: The interface discards any untagged or priority tagged frames it receives. ■ Only Untagged: The interface discards any tagged frames it receives. For all options, VLAN tagged frames are forwarded in accordance with the IEEE 802.1Q VLAN standard.
Ingress Filtering	Indicates how the interface handles tagged frames. The options include the following: ■ Enabled: A tagged frame is discarded if this interface is not a member of the VLAN identified by the VLAN ID in the tag. ■ Disabled: All tagged frames are accepted.
Untagged VLANs	VLANs which are configured on the port to transmit egress packets as untagged.
Tagged VLANs	VLANs which are configured on the port to transmit egress packets as tagged.
Forbidden VLANs	When configuring port memberships in VLANs, you can specify one or more VLANs to be excluded from the available VLANs for the port. The forbidden VLANs list shows the VLANs to which the port cannot be assigned membership.
Dynamic VLANs	The list of VLANs of which the port became a member as result of the operations of dynamic VLAN protocols. When a VLAN is created as a dynamic VLAN, any port that is configured as switchport type Trunk or General automatically becomes a member of the VLAN, unless the VLAN port is excluded from the VLAN.
Priority	The default 802.1p priority assigned to untagged packets arriving at the interface.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected interfaces.
Edit All	Click **Edit All** to apply same settings to all interfaces.

4.4.20.4 Switchport Summary

Use the VLAN Switchport Summary page to configure switchport mode settings on interfaces. The switchport mode defines the purpose of the port based on the type of device it connects to and constraints the VLAN configuration of the port accordingly. Assigning the appropriate switchport mode helps simplify VLAN configuration and minimize errors.

To access this page, click **Switching** > **VLAN** > **Switchport Summary**.

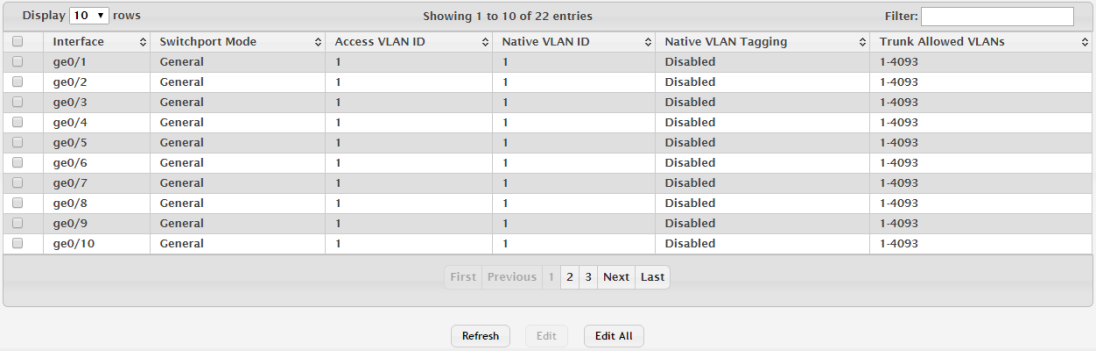


Figure 4.253 Switching > VLAN > Switchport Summary

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When editing information for one or more interfaces, this field identifies the interfaces that are being configured.
Switchport Mode	The switchport mode of the interface, which is one of the following: ■ Access: Access mode is suitable for ports connected to end stations or end users. Access ports participate only in one VLAN. They accept both tagged and untagged packets, but always transmit untagged packets. ■ Trunk: Trunk mode is intended for ports that are connected to other switches. Trunk ports can participate in multiple VLANs and accept both tagged and untagged packets. ■ General: General mode enables a custom configuration of a port. The user configures the General port VLAN attributes such as membership, PVID, tagging, ingress filter, etc., using the settings on the Port Configuration page. By default, all ports are initially configured in General mode. ■ Promiscuous: The interface belongs to a primary VLAN and can communicate with all interfaces in the private VLAN, including other promiscuous ports, community ports, and isolated ports. ■ Host: The interface belongs to a secondary VLAN and, depending upon the type of secondary VLAN, can either communicate with other ports in the same community (if the secondary VLAN is a community VLAN) and with the promiscuous ports or is able to communicate only with the promiscuous ports (if the secondary VLAN is an isolated VLAN).
Access VLAN ID	The access VLAN for the port, which is valid only when the port switchport mode is Access.
Native VLAN ID	The native VLAN for the port, which is valid only when the port switchport mode is Trunk.
Native VLAN Tagging	When enabled, if the trunk port receives untagged frames, it forwards them on the native VLAN with no VLAN tag. When disabled, if the port receives untagged frames, it includes the native VLAN ID in the VLAN tag when forwarding.
Trunk Allowed VLANs	The set of VLANs of which the port can be a member, when configured in Trunk mode. By default, this list contains all possible VLANs even if they have not yet been created.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected interfaces.
Edit All	Click **Edit All** to apply same settings to all interfaces.

4.4.20.5 Internal Usage

Use the VLAN Internal Usage page to configure which VLAN IDs to use for port-based routing interfaces. When a port-based routing interface is created, an unused VLAN ID is assigned internally. This page also displays a list of VLANs assigned to routing interfaces.

To access this page, click **Switching** > **VLAN** > **Internal Usage**.

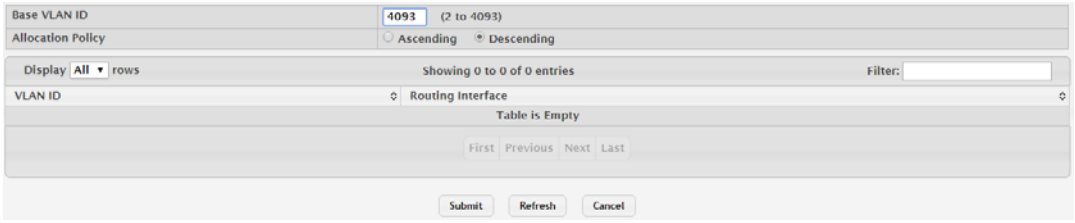


Figure 4.254 Switching > VLAN > Internal Usage

The following table describes the items in the previous figure.

Item	Description
Base VLAN ID	The first VLAN ID to be assigned to a port-based routing interface.
Allocation Policy	Determines whether VLAN IDs assigned to port-based routing interfaces start at the base and decrease in value (Descending) or start at the base and increase in value (Ascending).
VLAN ID	The VLAN ID assigned to a port-based routing interface. The device automatically assigns an unused VLAN ID when the routing interface is created.
Routing Interface	The port-based routing interface associated with the VLAN.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.20.6 Reset

Use the Reset VLAN Configuration page to reset all VLAN settings to their default values. Any VLANs that have been created on the system will be deleted.

To access this page, click **Switching** > **VLAN** > **Reset**.

Figure 4.255 Switching > VLAN > Reset

The following table describes the items in the previous figure.

Item	Description
Reset	Click **Reset** to initiates the action to reset all VLAN configuration parameters to their factory default settings.

4.4.20.7 RSPAN

Use the RSPAN Configuration page to configure the VLAN to use as the Remote Switched Port Analyzer (RSPAN) VLAN. RSPAN allows you to mirror traffic from multiple source ports (or from all ports that are members of a VLAN) from different network devices and send the mirrored traffic to a destination port (a probe port connected to a network analyzer) on a remote device. The mirrored traffic is tagged with the RSPAN VLAN ID and transmitted over trunk ports in the RSPAN VLAN.

To access this page, click **Switching** > **VLAN** > **RSPAN**.

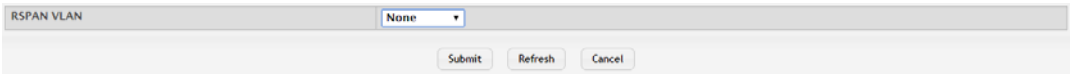


Figure 4.256 Switching > VLAN > Status

The following table describes the items in the previous figure.

Item	Description
RSPAN VLAN	Click the drop-down menu to select the VLAN to use as the RSAN VLAN.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.21 IP Subnet Based VLAN

4.4.21.1 Status

Use the IP Subnet Based VLAN Status page to add, edit, and remove IP subnet-based VLANs. IP subnet-based VLANs allow incoming untagged packets to be assigned to a VLAN based on the source IP address of the packet. All hosts in the same subnet are members of the same VLAN.

To access this page, click **Switching** > **IP Subnet Based VLAN** > **Status**.

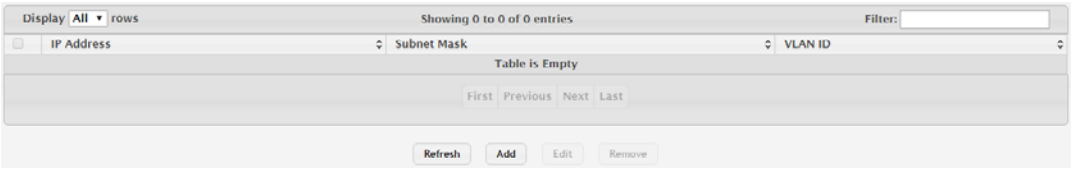


Figure 4.257 Switching > IP Subnet Based VLAN > Status

The following table describes the items in the previous figure.

Item	Description
IP Address	The network address for the IP subnet. All incoming untagged packets that have a source IP address within the defined subnetwork are placed in the same VLAN.
Subnet Mask	The subnet mask that defines the network portion of the IP address.
VLAN ID	The VLAN ID of the IP subnet-based VLAN. If the source IP address of untagged traffic received on any port or LAG is within the associated IP subnet, the traffic is tagged with this VLAN ID.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new IP subnet-based VLAN.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new IP subnet-based VLAN:

Click **Switching** > **IP Subnet Based VLAN** > **Status** > **Add**.

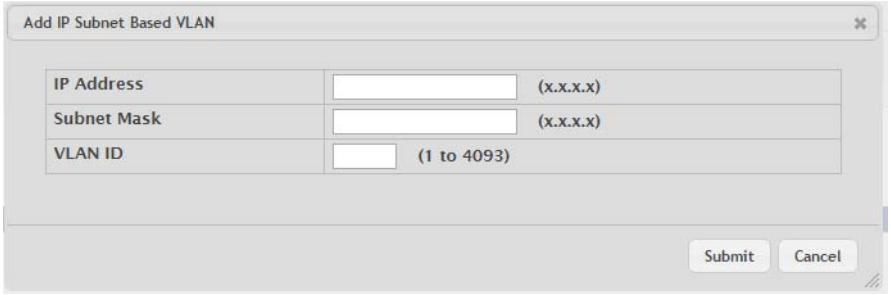


Figure 4.258 Switching > IP Subnet Based VLAN > Status > Add

The following table describes the items in the previous figure.

Item	Description
IP Address	The network address for the IP subnet. All incoming untagged packets that have a source IP address within the defined subnetwork are placed in the same VLAN.
Subnet Mask	The subnet mask that defines the network portion of the IP address.
VLAN ID	The VLAN ID of the IP subnet-based VLAN. If the source IP address of untagged traffic received on any port or LAG is within the associated IP subnet, the traffic is tagged with this VLAN ID.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.22 MAC Based VLAN

4.4.22.1 Status

Use the MAC Based VLAN Status page to add, edit, or remove MAC-based VLANs. MAC-based VLANs allow incoming untagged packets to be assigned to a VLAN based on the source MAC address of the packet. This type of VLAN is useful when a host might not always connect to the network through the same port but needs to be on the same VLAN.

To access this page, click **Switching** > **MAC Based VLAN** > **Status**.

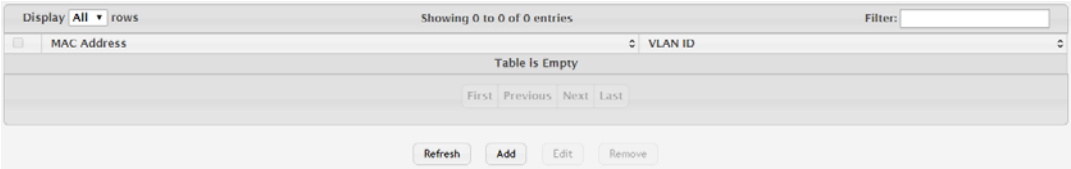


Figure 4.259 Switching > MAC Based VLAN > Status

The following table describes the items in the previous figure.

Item	Description
MAC Address	The source MAC address of the host. All untagged traffic that includes this address in the source MAC address field of the Ethernet frame is placed in the associated VLAN.
VLAN ID	The VLAN ID of the MAC-based VLAN. If an untagged frame received on any port or LAG matches the associated MAC address, it is tagged with this VLAN ID.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new MAC-based VLAN.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new MAC-based VLAN:

Click **Switching** > **MAC Based VLAN** > **Status** > **Add**.

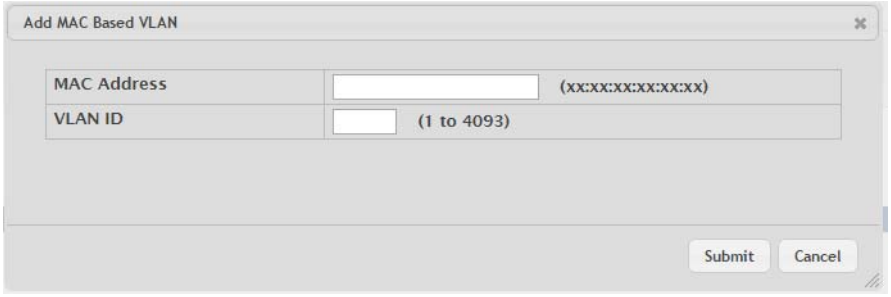


Figure 4.260 Switching > MAC Based VLAN > Status > Add

The following table describes the items in the previous figure.

Item	Description
MAC Address	The source MAC address of the host. All untagged traffic that includes this address in the source MAC address field of the Ethernet frame is placed in the associated VLAN.
VLAN ID	The VLAN ID of the MAC-based VLAN. If an untagged frame received on any port or LAG matches the associated MAC address, it is tagged with this VLAN ID.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.23 Protocol Based VLAN

4.4.23.1 Status

Use the Protocol Based VLAN Status page to add and remove Protocol-based Virtual Local Area Networks (PBVLANs). In a PBVLAN, traffic is bridged through specified ports based on the protocol. PBVLANS allow you to define a packet filter that the device uses as the matching criteria to determine whether a particular packet belongs to a particular VLAN. PBVLANs are most often used in environments where network segments contain hosts running multiple protocols. PBVLANs can help optimize network traffic patterns because protocol-specific broadcast messages are sent only to hosts that use the protocols specified in the PBVLAN.

To access this page, click **Switching** > **Protocol Based VLAN** > **Status**.

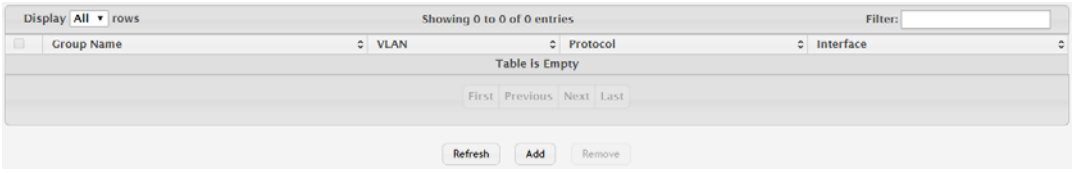


Figure 4.261 Switching > Protocol Based VLAN > Status

The following table describes the items in the previous figure.

Item	Description
Group Name	The user-configured name that identifies the PBVLAN group.

Item	Description
VLAN	The VLAN ID associated with the PBVLAN. VLAN tagging for the PBVLAN works as follows: ■ If the frame received over a port is tagged, normal processing takes place. ■ If the frame received over a port is untagged, the frame type is matched according to the protocol(s) assigned to the group on that port. – If a match is found, the frame is assigned the VLAN ID specified for the group. – If a match is not found, the frame is assigned the port VID (PVID) as its VLAN ID.
Protocol	The protocol or protocols to use as the match criteria for an Ethernet frame. The protocol is included in the two-byte EtherType field of the frame. When adding a PBVLAN, you can specify the EtherType hex value or (for IP, ARP, and IPX) the protocol keyword.
Interface	The interfaces that are members of the PBVLAN group. An interface can be a member of multiple groups as long as the same protocol is not specified in more than one group that includes the interface. When adding a PBVLAN group, use the Available Interfaces and Group Interfaces fields to configure the interfaces that are members of the PBVLAN group. To move an interface between the Available Interfaces and Group Interfaces fields, click the interface (or CTRL + click to select multiple interfaces), and then click the appropriate arrow to move the selected interfaces to the desired field.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new protocol based VLAN.
Remove	Click **Remove** to remove the selected entries.

To add a new protocol based VLAN:

Click **Switching** > **Protocol Based VLAN** > **Status** > **Add**.

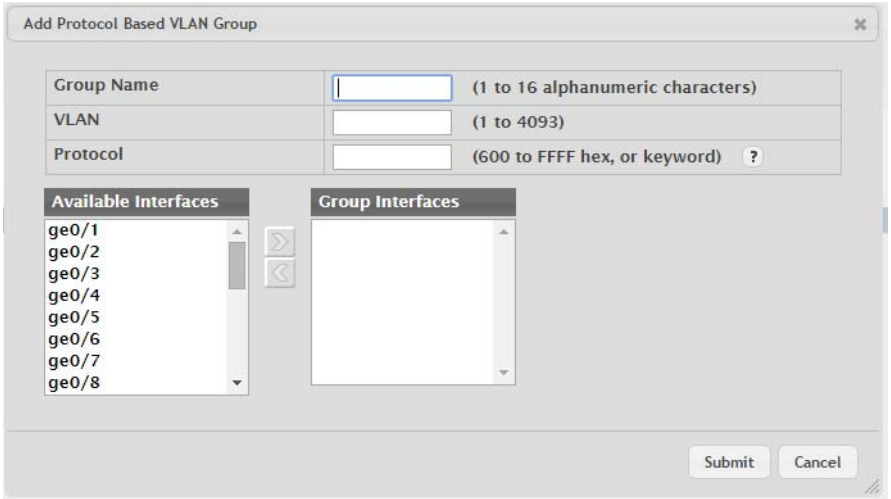


Figure 4.262 Switching > Protocol Based VLAN > Status > Add

The following table describes the items in the previous figure.

Item	Description
Group Name	The user-configured name that identifies the PBVLAN group.
VLAN	The VLAN ID associated with the PBVLAN. VLAN tagging for the PBVLAN works as follows: ■ If the frame received over a port is tagged, normal processing takes place. ■ If the frame received over a port is untagged, the frame type is matched according to the protocol(s) assigned to the group on that port. – If a match is found, the frame is assigned the VLAN ID specified for the group. – If a match is not found, the frame is assigned the port VID (PVID) as its VLAN ID.
Protocol	The protocol or protocols to use as the match criteria for an Ethernet frame. The protocol is included in the two-byte EtherType field of the frame. When adding a PBVLAN, you can specify the EtherType hex value or (for IP, ARP, and IPX) the protocol keyword.
Interface	The interfaces that are members of the PBVLAN group. An interface can be a member of multiple groups as long as the same protocol is not specified in more than one group that includes the interface. When adding a PBVLAN group, use the Available Interfaces and Group Interfaces fields to configure the interfaces that are members of the PBVLAN group. To move an interface between the Available Interfaces and Group Interfaces fields, click the interface (or CTRL + click to select multiple interfaces), and then click the appropriate arrow to move the selected interfaces to the desired field.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.23.2 Configuration

Use the Protocol Based VLAN Group Configuration page to configure existing Protocol-based VLAN (PBVLAN) groups. You can change the group name, VLAN ID, protocol information, and interfaces associated with the PBVLAN group.

To access this page, click **Switching** > **Protocol Based VLAN** > **Configuration**.

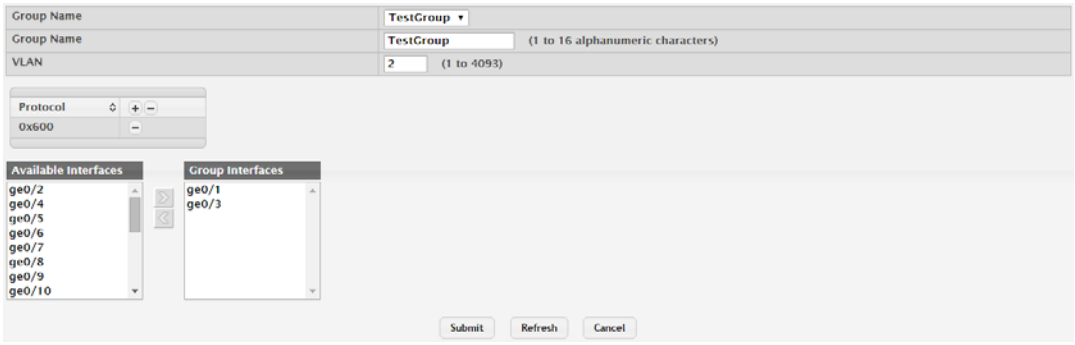


Figure 4.263 Switching > Protocol Based VLAN > Configuration

The following table describes the items in the previous figure.

Item	Description
Group Name	Click the drop-down menu select the PBLAN to change the properties.
Group Name	Enter the group name to update the name of the PBLAN group.

Item	Description
VLAN	The VLAN ID associated with the PBVLAN. Untagged traffic that matches the protocol criteria is tagged with this VLAN ID.
Protocol	The protocol or protocols to use as the match criteria to determine whether a particular packet belongs to the PBVLAN. The protocols in this list are checked against the two-byte EtherType field of ingress Ethernet frames on the PVBLAN Group Interfaces. When adding a protocol, you can specify the EtherType hex value or (for IP, ARP, and IPX) the protocol keyword. To configure the protocols associated with a PBVLAN group, use the buttons available in the protocol table: ■ To add a protocol to the group, click ⊕ button and enter the protocol to add. ■ To delete an entry from the list, click ⊖ button associated with the entry to remove. ■ To delete all entries from the list, click ⊖ button in the heading row.
Available Interfaces	The interfaces that can be added to the PBVLAN group. An interface can be a member of multiple groups as long as the same protocol is not specified in more than one group that includes the interface. To move an interface between the Available Interfaces and Group Interfaces fields, click the interface (or CTRL + click to select multiple interfaces), and then click the appropriate arrow to move the selected interfaces to the desired field.
Group Interfaces	The interfaces that are members of the PBVLAN group.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.4.24 Private VLAN

4.4.24.1 Configuration

Use the Private VLAN Configuration page to add Virtual Local Area Networks (VLANs) to the device and to configure existing VLANs as private VLANs. Private VLANs provide Layer 2 isolation between ports that share the same broadcast domain. In other words, a private VLAN allows a VLAN broadcast domain to be partitioned into smaller point-to-multipoint subdomains. The ports participating in a private VLAN can be located anywhere in the Layer 2 network. Each subdomain is defined (represented) by a primary VLAN and a secondary VLAN. The primary VLAN ID is the same for all subdomains that belong to a private VLAN. The secondary VLAN ID differentiates subdomains from each another and provides Layer 2 isolation between ports that are members of the same private VLAN.

Note! *The default VLAN and management VLAN are not displayed on the page because they cannot be configured as private VLANs.*

To access this page, click **Switching** > **Private VLAN** > **Configuration**.

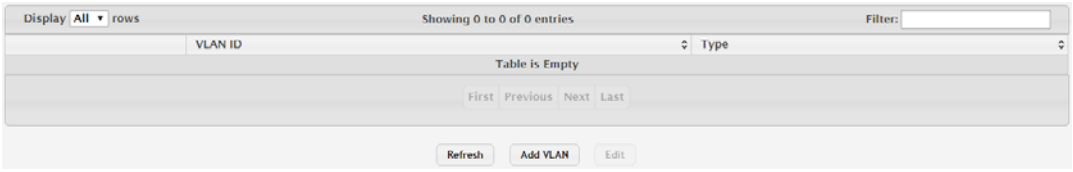


Figure 4.264 Switching > Private VLAN > Configuration

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The ID of the VLAN that exists on the device.
Type	The private VLAN type, which is one of the following: ■ Unconfigured: The VLAN is not configured as a private VLAN. ■ Primary: A private VLAN that forwards the traffic from the promiscuous ports to isolated ports, community ports, and other promiscuous ports in the same private VLAN. Only one primary VLAN can be configured per private VLAN. All ports within a private VLAN share the same primary VLAN. ■ Isolated: A secondary VLAN that carries traffic from isolated ports to promiscuous ports. Only one isolated VLAN can be configured per private VLAN. ■ Community: A secondary VLAN that forwards traffic between ports that belong to the same community and to the promiscuous ports. Multiple community VLANs can be configured per private VLAN.
Refresh	Click **Refresh** to update the screen.
Add VLAN	Click **Add VLAN** to add a new VLAN.
Edit	Click **Edit** to edit the selected entries.

To add a new VLAN:

Click **Switching** > **Private VLAN** > **Configuration** > **Add VLAN**.

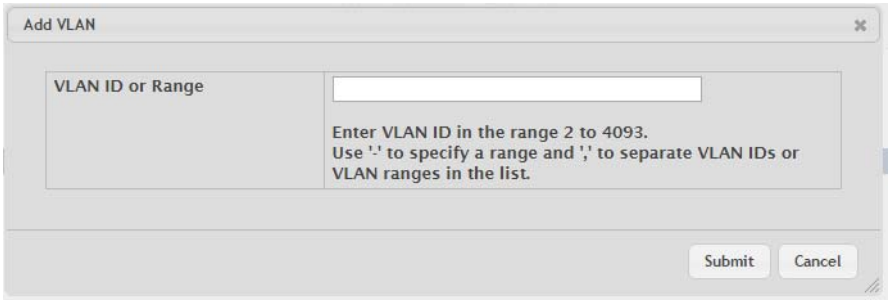


Figure 4.265 Switching > Private VLAN > Configuration > Add VLAN

The following table describes the items in the previous figure.

Item	Description
VLAN ID or Range	The ID of one or more VLANs to create. To create a single VLAN, enter its ID in the field. To create a continuous range of VLANs, use a hyphen (-) to separate the lowest and highest VLAN IDs in the range. To create multiple VLANs that are not in a continuous range, separate each VLAN ID or range of VLAN IDs with a comma (,). Do not use a space after the comma or anywhere in the field.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.24.2 Association

Use the Private VLAN Association page to configure the association between the primary VLAN and secondary VLANs. Associating a secondary VLAN with a primary VLAN allows host ports in the secondary VLAN to communicate outside the private VLAN.

Note! *Isolated VLANs and Community VLANs are collectively called Secondary VLANs.*

To access this page, click **Switching** > **Private VLAN** > **Association**.

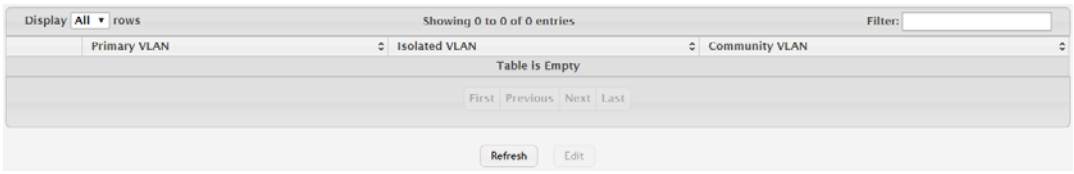


Figure 4.266 Switching > Private VLAN > Association

The following table describes the items in the previous figure.

Item	Description
Primary VLAN	The VLAN ID of each VLAN configured as a primary VLAN.
Isolated VLAN	The VLAN ID of the isolated VLAN associated with the primary VLAN. If the field is blank, no isolated VLAN has been associated with the primary VLAN. An isolated VLAN is a secondary VLAN that carries traffic from isolated ports to promiscuous ports. Only one isolated VLAN can be configured per private VLAN.
Community VLAN	The VLAN ID of each community VLAN associated with the primary VLAN. If the field is blank, no community VLANs have been associated with the primary VLAN. A community VLAN is a secondary VLAN that forwards traffic between ports that belong to the same community and to the promiscuous ports. Multiple community VLANs can be configured per private VLAN.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.4.24.3 Interface

Use the Private VLAN Interface Association page to configure the port mode for the ports and LAGs that belong to a private VLAN and to configure associations between interfaces and primary/secondary private VLANs.

To access this page, click **Switching** > **Private VLAN** > **Interface**.

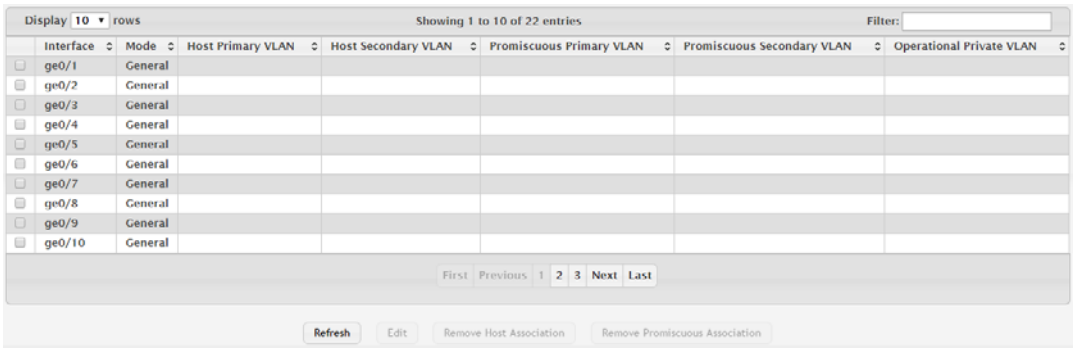


Figure 4.267 Switching > Private VLAN > Interface

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When editing interface settings, this field identifies the interface being configured.
Mode	The private VLAN mode of the interface, which is one of the following: ■ General: The interface is in general mode and is not a member of a private VLAN. ■ Access: Access mode is suitable for ports connected to end stations or end users. Access ports participate only in one VLAN. They accept both tagged and untagged packets, but always transmit untagged packets. ■ Trunk: Trunk mode is intended for ports that are connected to other switches. Trunk ports can participate in multiple VLANs and accept both tagged and untagged packets. ■ General: General mode enables a custom configuration of a port. The user configures the General port VLAN attributes such as membership, PVID, tagging, ingress filter, etc., using the settings on the Port Configuration page. By default, all ports are initially configured in General mode. ■ Promiscuous: The interface belongs to a primary VLAN and can communicate with all interfaces in the private VLAN, including other promiscuous ports, community ports, and isolated ports. ■ Host: The interface belongs to a secondary VLAN and, depending upon the type of secondary VLAN, can either communicate with other ports in the same community (if the secondary VLAN is a community VLAN) and with the promiscuous ports or is able to communicate only with the promiscuous ports (if the secondary VLAN is an isolated VLAN).
Host Primary VLAN	The primary private VLAN the port is a member of when it is configured to operate in Host mode.
Host Secondary VLAN	The secondary private VLAN the port is a member of when it is configured to operate in Host mode. The secondary private VLAN is either an isolated or community VLAN.
Promiscuous Primary VLAN	The primary private VLAN in which the port is a member when it is configured to operate in Promiscuous mode.
Promiscuous Secondary VLAN	The secondary private VLAN the port is a member of when it is configured to operate in Promiscuous mode. The secondary private VLAN is either an isolated or community VLAN.
Operational Private VLAN	The primary and secondary operational private VLANs for the interface. The VLANs that are operational depend on the configured mode for the interface and the private VLAN type.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.
Remove Host Association	Click **Remove Host Association** to remove the association between an interface and the primary/secondary private VLANs that the interface belongs to when it operates in host mode.
Remove Promiscuous Association	Click **Remove Promiscuous Association** to remove the association between an interface and the primary/secondary private VLANs that the interface belongs to when it operates in promiscuous mode.

4.4.25 X-Ring Pro

4.4.25.1 Configuration

Use the X-Ring Pro Configuration page to view and configure the X-Ring settings.

To access this page, click **Switching** > **X-Ring Pro** > **Configuration**.

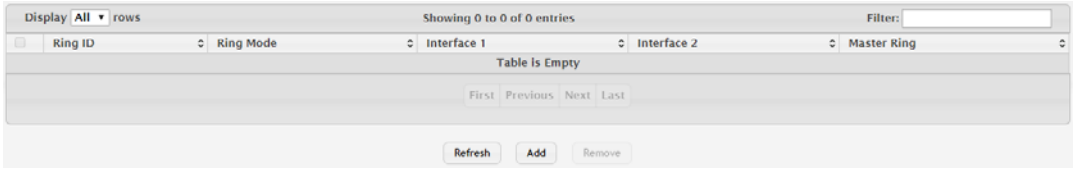


Figure 4.268 Switching > X-Ring Pro > Configuration

The following table describes the items in the previous figure.

Item	Description
Ring ID	Specifies a number ranging from 1 to 99 to identify a given X-Ring Pro group.
Ring Mode	Specifies the mode of the X-Ring Pro group. The value is either “Ring” or “Coupling”. The default value is “Ring”. ■ The X-Ring Pro group denoted as mode “Ring” means it is a switch connected to the other switches to form a ring topology. ■ The X-Ring Pro group denoted as “Coupling” means it is a switch that is used to inter-connect two X-Ring Pro networks.
Interface 1	Specifies the first member interface for the X-Ring Pro group. The value is either physical port or LAG (Link-Aggregation-Group) port.
Interface 2	Specifies the secondary member interface for the X-Ring Pro group. ■ For the X-Ring Pro group denoted as “Ring”, the value is either physical port or LAG (Link-Aggregation-Group) port. ■ For the X-Ring Pro group denoted as “Coupling”, the value is physical port or LAG (Link-Aggregation-Group) port or “None”. The value “None” implies the X-Ring Pro group is created not for coupling dual-homing application
Master Ring	Specifies the X-Ring Pro network that is coupling connected by the X-Ring Pro group denoted as “Coupling”. This field is required for the X-Ring coupling application only.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new X-Ring.
Remove	Click **Remove** to remove the selected entries.

To add a new X-Ring:

Click **Switching** > **X-Ring Pro** > **Configuration** > **Add**.

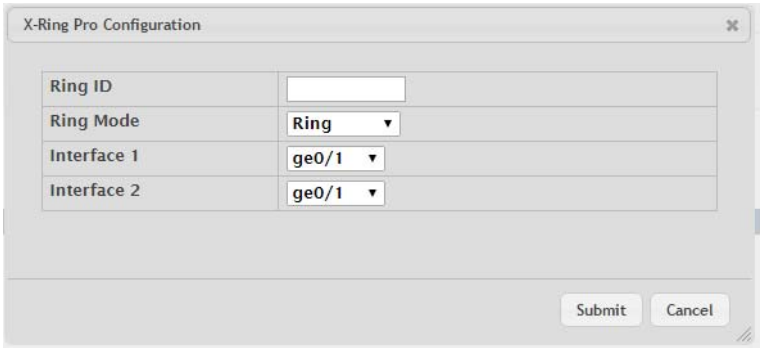


Figure 4.269 Switching > X-Ring Pro > Configuration > Add

The following table describes the items in the previous figure.

Item	Description
Ring ID	Specifies a number ranging from 1 to 99 to identify a given X-Ring Pro group.
Ring Mode	Specifies the mode of the X-Ring Pro group. The value is either "Ring" or "Coupling". The default value is "Ring". ■ The X-Ring Pro group denoted as mode "Ring" means it is a switch connected to the other switches to form a ring topology. ■ The X-Ring Pro group denoted as "Coupling" means it is a switch that is used to inter-connect two X-Ring Pro networks.
Interface 1	Specifies the first member interface for the X-Ring Pro group. The value is either physical port or LAG (Link-Aggregation-Group) port.
Interface 2	Specifies the secondary member interface for the X-Ring Pro group. ■ For the X-Ring Pro group denoted as "Ring", the value is either physical port or LAG (Link-Aggregation-Group) port. ■ For the X-Ring Pro group denoted as "Coupling", the value is physical port or LAG (Link-Aggregation-Group) port or "None". The value "None" implies the X-Ring Pro group is created not for coupling dual-homing application.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.4.25.2 Status

Use the X-Ring Pro Status page to view and configure the X-Ring settings.

To access this page, click **Switching** > **X-Ring Pro** > **Status**.

Figure 4.270 Switching > X-Ring Pro > Status

The following table describes the items in the previous figure.

Item	Description
Ring ID	Specifies a number ranging from 1 to 99 to identify a given X-Ring Pro group.
Ring Mode	Specifies the mode of the X-Ring Pro group. The value is either “Ring” or “Coupling”. The default value is “Ring”. ■ The X-Ring Pro group denoted as mode “Ring” means it is a switch connected to the other switches to form a ring topology. ■ The X-Ring Pro group denoted as “Coupling” means it is a switch that is used to inter-connect two X-Ring Pro networks.
Operation State	Specifies the run-time operation state of the X-Ring Pro group. ■ For the X-Ring Pro group denoted as “Ring”, the value is “Standby”, “Edge”, “Master”, or “Transit”. For the ring topology, there would be exactly one switch stays in master state and one of two Ring interfaces is set in blocking state. ■ For the X-Ring Pro group denoted as “Coupling”, the value is “Disconnect”, “Backup”, or “Primary”. There would be maximum one coupling path stays in “Primary” to forward traffic between two X-Ring Pro networks.

Item	Description
Interface 1	Specifies the first member interface for the X-Ring Pro group. The value is either physical port or LAG (Link-Aggregation-Group) port.
Interface 2	Specifies the secondary member interface for the X-Ring Pro group. ■ For the X-Ring Pro group denoted as “Ring”, the value is either physical port or LAG (Link-Aggregation-Group) port. ■ For the X-Ring Pro group denoted as “Coupling”, the value is physical port or LAG (Link-Aggregation-Group) port or “None”. The value “None” implies the X-Ring Pro group is created not for coupling dual-homing application.
Forward State	Specifies the spanning tree state of the member interface of an X-Ring Pro group. The value is “Discarding” or “Forwarding”. ■ Discarding: Discard traffic in both ingress and egress directions. ■ Forwarding: Forward ingress traffic bases on the result of forwarding database lookup.
Master Ring	Specifies the X-Ring Pro network that is coupling connected by the X-Ring Pro group denoted as “Coupling”. This field is required for the X-Ring coupling application only.
Refresh	Click **Refresh** to update the screen.

4.5 Routing

When a packet enters the switch, the destination MAC address is checked to see if it matches any of the configured routing interfaces. If it does, then the silicon searches the host table for a matching destination IP address. If an entry is found, then the packet is routed to the host. If there is not a matching entry, then the switch performs a longest prefix match on the destination IP address. If an entry is found, then the packet is routed to the next hop. If there is no match, then the packet is routed to the next hop specified in the default route. If there is no default route configured, then the packet is passed to the 6200 series software to be handled appropriately.

The routing table can have entries added either statically by the administrator or dynamically via a routing protocol. The host table can have entries added either statically by the administrator or dynamically via ARP.

4.5.1 ARP Table

The ARP protocol associates a layer 2 MAC address with a layer 3 IPv4 address. FASTPATH SMB software features both dynamic and manual ARP configuration. With manual ARP configuration, you can statically add entries into the ARP table.

ARP is a necessary part of the internet protocol (IP) and is used to translate an IP address to a media (MAC) address, defined by a local area network (LAN) such as Ethernet. A station needing to send an IP packet must learn the MAC address of the IP destination, or of the next hop router, if the destination is not on the same subnet. This is achieved by broadcasting an ARP request packet, to which the intended recipient responds by unicasting an ARP reply containing its MAC address. Once learned, the MAC address is used in the destination address field of the layer 2 header prepended to the IP packet.

The ARP cache is a table maintained locally in each station on a network. ARP cache entries are learned by examining the source information in the ARP packet payload fields, regardless of whether it is an ARP request or response. Thus, when an ARP request is broadcast to all stations on a LAN segment or virtual LAN (VLAN), every recipient has the opportunity to store the sender's IP and MAC address in their respective ARP cache. The ARP response, being unicast, is normally seen only by

the requestor, who stores the sender information in its ARP cache. Newer information always replaces existing content in the ARP cache.

The number of supported ARP entries is platform-dependent.

Devices can be moved in a network, which means the IP address that was at one time associated with a certain MAC address is now found using a different MAC, or may have disappeared from the network altogether (i.e., it has been reconfigured, disconnected, or powered off). This leads to stale information in the ARP cache unless entries are updated in reaction to new information seen on the network, periodically refreshed to determine if an address still exists, or removed from the cache if the entry has not been identified as a sender of an ARP packet during the course of an ageout interval, usually specified via configuration.

4.5.1.1 Summary

Use the ARP Table page to add an entry to the Address Resolution Protocol table.

To access this page, click **Routing** > **ARP Table** > **Summary**.

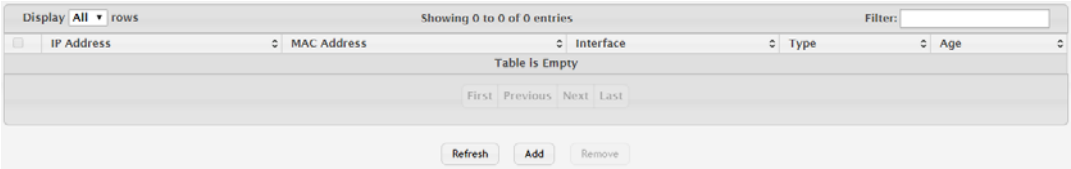


Figure 4.271 Routing > ARP Table > Summary

The following table describes the items in the previous figure.

Item	Description
IP Address	The IP address of a network host on a subnet attached to one of the device's routing interfaces. When adding a static ARP entry, specify the IP address for the entry after you click **Add**.
MAC Address	The unicast MAC address (hardware address) associated with the network host. When adding a static ARP entry, specify the MAC address to associate with the IP address in the entry.
Interface	The routing interface associated with the ARP entry. The network host is associated with the device through this interface.
Type	The ARP entry type: ■ Dynamic: An ARP entry that has been learned by the router ■ Gateway: A dynamic ARP entry that has the IP address of a routing interface ■ Local: An ARP entry associated with the MAC address of a routing interface on the device ■ Static: An ARP entry configured by the user
Age	The age of the entry since it was last learned or refreshed. This value is specified for Dynamic or Gateway entries only (it is left blank for all other entry types).
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new static ARP entry.
Remove	Click **Remove** to remove the selected entries.

To add a new static ARP entry:

Click **Routing** > **ARP Table** > **Summary** > **Add**.

Figure 4.272 Routing > ARP Table > Summary > Add

The following table describes the items in the previous figure.

Item	Description
IP Address	The IP address of a network host on a subnet attached to one of the device's routing interfaces.
MAC Address	The unicast MAC address (hardware address) associated with the network host.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.5.1.2 Configuration

Use the ARP Table Configuration page to change the configuration parameters for the Address Resolution Protocol Table. You can also use this screen to display the contents of the table.

To access this page, click **Routing** > **ARP Table** > **Configuration**.

Figure 4.273 Routing > ARP Table > Configuration

The following table describes the items in the previous figure.

Item	Description
Age Time (Seconds)	The amount of time, in seconds, that a dynamic ARP entry remains in the ARP table before aging out.
Response Time (Seconds)	The amount of time, in seconds, that the device waits for an ARP response to an ARP request that it sends.
Retries	The maximum number of times an ARP request will be retried after an ARP response is not received. The number includes the initial ARP request.
Cache Size	The maximum number of entries allowed in the ARP table. This number includes all static and dynamic ARP entries.
Dynamic Renew	When selected, this option allows the ARP component to automatically attempt to renew dynamic ARP entries when they age out.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.5.1.3 Statistics

Use the ARP Table Statistics page to view the statistics for the Address Resolution Protocol Table. You can also use this screen to display the contents of the table.

To access this page, click **Routing** > **ARP Table** > **Statistics**.

Figure 4.274 Routing > ARP Table > Statistics

The following table describes the items in the previous figure.

Item	Description
Total Entry Count	The total number of entries currently in the ARP table. The number includes both dynamically learned entries and statically configured entries.
Peak Total Entries	The highest value reached by the Total Entry Count. This value is reset whenever the ARP table Cache Size configuration parameter is changed.
Active Static Entries	The total number of active ARP entries in the ARP table that were statically configured. After a static ARP entry is configured, it might not become active until certain other routing configuration conditions are met.
Configured Static Entries	The total number of static ARP entries that are currently in the ARP table. This number includes static ARP entries that are not active.
Maximum Static Entries	The maximum number of static ARP entries that can be configured in the ARP table.
Refresh	Click **Refresh** to update the screen.

4.5.2 IP

4.5.2.1 Configuration

Use the Routing IP Configuration page to configure global routing settings on the device. Routing provides a means of transmitting IP packets between subnets on the network. Routing configuration is necessary only if the device is used as a Layer 3 device that routes packets between subnets. If the device is used as a Layer 2 device that handles switching only, it typically connects to an external Layer 3 device that handles the routing functions; therefore, routing configuration is not required on the Layer 2 device.

To access this page, click **Routing** > **IP** > **Configuration**.

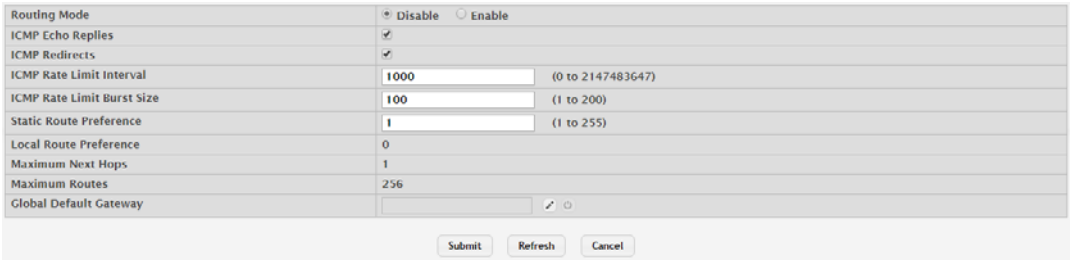


Figure 4.275 Routing > IP > Configuration

The following table describes the items in the previous figure.

Item	Description
Routing Mode	The administrative mode of routing on the device. The options are as follows: ■ Enable: The device can act as a Layer 3 device by routing packets between interfaces configured for IP routing. ■ Disable: The device acts as a Layer 2 bridge and switches traffic between interfaces. The device does not perform any internetwork routing.
ICMP Echo Replies	Select this option to allow the device to send ICMP Echo Reply messages in response to ICMP Echo Request (ping) messages it receives.
ICMP Redirects	Select this option to allow the device to send ICMP Redirect messages to hosts. An ICMP Redirect message notifies a host when a better route to a particular destination is available on the network segment.
ICMP Rate Limit Interval	The maximum burst interval for ICMP error messages transmitted by the device. The rate limit for ICMP error messages is configured as a token bucket. The ICMP Rate Limit Interval specifies how often the token bucket is initialized with tokens of the size configured in the ICMP Rate Limit Burst Size field.
ICMP Rate Limit Burst Size	The number of ICMP error messages that can be sent during the burst interval configured in the ICMP Rate Limit Interval field.
Static Route Preference	The default distance (preference) for static routes. Lower route-distance values are preferred when determining the best route. The value configured for Static Route Preference is used when using the CLI to configure a static route and no preference is specified. Changing the Static Route Preference does not update the preference of existing static routes.
Local Route Preference	The default distance (preference) for local routes.
Maximum Next Hops	The maximum number of hops the device supports.
Maximum Routes	The maximum number of routes that can exist in the routing table.
Global Default Gateway	The IP address of the default gateway for the device. If the destination IP address in a packet does not match any routes in the routing table, the packet is sent to the default gateway. The gateway specified in this field is more preferred than a default gateway learned from a DHCP server. Use the icons associated with this field to perform the following tasks: ■ To configure the default gateway, click  button and specify the IP address of the default gateway in the available field. ■ To reset the IP address of the default gateway to the factory default value, click  button associated with this field.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.5.2.2 Interface Summary

The Routing IP Interface Summary page shows summary information about the routing configuration for all interfaces.

To access this page, click **Routing** > **IP** > **Interface Summary**.

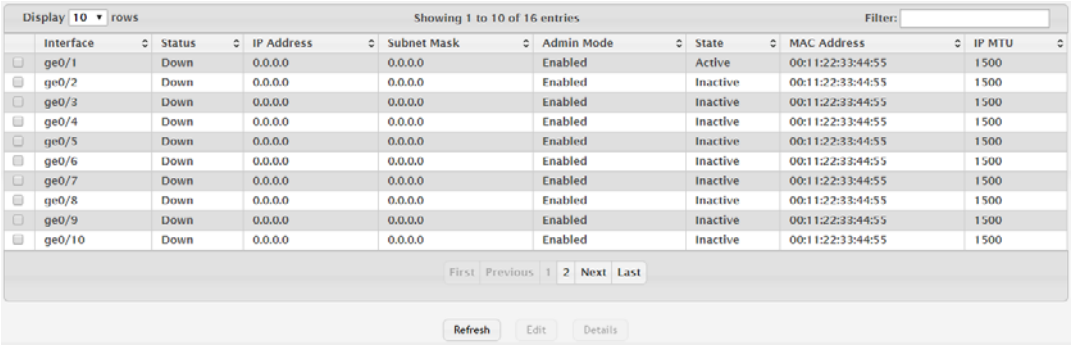


Figure 4.276 Routing > IP > Interface Summary

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When viewing details about the routing settings for an interface, this field identifies the interface being viewed.
Status	Indicates whether the interface is capable of routing IP packets (Up) or cannot route packets (Down). For the status to be Up, the routing mode and administrative mode for the interface must be enabled. Additionally, the interface must have an IP address and be physically up (active link).
IP Address	The IP address of the interface.
Subnet Mask	The IP subnet mask for the interface (also known as the network mask or netmask). It defines the portion of the interface's IP address that is used to identify the attached network.
Admin Mode	The administrative mode of the interface, which is either Enabled or Disabled.
State	The state of the interface, which is either Active or Inactive. An interface is considered active if the link is up, and the interface is in a forwarding state.
MAC Address	The burned-in physical address of the interface. The format is six two-digit hexadecimal numbers separated by colons, for example 00:06:29:32:81:40.
IP MTU	The largest IP packet size the interface can transmit, in bytes. The IP Maximum Transmission Unit (MTU) is the maximum frame size minus the length of the Layer 2 header.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.
Details	Click **Details** to open a window and display additional information.

4.5.2.3 Interface Configuration

Use the Routing IP Interface Configuration page to configure the IP routing settings for each non-loopback interface.

To access this page, click **Routing** > **IP** > **Interface Configuration**.

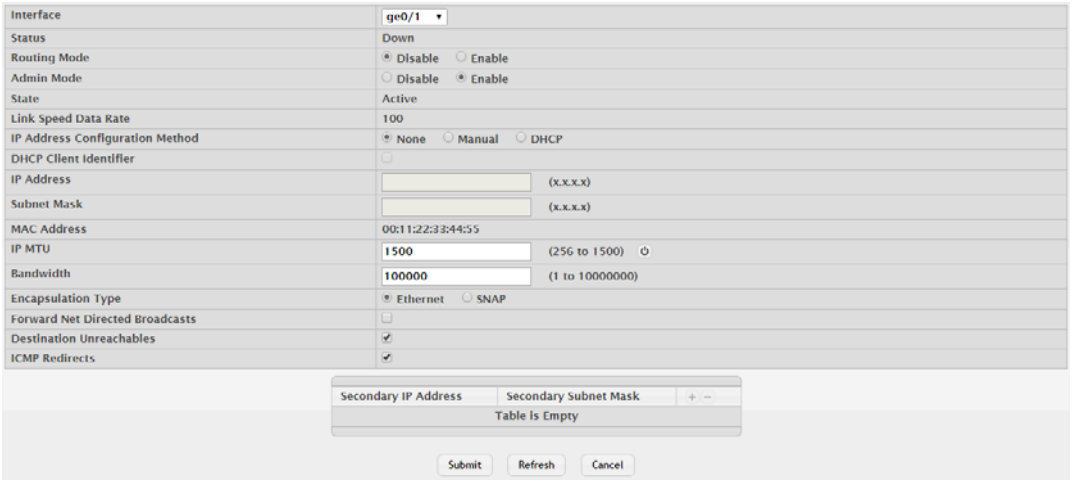


Figure 4.277 Routing > IP > Interface Configuration

The following table describes the items in the previous figure.

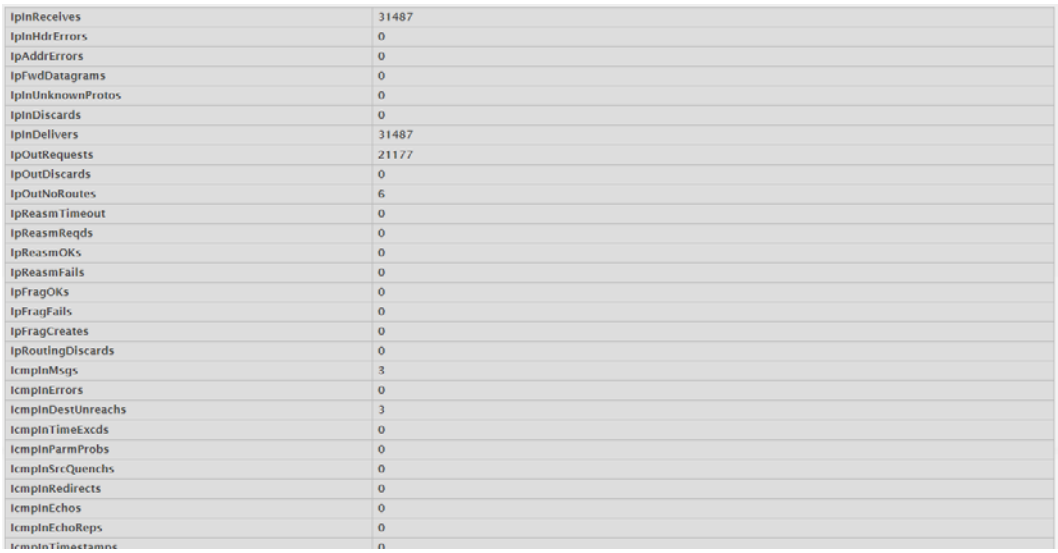
Item	Description
Interface	The menu contains all non-loopback interfaces that can be configured for routing. To configure routing settings for an interface, select it from the menu and then configure the rest of the settings on the page.
Status	Indicates whether the interface is currently capable of routing IP packets (Up) or cannot route packets (Down). For the status to be Up, the routing mode and administrative mode for the interface must be enabled. Additionally, the interface must have an IP address and be physically up (active link).
Routing Mode	The administrative mode of IP routing on the interface.
Admin Mode	The administrative mode of the interface. If an interface is administratively disabled, it cannot forward traffic.
State	The state of the interface, which is either Active or Inactive. An interface is considered active if the link is up, and the interface is in a forwarding state.
Link Speed Data Rate	The physical link data rate of the interface.
IP Address Configuration Method	The method to use for configuring an IP address on the interface, which can be one of the following: ■ None: No address is to be configured. ■ Manual: The address is to be statically configured. When this option is selected you can specify the IP address and subnet mask in the available fields. ■ DHCP: The interface will attempt to acquire an IP address from a network DHCP server.
DHCP Client Identifier	The DHCP Client Identifier (Option 61) is used by DHCP clients to specify their unique identifier. DHCP servers use this value to index their database of address bindings. This value is expected to be unique for all clients in an administrative domain. The Client Identifier string will be displayed beside the check box once DHCP is enabled on the port on which the Client Identifier option is selected. This web page will need to be refreshed once this change is made.

Item	Description
IP Address	The IP address of the interface. This field can be configured only when the selected IP Address Configuration Method is Manual. If the method is DHCP, the interface attempts to lease an IP address from a DHCP server on the network, and the IP address appears in this field (read-only) after it is acquired. If this field is blank, the IP Address Configuration Method might be None, or the method might be DHCP and the interface is unable to lease an address.
Subnet Mask	The IP subnet mask for the interface (also known as the network mask or netmask). This field can be configured only when the selected IP Address Configuration Method is Manual.
MAC Address	The burned-in physical address of the interface. The format is six two-digit hexadecimal numbers separated by colons, for example 00:06:29:32:81:40.
IP MTU	The largest IP packet size the interface can transmit, in bytes. The IP Maximum Transmission Unit (MTU) is the maximum frame size minus the length of the Layer 2 header.
Bandwidth	The configured bandwidth on this interface. This setting communicates the speed of the interface to higher-level protocols.
Encapsulation Type	The link layer encapsulation type for packets transmitted from the interface, which can be either Ethernet or SNAP.
Forward Net Directed Broadcasts	Determines how the interface handles network-directed broadcast packets. A network-directed broadcast is a broadcast directed to a specific subnet. If this option is selected, network directed broadcasts are forwarded. If this option is clear, network directed broadcasts are dropped.
Destination Unreachables	When this option is selected, the interface is allowed to send ICMP Destination Unreachable message to a host if the intended destination cannot be reached for some reason. If this option is clear, the interface will not send ICMP Destination Unreachable messages to inform the host about the error in reaching the intended destination.
ICMP Redirects	When this option is selected, the interface is allowed to send ICMP Redirect messages. The device sends an ICMP Redirect message on an interface only if ICMP Redirects are enabled both globally and on the interface. An ICMP Redirect message notifies a host when a better route to a particular destination is available on the network segment.
Secondary IP Address	To add a secondary IP address on the interface, click + button in the header row and enter the address in the appropriate field in the Secondary IP Address Configuration window. You can add one or more secondary IP addresses to an interface only if the interface already has a primary IP address. To remove a configured secondary IP address, click − button associated with the entry to remove. To remove all configured secondary IP addresses, click − button in the header row.
Secondary Subnet Mask	The subnet mask associated with the secondary IP address. You configure this field in the Secondary IP Address Configuration window.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.5.2.4 Statistics

The Routing IP Statistics page displays information about the number and type of IP packets sent and received by all interfaces on the device. The statistics on this page are specified in RFC 1213.

To access this page, click **Routing** > **IP** > **Statistics**.



IpInReceives	31487
IpInHdrErrors	0
IpAddrErrors	0
IpFwdDatagrams	0
IpInUnknownProtos	0
IpInDiscards	0
IpInDelivers	31487
IpOutRequests	21177
IpOutDiscards	0
IpOutNoRoutes	6
IpReasmTimeout	0
IpReasmReqds	0
IpReasmOKs	0
IpReasmFails	0
IpFragOKs	0
IpFragFails	0
IpFragCreates	0
IpRoutingDiscards	0
IcmpInMsgs	3
IcmpInErrors	0
IcmpInDestUnreachs	3
IcmpInTimeExcds	0
IcmpInParmProbs	0
IcmpInSrcQuenchs	0
IcmpInRedirects	0
IcmpInEchos	0
IcmpInEchoReps	0
IcmpInTimestamps	0

Figure 4.278 Routing > IP > Statistics

The following table describes the items in the previous figure.

Item	Description
IpInReceives	The total number of input datagrams received from all routing interfaces, including those datagrams received in error.
IpInHdrErrors	The number of input datagrams discarded due to errors in their IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, errors discovered in processing their IP options, etc.
IpAddrErrors	The number of input datagrams discarded because the IP address in their IP header's destination field was not a valid address to be received at this entity. This count includes invalid addresses (e.g., 0.0.0.0) and addresses of unsupported classes (e.g., Class E). For entities which are not IP gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address was not a local address.
IpFwdDatagrams	The number of input datagrams for which this entity was not their final IP destination, as a result of which an attempt was made to find a route to forward them to that final destination. In entities which do not act as IP gateways, this counter will include only those packets which were Source-Routed via this entity, and the Source-Route option processing was successful.
IpInUnknownProtos	The number of locally-addressed datagrams received successfully but discarded because of an unknown or unsupported protocol.
IpInDiscards	The number of input IP datagrams for which no problems were encountered to prevent their continued processing, but which were discarded (e.g., for lack of buffer space). Note that this counter does not include any datagrams discarded while awaiting reassembly.
IpInDelivers	The total number of input datagrams successfully delivered to IP user-protocols (including ICMP).
IpOutRequests	The total number of IP datagrams which local IP user-protocols (including ICMP) supplied to IP in requests for transmission. Note that this counter does not include any datagrams counted in ipForwDatagrams.

Item	Description
IpOutDiscards	The number of output IP datagrams for which no problem was encountered to prevent their transmission to their destination, but which were discarded (e.g., for lack of buffer space). Note that this counter would include datagrams counted in ipForwDatagrams if any such packets met this (discretionary) discard criterion.
IpOutNoRoutes	The number of IP datagrams discarded because no route could be found to transmit them to their destination. Note that this counter includes any packets counted in ipForwDatagrams which meet this no-route criterion. Note that this includes any datagrams which a host cannot route because all of its default gateways are down.
IpReasmTimeout	The maximum number of seconds which received fragments are held while they are awaiting reassembly at this entity.
IpReasmReqds	The number of IP fragments received which needed to be reassembled at this entity.
IpReasmOKs	The number of IP datagrams successfully reassembled.
IpReasmFails	The number of failures detected by the IP reassembly algorithm (for whatever reason: timed out, errors, etc). Note that this is not necessarily a count of discarded IP fragments since some algorithms can lose track of the number of fragments by combining them as they are received.
IpFragOKs	The number of IP datagrams that have been successfully fragmented at this entity.
IpFragFails	The number of IP datagrams that have been discarded because they needed to be fragmented at this entity but could not be, e.g., because their Don't Fragment flag was set.
IpFragCreates	The number of IP datagram fragments that have been generated as a result of fragmentation at this entity.
IpRoutingDiscards	The number of routing entries which were chosen to be discarded even though they are valid. One possible reason for discarding such an entry could be to free-up buffer space for other routing entries.
IcmpInMsgs	The total number of ICMP messages which the entity received. Note that this counter includes all those counted by icmpInErrors.
IcmpInErrors	The number of ICMP messages which the entity received but determined as having ICMP-specific errors (bad ICMP checksums, bad length, etc.).
IcmpInDestUnreachs	The number of ICMP Destination Unreachable messages received.
IcmpInTimeExcds	The number of ICMP Time Exceeded messages received.
IcmpInParmProbs	The number of ICMP Parameter Problem messages received.
IcmpInSrcQuenchs	The number of ICMP Source Quench messages received.
IcmpInRedirects	The number of ICMP Redirect messages received.
IcmpInEchos	The number of ICMP Echo (request) messages received.
IcmpInEchoReps	The number of ICMP Echo Reply messages received.
IcmpInTimestamps	The number of ICMP Timestamp (request) messages received.
IcmpInTimestampReps	The number of ICMP Timestamp Reply messages received.
IcmpInAddrMasks	The number of ICMP Address Mask Request messages received.
IcmpInAddrMaskReps	The number of ICMP Address Mask Reply messages received.
IcmpOutMsgs	The total number of ICMP messages which this entity attempted to send. Note that this counter includes all those counted by icmpOutErrors.

Item	Description
IcmpOutErrors	The number of ICMP messages which this entity did not send due to problems discovered within ICMP, such as a lack of buffers. This value should not include errors discovered outside the ICMP layer such as the inability of IP to route the resultant datagram. In some implementations there may be no type of error that contributes to this counter's value.
IcmpOutDestUnreachs	The number of ICMP Destination Unreachable messages sent.
IcmpOutTimeExcds	The number of ICMP Time Exceeded messages sent.
IcmpOutParmProbs	The number of ICMP Parameter Problem messages sent.
IcmpOutSrcQuenchs	The number of ICMP Source Quench messages sent.
IcmpOutRedirects	The number of ICMP Redirect messages sent. For a host, this object will always be zero, since hosts do not send redirects.
IcmpOutEchos	The number of ICMP Echo (request) messages sent.
IcmpOutEchoReps	The number of ICMP Echo Reply messages sent.
IcmpOutTimestamps	The number of ICMP Timestamp (request) messages.
IcmpOutTimestampReps	The number of ICMP Timestamp Reply messages sent.
IcmpOutAddrMasks	The number of ICMP Address Mask Request messages sent.
Refresh	Click **Refresh** to update the screen.

4.5.3 Router

4.5.3.1 Route Table

The Route Table Summary page collects routes from multiple sources: static routes and local routes. The route table manager may learn multiple routes to the same destination from multiple sources. The route table lists all routes. The best routes table displays only the most preferred route to each destination.

To access this page, click **Routing** > **Router** > **Route Table**.

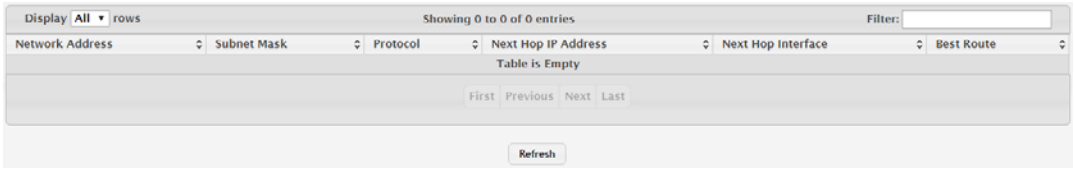


Figure 4.279 Routing > Router > Route Table

The following table describes the items in the previous figure.

Item	Description
Network Address	The IP route prefix for the destination network.
Subnet Mask	The IP subnet mask (also known as the network mask or netmask) associated with the network address. It defines the portion of the IP address that is used to identify the attached network.
Protocol	Identifies which protocol created the route. A route can be created one of the following ways: ■ Dynamically learned through a supported routing protocol ■ Dynamically learned by being a directly-attached local route ■ Statically configured by an administrator ■ Configured as a default route by an administrator

Item	Description
Next Hop IP Address	The outgoing router IP address to use when forwarding traffic to the next router (if any) in the path towards the destination. The next router is always one of the adjacent neighbors or the IP address of the local interface for a directly-attached network.
Next Hop Interface	The outgoing interface to use when forwarding traffic to the destination. For a static reject route, the next hop is Null.
Best Route	Indicates whether the route is the preferred route to the network. If the field is blank, a better route to the same network exists in the routing table.
Refresh	Click **Refresh** to update the screen.

4.5.3.2 Configured Routes

Use the Configured Route Summary page to create and display static routes.

To access this page, click **Routing** > **Router** > **Configured Routes**.

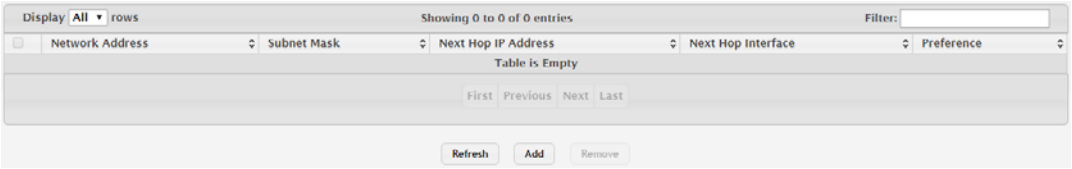


Figure 4.280 Routing > Router > Configured Routes

The following table describes the items in the previous figure.

Item	Description
Network Address	The IP route prefix for the destination network. This IP address must contain only the network portion of the address and not the host bits. When adding a default route, this field is not available.
Subnet Mask	The IP subnet mask (also known as the network mask or netmask) associated with the network address. The subnet mask defines which portion of an IP address belongs to the network prefix, and which portion belongs to the host identifier. When adding a default route, this field is not available.
Next Hop IP Address	The outgoing router IP address to use when forwarding traffic to the next router (if any) in the path towards the destination. The next router is always one of the adjacent neighbors or the IP address of the local interface for a directly-attached network. When adding a static reject route, this field is not available because the packets are dropped rather than forwarded.
Next Hop Interface	The outgoing interface to use when forwarding traffic to the destination. For a static reject route, the next hop is Null.
Preference	The preference of the route. A lower preference value indicates a more preferred route. When the routing table has more than one route to the same network, the device selects the route with the best (lowest) route preference.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new route.
Remove	Click **Remove** to remove the selected entries.

To add a new route:

Click **Routing** > **Router** > **Configured Routes** > **Add**.

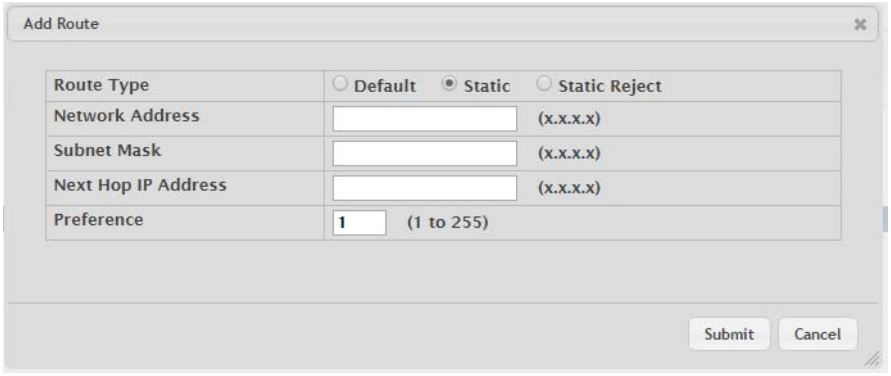


Figure 4.281 Routing > Router > Configured Routes > Add

The following table describes the items in the previous figure.

Item	Description
Route Type	The type of route to configure, which is one of the following: ■ Default: The route the device uses to send a packet if the routing table does not contain a longer matching prefix for the packet's destination. The routing table can contain only one default route. ■ Static: A route that is manually added to the routing table by an administrator. ■ Static Reject: A route where packets that match the route are discarded instead of forwarded. The device might send an ICMP Destination Unreachable message.
Network Address	The IP route prefix for the destination network. This IP address must contain only the network portion of the address and not the host bits. When adding a default route, this field is not available.
Subnet Mask	The IP subnet mask (also known as the network mask or netmask) associated with the network address. The subnet mask defines which portion of an IP address belongs to the network prefix, and which portion belongs to the host identifier. When adding a default route, this field is not available.
Next Hop IP Address	The outgoing router IP address to use when forwarding traffic to the next router (if any) in the path towards the destination. The next router is always one of the adjacent neighbors or the IP address of the local interface for a directly-attached network. When adding a static reject route, this field is not available because the packets are dropped rather than forwarded.
Preference	The preference of the route. A lower preference value indicates a more preferred route. When the routing table has more than one route to the same network, the device selects the route with the best (lowest) route preference.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.5.3.3 Summary

Use the IP Route Summary page to view the statistics of static routes.

To access this page, click **Routing** > **Router** > **Summary**.

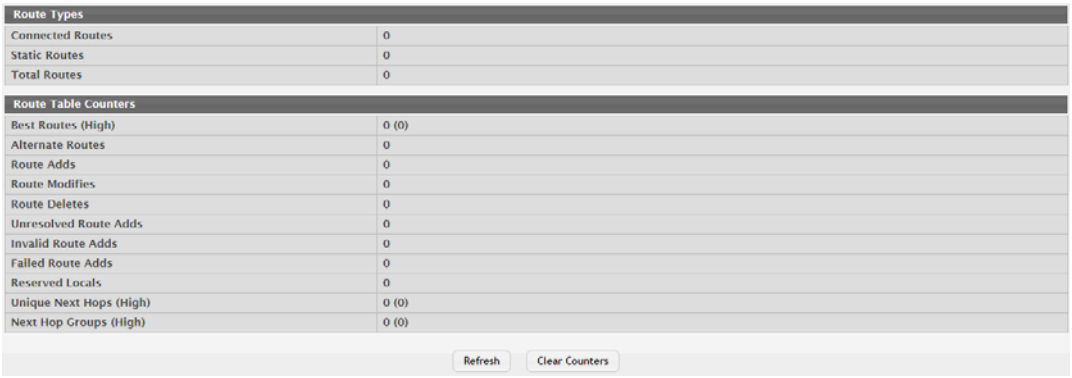


Figure 4.282 Routing > Router > Summary

The following table describes the items in the previous figure.

Item	Description
Route Types	
Connected Routes	The total number of connected routes in the IP routing table.
Static Routes	The total number of static routes in the IP routing table.
Total Routes	The total number of routes in the routing table.
Route Table Counters	
Best Routes (High)	The number of best routes currently in the routing table. This number only counts the best route to each destination.
Alternate Routes	The number of alternate routes currently in the routing table. An alternate route is a route that was not selected as the best route to its destination.
Route Adds	The number of routes that have been added to the routing table.
Route Modifies	The number of routes that have been changed after they were initially added to the routing table.
Route Deletes	The number of routes that have been deleted from the routing table.
Unresolved Route Adds	The number of route adds that failed because none of the route's next hops were on a local subnet. Note that static routes can fail to be added to the routing table at startup because the routing interfaces are not yet up. This counter gets incremented in this case. The static routes are added to the routing table when the routing interfaces come up.
Invalid Route Adds	The number of routes that failed to be added to the routing table because the route was invalid. A log message is written for each of these failures.
Failed Route Adds	The number of routes that failed to be added to the routing table because of a resource limitation in the routing table.
Reserved Locals	The number of routing table entries reserved for a local subnet on a routing interface that is down. Space for local routes is always reserved so that local routes can be installed when a routing interface bounces.
Unique Next Hops (High)	The number of distinct next hops used among all routes currently in the routing table. These include local interfaces for local routes and neighbors for indirect routes.
Next Hop Groups (High)	The current number of next hop groups in use by one or more routes. Each next hop group includes one or more next hops.
Refresh	Click **Refresh** to update the screen.
Clear Counters	Click **Clear Counters** to reset all counters to zero.

4.6 Security

4.6.1 Port Access Control

In port-based authentication mode, when 802.1x is enabled globally and on the port, successful authentication of any one supplicant attached to the port results in all users being able to use the port without restrictions. At any given time, only one supplicant is allowed to attempt authentication on a port in this mode. Ports in this mode are under bidirectional control. This is the default authentication mode.

The 802.1X network has three components:

- Authenticators: Specifies the port that is authenticated before permitting system access.
- Supplicants: Specifies host connected to the authenticated port requesting access to the system services.
- Authentication Server: Specifies the external server, for example, the RADIUS server that performs the authentication on behalf of the authenticator, and indicates whether the user is authorized to access system services.

The Port Access Control folder contains links to the following pages that allow you to view and configure 802.1X features on the system.

4.6.1.1 Configuration

Use the Port Access Control Configuration page to enable or disable port access control on the system.

To access this page, click **Security** > **Port Access Control** > **Configuration**.

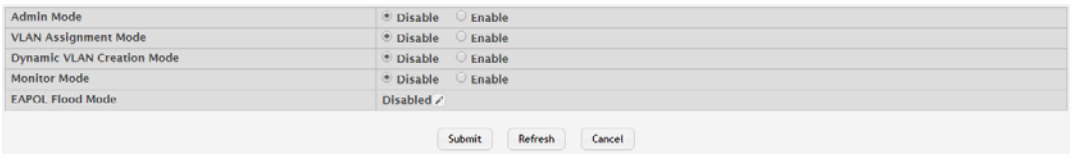


Figure 4.283 Security > Port Access Control > Configuration

The following table describes the items in the previous figure.

Item	Description
Admin Mode	The administrative mode of port-based authentication on the device.
VLAN Assignment Mode	The administrative mode of RADIUS-based VLAN assignment on the device. When enabled, this feature allows a port to be placed into a particular VLAN based on the result of the authentication or type of 802.1X authentication a client uses when it accesses the device. The authentication server can provide information to the device about which VLAN to assign the supplicant.
Dynamic VLAN Creation Mode	The administrative mode of dynamic VLAN creation on the device. If RADIUS-assigned VLANs are enabled, the RADIUS server is expected to include the VLAN ID in the 802.1X tunnel attributes of its response message to the device. If dynamic VLAN creation is enabled on the device and the RADIUS-assigned VLAN does not exist, then the assigned VLAN is dynamically created. This implies that the client can connect from any port and can get assigned to the appropriate VLAN. This feature gives flexibility for clients to move around the network without much additional configuration required.

Item	Description
Monitor Mode	The administrative mode of the Monitor Mode feature on the device. Monitor mode is a special mode that can be enabled in conjunction with port-based access control. Monitor mode provides a way for network administrators to identify possible issues with the port-based access control configuration on the device without affecting the network access to the users of the device. It allows network access even in cases where there is a failure to authenticate, but it logs the results of the authentication process for diagnostic purposes. If the device fails to authenticate a client for any reason (for example, RADIUS access reject from the RADIUS server, RADIUS timeout, or the client itself is 802.1X unaware), the client is authenticated and is undisturbed by the failure condition(s). The reasons for failure are logged and buffered into the local logging database for tracking purposes.
EAPOL Flood Mode	The administrative mode of the Extensible Authentication Protocol (EAP) over LAN (EAPOL) flood support on the device. EAPOL Flood Mode can be enabled when Admin Mode and Monitor Mode are disabled.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.6.1.2 Port Summary

Use the Port Access Control Port Summary page to view summary information about the port-based authentication settings for each port.

To access this page, click **Security** > **Port Access Control** > **Port Summary**.

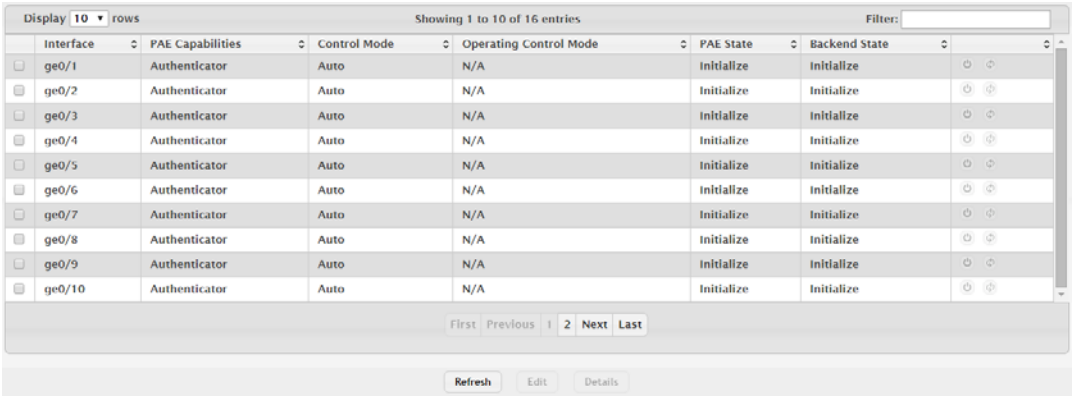


Figure 4.284 Security > Port Access Control > Port Summary

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row.
PAE Capabilities	The Port Access Entity (PAE) role, which is one of the following: ■ Authenticator: The port enforces authentication and passes authentication information from a remote supplicant (similar to a client or host) to the authentication server. If the server successfully authenticates the supplicant, the port allows access. ■ Supplicant: The port must be granted permission by the authentication server before it can access the remote authenticator port.

Item	Description
Control Mode	The port-based access control mode configured on the port, which is one of the following: ■ Auto: The port is unauthorized until a successful authentication exchange has taken place. ■ Force Unauthorized: The port ignores supplicant authentication attempts and does not provide authentication services to the client. ■ Force Authorized: The port sends and receives normal traffic without client port-based authentication. ■ MAC-Based: This mode allows multiple supplicants connected to the same port to each authenticate individually. Each host connected to the port must authenticate separately in order to gain access to the network. The hosts are distinguished by their MAC addresses.
Operating Control Mode	The control mode under which the port is actually operating, which is one of the following: ■ Auto ■ Force Unauthorized ■ Force Authorized ■ MAC-Based ■ N/A If the mode is N/A, port-based access control is not applicable to the port. If the port is in detached state it cannot participate in port access control. Additionally, if port-based access control is globally disabled, the status for all ports is N/A.
PAE State	The current state of the authenticator PAE state machine, which is the 802.1X process that controls access to the port. The state can be one of the following: ■ Initialize ■ Disconnected ■ Connecting ■ Authenticating ■ Authenticated ■ Aborting ■ Held ■ ForceAuthorized ■ ForceUnauthorized
Backend State	The current state of the backend authentication state machine, which is the 802.1X process that controls the interaction between the 802.1X client on the local system and the remote authentication server. The state can be one of the following: ■ Request ■ Response ■ Success ■ Fail ■ Timeout ■ Initialize ■ Idle
	Initialize
	Re-Authenticate
Refresh	Click **Refresh** to update the screen.

Item	Description
Edit	Click **Edit** to edit the selected entries.
Details	Click **Details** to open a window and display additional information.

4.6.1.3 Port Configuration

Use the Port Access Control Port Configuration page to enable and configure port access control on one or more ports.

To access this page, click **Security** > **Port Access Control** > **Port Configuration**.

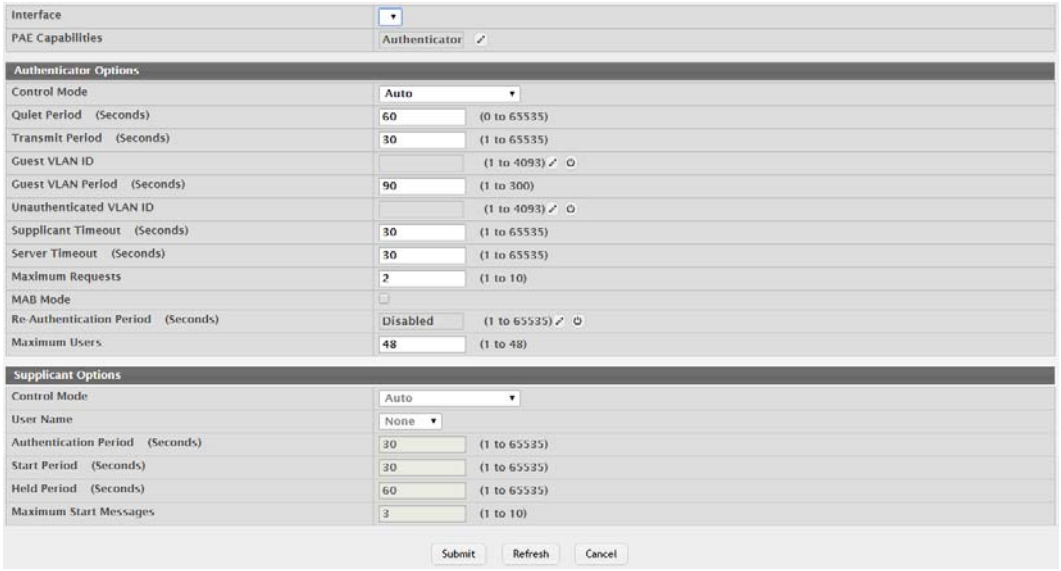


Figure 4.285 Security > Port Access Control > Port Configuration

The following table describes the items in the previous figure.

Item	Description
Interface	The interface with the settings to view or configure. If you have been redirected to this page, this field is read-only and displays the interface that was selected on the Port Access Control Port Summary page.
PAE Capabilities	The Port Access Entity (PAE) role, which is one of the following: ■ Authenticator: The port enforces authentication and passes authentication information from a remote supplicant (client or host) to the authentication server. If the server successfully authenticates the supplicant, the port allows access. ■ Supplicant: The port is connected to an authenticator port and must be granted permission by the authentication server before it can send and receive traffic through the remote port. To change the PAE capabilities of a port, click the Edit icon associated with the field and select the desired setting from the menu in the Set PAE Capabilities window.

Item	Description
Authenticator Options	
Control Mode	The port-based access control mode on the port, which is one of the following: ■ Auto: The port is unauthorized until a successful authentication exchange has taken place. ■ Force Unauthorized: The port ignores supplicant authentication attempts and does not provide authentication services to the client. ■ Force Authorized: The port sends and receives normal traffic without client port-based authentication. ■ MAC-Based: This mode allows multiple supplicants connected to the same port to each authenticate individually. Each host connected to the port must authenticate separately in order to gain access to the network. The hosts are distinguished by their MAC addresses.
Quiet Period (Seconds)	The number of seconds that the port remains in the quiet state following a failed authentication exchange.
Transmit Period (Seconds)	The value, in seconds, of the timer used by the authenticator state machine on the port to determine when to send an EAPOL EAP Request/Identity frame to the supplicant.
Guest VLAN ID	The VLAN ID for the guest VLAN. The guest VLAN allows the port to provide a distinguished service to unauthenticated users. This feature provides a mechanism to allow users access to hosts on the guest VLAN. To set the guest VLAN ID, click the Edit icon associated with the field and specify the ID value in the available field. To reset the guest VLAN ID to the default value, click the Reset icon associated with the field and confirm the action.
Guest VLAN Period (Seconds)	The value, in seconds, of the timer used for guest VLAN authentication.
Unauthenticated VLAN ID	The VLAN ID of the unauthenticated VLAN. Hosts that fail the authentication might be denied access to the network or placed on a VLAN created for unauthenticated clients. This VLAN might be configured with limited network access. To set the unauthenticated VLAN ID, click the Edit icon associated with the field and specify the ID value in the available field. To reset the unauthenticated VLAN ID to the default value, click the Reset icon associated with the field and confirm the action.
Supplicant Timeout (Seconds)	The amount of time that the port waits for a response before retransmitting an EAP request frame to the client.
Server Timeout (Seconds)	The amount of time the port waits for a response from the authentication server.
Maximum Requests	The maximum number of times that the port sends an EAP request frame (assuming that no response is received) to the client before restarting the authentication process.
MAB Mode	The MAC-based Authentication Bypass (MAB) mode on the port, which can be enabled or disabled.
Re-Authentication Period (Seconds)	The amount of time that clients can be connected to the port without being reauthenticated. If this field is disabled, connected clients are not forced to reauthenicate periodically. To change the value, click the Edit icon associated with the field and specify a value in the available field. To reset the reauthentication period to the default value, click the Reset icon associated with the field and confirm the action.
Maximum Users	The maximum number of clients supported on the port if the Control Mode on the port is MAC-based 802.1X authentication.

Item	Description
Supplicant Options	
Control Mode	The port-based access control mode on the port, which is one of the following: ■ Auto: The port is in an unauthorized state until a successful authentication exchange has taken place between the supplicant port, the authenticator port, and the authentication server. ■ Force Unauthorized: The port is placed into an unauthorized state and is automatically denied system access. ■ Force Authorized: The port is placed into an authorized state and does not require client port-based authentication to be able to send and receive traffic.
User Name	The name the port uses to identify itself as a supplicant to the authenticator port. The menu includes the users that are configured for system management. When authenticating, the supplicant provides the password associated with the selected User Name.
Authentication Period (Seconds)	The amount of time the supplicant port waits to receive a challenge from the authentication server. If the configured Authentication Period expires, the supplicant retransmits the authentication request until it is authenticated or has sent the number of messages configured in the Maximum Start Messages field.
Start Period (Seconds)	The amount of time the supplicant port waits for a response from the authenticator port after sending a Start packet. If no response is received, the supplicant retransmits the Start packet.
Held Period (Seconds)	The amount of time the supplicant port waits before contacting the authenticator port after an active 802.1X session fails.
Maximum Start Messages	The maximum number of Start packets the supplicant port sends to the authenticator port without receiving a response before it considers the authenticator to be 802.1X-unaware.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.6.1.4 Port Details

Use the Port Access Control Port Details page to view 802.1X information for a specific port.

To access this page, click **Security** > **Port Access Control** > **Port Details**.

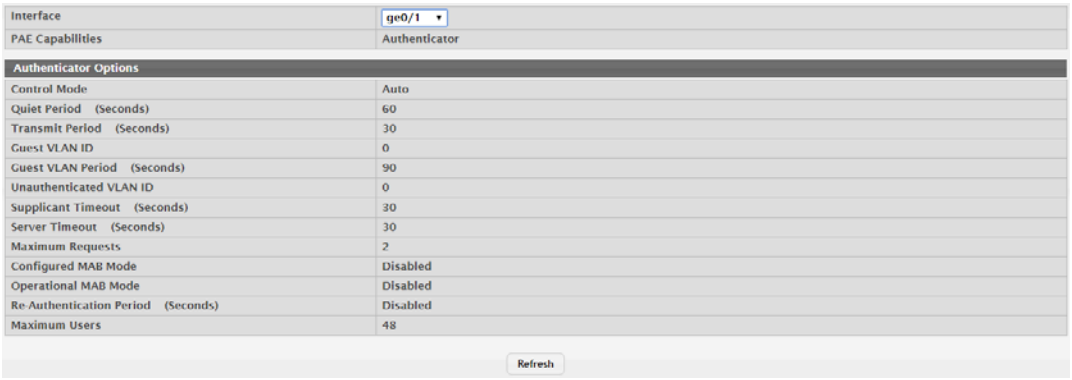


Figure 4.286 Security > Port Access Control > Port Details

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data on the page.

Item	Description
PAE Capabilities	The Port Access Entity (PAE) role, which is one of the following: ■ Authenticator: The port enforces authentication and passes authentication information from a remote supplicant (client or host) to the authentication server. If the server successfully authenticates the supplicant, the port allows access. ■ Supplicant: The port is connected to an authenticator port and must be granted permission by the authentication server before it can send and receive traffic through the remote port.
Authenticator Options	
Control Mode	The port-based access control mode on the port, which is one of the following: ■ Auto: The port is unauthorized until a successful authentication exchange has taken place. ■ Force Unauthorized: The port ignores supplicant authentication attempts and does not provide authentication services to the client. ■ Force Authorized: The port sends and receives normal traffic without client port-based authentication. ■ MAC-Based: This mode allows multiple supplicants connected to the same port to each authenticate individually. Each host connected to the port must authenticate separately in order to gain access to the network. The hosts are distinguished by their MAC addresses.
Quiet Period (Seconds)	The number of seconds that the port remains in the quiet state following a failed authentication exchange.
Transmit Period (Seconds)	The value, in seconds, of the timer used by the authenticator state machine on the port to determine when to send an EAPOL EAP Request/Identity frame to the supplicant.
Guest VLAN ID	The VLAN ID for the guest VLAN. The guest VLAN allows the port to provide a distinguished service to unauthenticated users. This feature provides a mechanism to allow users access to hosts on the guest VLAN.
Guest VLAN Period (Seconds)	The value, in seconds, of the timer used for guest VLAN authentication.
Unauthenticated VLAN ID	The VLAN ID of the unauthenticated VLAN. Hosts that fail the authentication might be denied access to the network or placed on a VLAN created for unauthenticated clients. This VLAN might be configured with limited network access.
Supplicant Timeout (Seconds)	The amount of time that the port waits for a response before retransmitting an EAP request frame to the client.
Server Timeout (Seconds)	The amount of time the port waits for a response from the authentication server.
Maximum Requests	The maximum number of times that the port sends an EAP request frame (assuming that no response is received) to the client before restarting the authentication process.
Configured MAB Mode	The configured MAC-based Authentication Bypass (MAB) mode on the port.
Operational MAB Mode	The operational MAC-based Authentication Bypass (MAB) mode on the port.
Re-Authentication Period (Seconds)	The amount of time that clients can be connected to the port without being reauthenticated. If this field is disabled, connected clients are not forced to reauthenicate periodically.

Item	Description
Maximum Users	The maximum number of clients supported on the port if the Control Mode on the port is MAC-based 802.1X authentication.
Refresh	Click **Refresh** to update the screen.

4.6.1.5 Statistics

Use the Port Access Control Statistics page to view information about the Extensible Authentication Protocol over LAN (EAPOL) frames and EAP messages sent and received by the local interfaces.

To access this page, click **Security** > **Port Access Control** > **Statistics**.

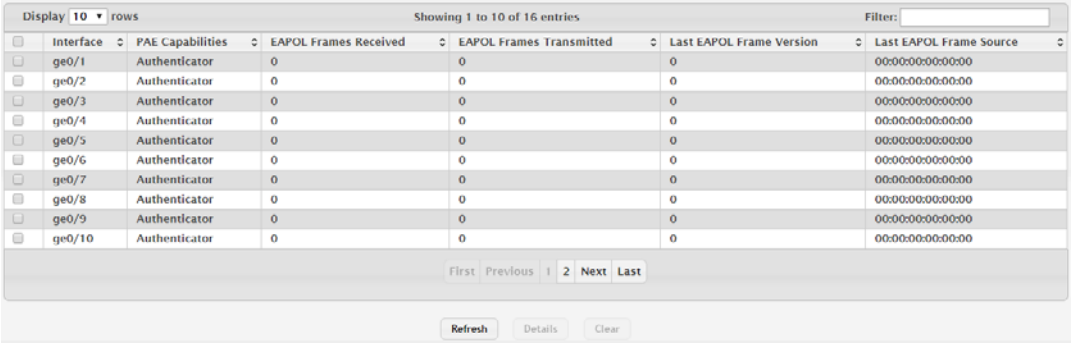


Figure 4.287 Security > Port Access Control > Statistics

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. When viewing detailed information for an interface, this field identifies the interface being viewed.
PAE Capabilities	The Port Access Entity (PAE) role, which is one of the following: ■ Authenticator: The port enforces authentication and passes authentication information from a remote supplicant (similar to a client or host) to the authentication server. If the server successfully authenticates the supplicant, the port allows access. ■ Supplicant: The port must be granted permission by the authentication server before it can access the remote authenticator port.
EAPOL Frames Received	The total number of valid EAPOL frames received on the interface.
EAPOL Frames Transmitted	The total number of EAPOL frames sent by the interface.
Last EAPOL Frame Version	The protocol version number attached to the most recently received EAPOL frame.
Last EAPOL Frame Source	The source MAC address attached to the most recently received EAPOL frame.
Refresh	Click **Refresh** to update the screen.
Details	Click **Details** to open a window and display additional information.
Clear	Click **Clear** to reset all statistics counters to zero.

4.6.1.6 Client Summary

The Port Access Control Client Summary page displays information about supplicant devices that are connected to the local authenticator ports. If there are no active 802.1X sessions, the table is empty.

To access this page, click **Security** > **Port Access Control** > **Client Summary**.

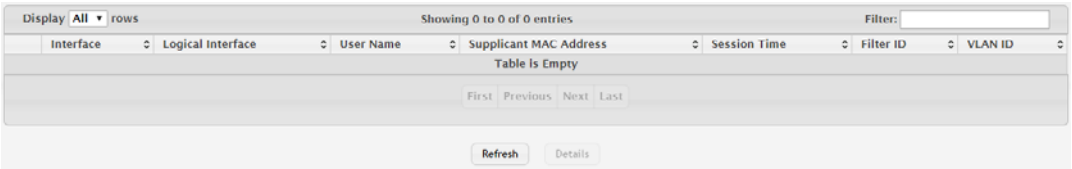


Figure 4.288 Security > Port Access Control > Client Summary

The following table describes the items in the previous figure.

Item	Description
Interface	The local interface associated with the rest of the data in the row. When viewing detailed information for an interface, this field identifies the interface being viewed.
Logical Interface	The logical port number associated with the supplicant that is connected to the port.
User Name	The name the client uses to identify itself as a supplicant to the authentication server.
Supplicant MAC Address	The MAC address of the supplicant that is connected to the port.
Session Time	The amount of time that has passed since the connected supplicant was granted access to the network through the authenticator port.
Filter ID	The policy filter ID assigned by the authenticator to the supplicant device.
VLAN ID	The ID of the VLAN the supplicant was placed in as a result of the authentication process.
Refresh	Click **Refresh** to update the screen.
Details	Click **Details** to open a window and display additional information.

4.6.1.7 Privileges Summary

Use the Port Access Control Privileges Summary page to grant or deny port access to users configured on the system.

To access this page, click **Security** > **Port Access Control** > **Privileges Summary**.

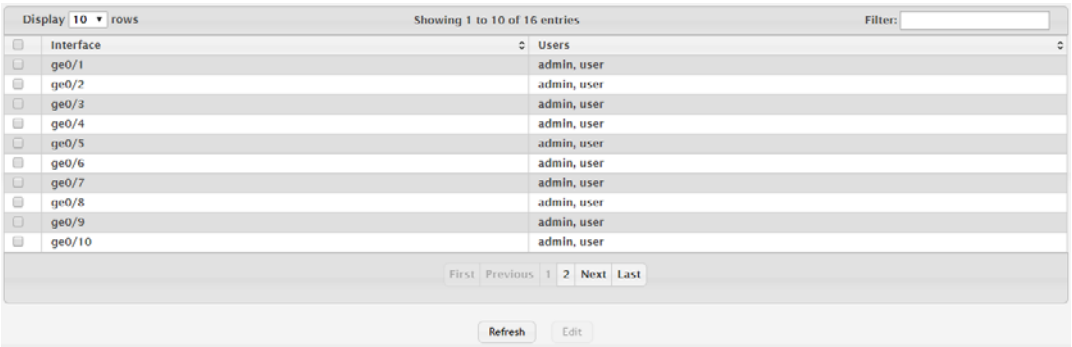


Figure 4.289 Security > Port Access Control > Privileges Summary

The following table describes the items in the previous figure.

Item	Description
Interface	The local interface associated with the rest of the data in the row. When configuring access information for one or more interfaces, this field identifies each interface being configured.

Item	Description
Users	The users that are allowed access to the system through the associated port. When configuring user access for a port, the Available Users field lists the users configured on the system that are denied access to the port. The users in the Selected Users field are allowed access. To move a user from one field to the other, click the user to move (or CTL + click to select multiple users) and click the appropriate arrow.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.

4.6.1.8 History Log Summary

Use the Port Access Control History Log Summary page to grant or deny port access to users configured on the system.

To access this page, click **Security** > **Port Access Control** > **History Log Summary**.

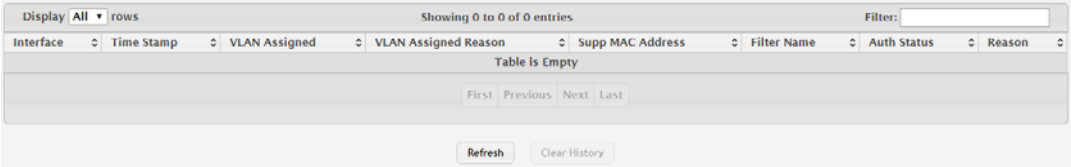


Figure 4.290 Security > Port Access Control > History Log Summary

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. Only interfaces that have entries in the log history are listed.
Time Stamp	The absolute time when the authentication event took place.
VLAN Assigned	The ID of the VLAN the supplicant was placed in as a result of the authentication process.
VLAN Assigned Reason	The reason why the authenticator placed the supplicant in the VLAN. Possible values are: ■ RADIUS ■ Unauth ■ Default ■ Not Assigned
Supp MAC Address	The MAC address of the supplicant that is connected to the port.
Filter Name	The policy filter ID assigned by the authenticator to the supplicant device.
Auth Status	The authentication status of the client or port.
Reason	The reason for the successful or unsuccessful authentication.
Refresh	Click **Refresh** to update the screen.
Clear History	Click **Clear History** to clear the history logs.

4.6.2 RADIUS

Remote Authorization Dial-In User Service (RADIUS) servers provide additional security for networks. The RADIUS server maintains a user database, which contains per-user authentication information. RADIUS servers provide a centralized authentication method for:

- Telnet Access
- Web Access
- Console to Switch Access

- Port Access Control (802.1X)

4.6.2.1 Configuration

Use the RADIUS Configuration page to view and configure various settings for the RADIUS servers configured on the system.

To access this page, click **Security** > **RADIUS** > **Configuration**.

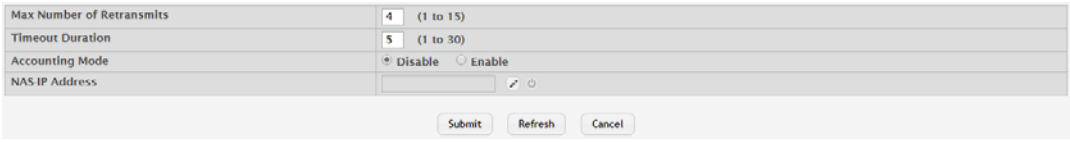


Figure 4.291 Security > RADIUS > Configuration

The following table describes the items in the previous figure.

Item	Description
Max Number of Retransmits	The maximum number of times the RADIUS client on the device will retransmit a request packet to a configured RADIUS server after a response is not received. If multiple RADIUS servers are configured, the max retransmit value will be exhausted on the first server before the next server is attempted. A retransmit will not occur until the configured timeout value on that server has passed without a response from the RADIUS server. Therefore, the maximum delay in receiving a response from the RADIUS server equals the sum of (retransmit - timeout) for all configured servers. If the RADIUS request was generated by a user login attempt, all user interfaces will be blocked until the RADIUS application returns a response.
Timeout Duration	The number of seconds the RADIUS client waits for a response from the RADIUS server. Consideration to maximum delay time should be given when configuring RADIUS timeout and RADIUS max retransmit values.
Accounting Mode	Specifies whether the RADIUS accounting mode on the device is enabled or disabled.
NAS-IP Address	The network access server (NAS) IP address for the RADIUS server. To specify an address, click button and enter the IP address of the NAS in the available field. The address should be unique to the NAS within the scope of the RADIUS server. The NAS IP address is used only in Access-Request packets. To reset the NAS IP address to the default value, click button and confirm the action.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.6.2.2 Named Server

The RADIUS Named Server Status page shows summary information about the RADIUS servers configured on the system.

To access this page, click **Security** > **RADIUS** > **Named Server**.

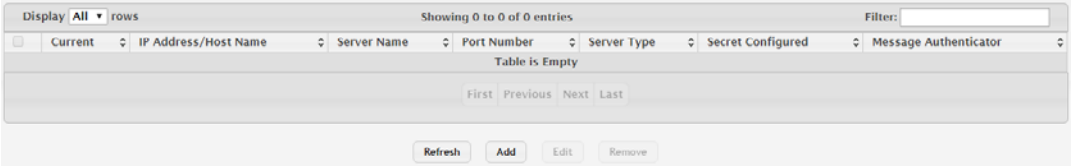


Figure 4.292 Security > RADIUS > Named Server

The following table describes the items in the previous figure.

Item	Description
Current	Indicates whether the RADIUS server is the current server (True) or a backup server (False) within its group. If more than one RADIUS server is configured with the same Server Name, the device selects one of the servers to be the current server in the named server group. When the device sends a RADIUS request to the named server, the request is directed to the server selected as the current server. Initially the primary server is selected as the current server. If the primary server fails, one of the other servers becomes the current server. If no server is configured as the primary server, the current server is the RADIUS server that is added to the group first.
IP Address/Host Name	The IP address or host name of the RADIUS server. Host names must be resolvable by DNS and are composed of a series of labels separated by dots.
Server Name	The name of the RADIUS server. RADIUS authentication servers that are configured with the same name are members of the same named RADIUS server group. RADIUS servers in the same group serve as backups for each other.
Port Number	The UDP port on the RAIDUS authentication server to which the local RADIUS client sends request packets.
Server Type	Indicates whether the server is the Primary or a Secondary RADIUS authentication server. When multiple RADIUS servers have the same Server Name value, the RADIUS client attempts to use the primary server first. If the primary server does not respond, the RADIUS client attempts to use one of the backup servers within the same named server group.
Secret Configured	Indicates whether the shared secret for this server has been configured.
Message Authenticator	Indicates whether the RADIUS server requires the Message Authenticator attribute to be present. The Message Authenticator adds protection to RADIUS messages by using an MD5 hash to encrypt each message. The shared secret is used as the key, and if the message fails to be verified by the RADIUS server, it is discarded.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new RADIUS authentication server.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new RADIUS authentication server:

Click **Security** > **RADIUS** > **Named Server** > **Add**.

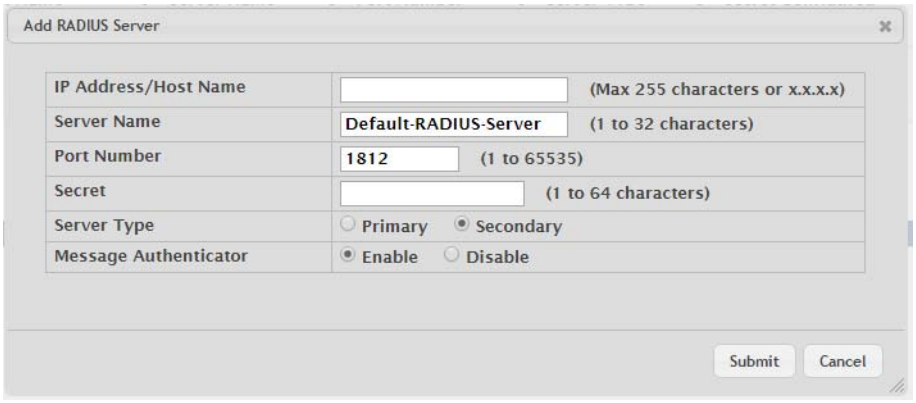


Figure 4.293 Security > RADIUS > Named Server > Add

The following table describes the items in the previous figure.

Item	Description
IP Address/Host Name	The IP address or host name of the RADIUS server. Host names must be resolvable by DNS and are composed of a series of labels separated by dots.
Server Name	The name of the RADIUS server. RADIUS authentication servers that are configured with the same name are members of the same named RADIUS server group. RADIUS servers in the same group serve as backups for each other.
Port Number	The UDP port on the RAIDUS authentication server to which the local RADIUS client sends request packets.
Secret	The shared secret text string used for authenticating and encrypting all RADIUS communications between the RADIUS client on the device and the RADIUS server. The secret specified in this field must match the shared secret configured on the RADIUS server.
Server Type	Indicates whether the server is the Primary or a Secondary RADIUS authentication server. When multiple RADIUS servers have the same Server Name value, the RADIUS client attempts to use the primary server first. If the primary server does not respond, the RADIUS client attempts to use one of the backup servers within the same named server group.
Message Authenticator	Indicates whether the RADIUS server requires the Message Authenticator attribute to be present. The Message Authenticator adds protection to RADIUS messages by using an MD5 hash to encrypt each message. The shared secret is used as the key, and if the message fails to be verified by the RADIUS server, it is discarded.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.6.2.3 Statistics

Use the RADIUS Server Statistics page to view statistical information for each RADIUS server configured on the system.

To access this page, click **Security** > **RADIUS** > **Statistics**.

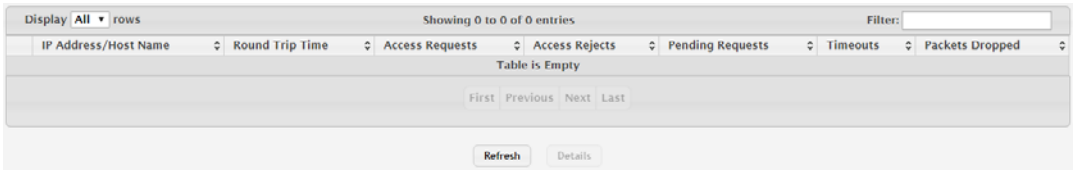


Figure 4.294 Security > RADIUS > Statistics

The following table describes the items in the previous figure.

Item	Description
IP Address/Host Name	The IP address or host name of the RADIUS server associated with the rest of the data in the row. When viewing the detailed statistics for a RADIUS server, this field identifies the RADIUS server.
Round Trip Time	The time interval, in hundredths of a second, between the most recent Access-Reply/Access-Challenge and the Access-Request that matched it from the RADIUS authentication server.
Access Requests	The number of RADIUS Access-Request packets sent to the server. This number does not include retransmissions.
Access Rejects	The number of RADIUS Access-Reject packets, including both valid and invalid packets, that were received from the server.

Item	Description
Pending Requests	The number of RADIUS Access-Request packets destined for the server that have not yet timed out or received a response.
Timeouts	The number of times a response was not received from the server within the configured timeout value.
Packets Dropped	The number of RADIUS packets received from the server on the authentication port and dropped for some other reason.
Refresh	Click **Refresh** to update the screen.
Details	Click **Details** to open a window and display additional information.

4.6.2.4 Accounting Server

The RADIUS Accounting Server Status page shows summary information about the accounting servers configured on the system.

To access this page, click **Security** > **RADIUS** > **Accounting Server**.

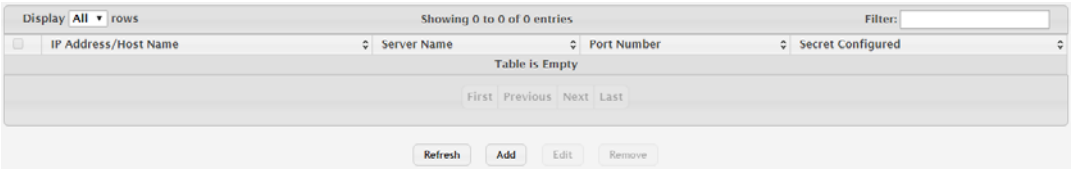


Figure 4.295 Security > RADIUS > Accounting Server

The following table describes the items in the previous figure.

Item	Description
IP Address/Host Name	The IP address or host name of the RADIUS accounting server. Host names must be resolvable by DNS and are composed of a series of labels separated by dots.
Server Name	The name of the RADIUS accounting server. The server name must be unique among all configured RADIUS accounting servers.
Port Number	The UDP port on the RAIDUS accounting server to which the local RADIUS client sends request packets.
Secret Configured	Indicates whether the shared secret for this server has been configured.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new RADIUS accounting server.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new RADIUS accounting server:

Click **Security** > **RADIUS** > **Accounting Server** > **Add**.

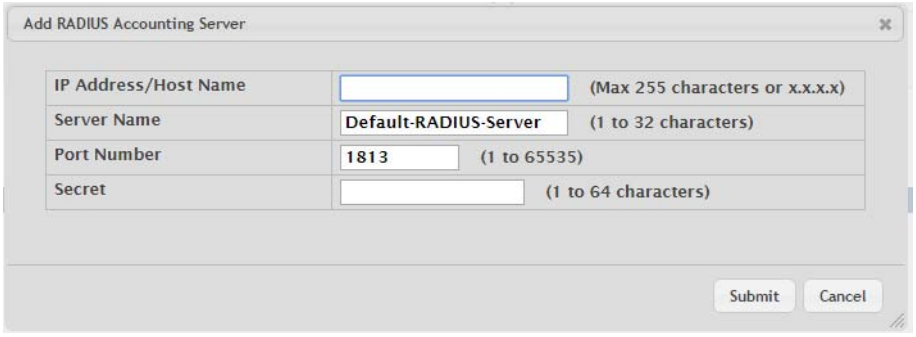


Figure 4.296 Security > RADIUS > Accounting Server > Add

The following table describes the items in the previous figure.

Item	Description
IP Address/Host Name	The IP address or host name of the RADIUS accounting server. Host names must be resolvable by DNS and are composed of a series of labels separated by dots.
Server Name	The name of the RADIUS accounting server. The server name must be unique among all configured RADIUS accounting servers.
Port Number	The UDP port on the RAIDUS accounting server to which the local RADIUS client sends request packets.
Secret	The shared secret text string used for authenticating and encrypting all RADIUS communications between the RADIUS client on the device and the RADIUS accounting server. The secret specified in this field must match the shared secret configured on the RADIUS accounting server.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.6.2.5 Accounting Statistics

Use the RADIUS Accounting Server Statistics page to view statistical information for each RADIUS server configured on the system.

To access this page, click **Security** > **RADIUS** > **Accounting Statistics**.

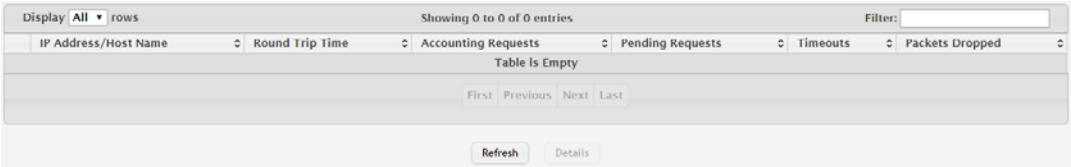


Figure 4.297 Security > RADIUS > Accounting Statistics

The following table describes the items in the previous figure.

Item	Description
IP Address/Host Name	The IP address or host name of the RADIUS accounting server associated with the rest of the data in the row. When viewing the detailed statistics for a RADIUS accounting server, this field identifies the server.
Round Trip Time	The time interval, in hundredths of a second, between the most recent Accounting-Response and the Accounting-Request that matched it from the RADIUS accounting server.
Accounting Requests	The number of RADIUS Accounting-Request packets sent to the server. This number does not include retransmissions.
Pending Requests	The number of RADIUS Accounting-Request packets destined for the server that have not yet timed out or received a response.
Timeouts	The number of times a response was not received from the server within the configured timeout value.
Packets Dropped	The number of RADIUS packets received from the server on the accounting port and dropped for some other reason.
Refresh	Click **Refresh** to update the screen.
Details	Click **Details** to open a window and display additional information.

4.6.2.6 Clear Statistics

Use the RADIUS Clear Statistics page to reset all RADIUS authentication and accounting statistics to zero.

To access this page, click **Security** > **RADIUS** > **Clear Statistics**.

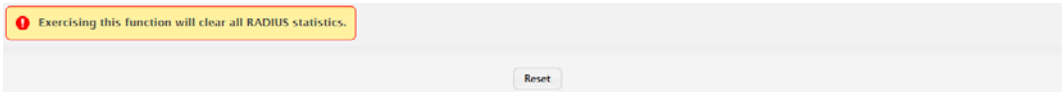


Figure 4.298 Security > RADIUS > Clear Statistics

The following table describes the items in the previous figure.

Item	Description
Reset	Click **Reset** to clear all RADIUS authentication and RAIDUS accounting server statistics.

4.6.2.7 Source Interface Configuration

Use the RADIUS Source Interface Configuration page to specify the physical or logical interface to use as the RADIUS client source interface. When an IP address is configured on the source interface, this address is used for all RADIUS communications between the local RADIUS client and the remote RADIUS server. The IP address of the designated source interface is used in the IP header of RADIUS management protocol packets. This allows security devices, such as firewalls, to identify all source packets coming from a specific device.

To access this page, click **Security** > **RADIUS** > **Source Interface Configuration**.

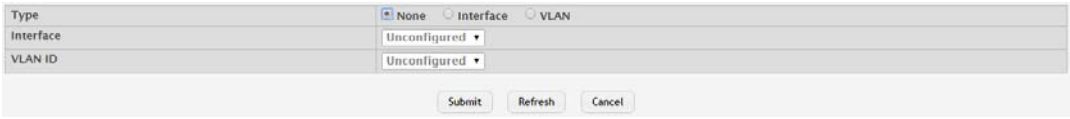


Figure 4.299 Security > RADIUS > Source Interface Configuration

The following table describes the items in the previous figure.

Item	Description
Type	The type of interface to use as the source interface: ■ None: The primary IP address of the originating (outbound) interface is used as the source address. ■ Interface: The primary IP address of a physical port is used as the source address. ■ VLAN: The primary IP address of a VLAN routing interface is used as the source address.
Interface	When the selected Type is Interface, select the physical port to use as the source interface.
VLAN ID	When the selected Type is VLAN, select the VLAN to use as the source interface. The menu contains only the VLAN IDs for VLAN routing interfaces.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.6.3 TACACS+

4.6.3.1 Configuration

Use the TACACS+ Configuration page to setup accounting information and administration control over authentication and authorization between the TACACS+ server and the device.

To access this page, click **Security** > **TACACS+** > **Configuration**.

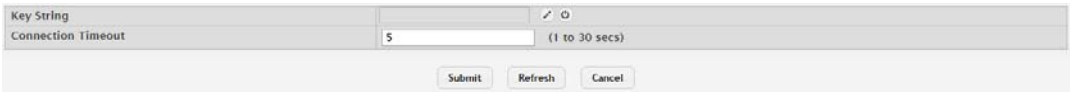


Figure 4.300 Security > TACACS+ > Configuration

The following table describes the items in the previous figure.

Item	Description
Key String	Specifies the authentication and encryption key for TACACS+ communications between the device and the TACACS+ server. The key must match the key configured on the TACACS+ server.
Connection Timeout	The maximum number of seconds allowed to establish a TCP connection between the device and the TACACS+ server.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.6.3.2 Server Summary

Use the TACACS+ Server Summary page to view and configure information about the TACACS+ Server(s).

To access this page, click **Security** > **TACACS+** > **Server Summary**.

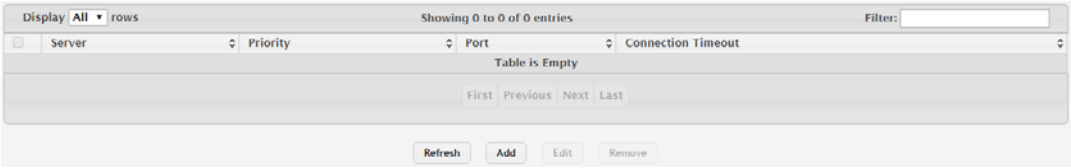


Figure 4.301 Security > TACACS+ > Server Summary

The following table describes the items in the previous figure.

Item	Description
Server	Specifies the TACACS+ Server IP address or Hostname.
Priority	Specifies the order in which the TACACS+ servers are used.
Port	Specifies the authentication port.
Connection Timeout	The amount of time that passes before the connection between the device and the TACACS+ server time out.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new TACACS+ server.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new TACACS+ server:

Click **Security** > **TACACS+** > **Server Summary** > **Add**.

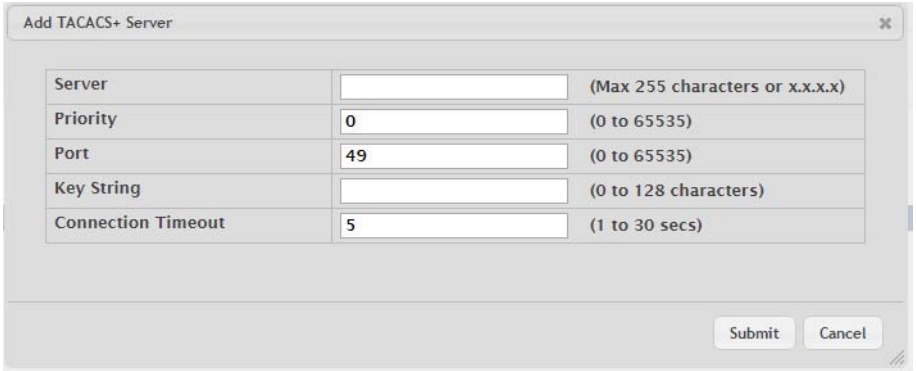


Figure 4.302 Security > TACACS+ > Server Summary > Add

The following table describes the items in the previous figure.

Item	Description
Server	Specifies the TACACS+ Server IP address or Hostname.
Priority	Specifies the order in which the TACACS+ servers are used.
Port	Specifies the authentication port.
Key String	Specifies the authentication and encryption key for TACACS+ communications between the device and the TACACS+ server. The key must match the encryption used on the TACACS+ server.
Connection Timeout	The amount of time that passes before the connection between the device and the TACACS+ server time out.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.6.3.3 Server Configuration

Use the TACACS+ Server Configuration page to view and configure information about the TACACS+ Server(s).

To access this page, click **Security** > **TACACS+** > **Server Configuration**.

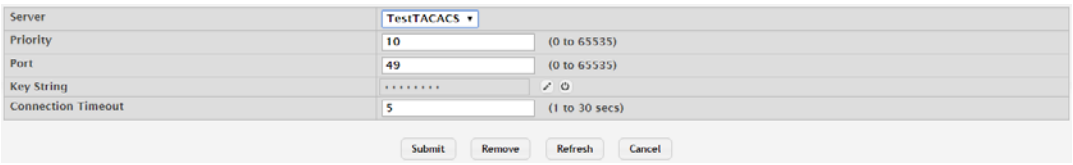


Figure 4.303 Security > TACACS+ > Server Configuration

The following table describes the items in the previous figure.

Item	Description
Server	Specifies the TACACS+ Server IP address or Hostname.
Priority	Specifies the order in which the TACACS+ servers are used.
Port	Specifies the authentication port.
Key String	Specifies the authentication and encryption key for TACACS+ communications between the device and the TACACS+ server. The key must match the encryption used on the TACACS+ server.
Connection Timeout	The amount of time that passes before the connection between the device and the TACACS+ server time out.
Submit	Click **Submit** to save the values and update the screen.
Remove	Click **Remove** to remove the selected entries.

Item	Description
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.6.3.4 Source Interface Configuration

Use the TACACS+ Source Interface Configuration page to specify the physical or logical interface to use as the TACACS+ client source interface. When an IP address is configured on the source interface, this address is used for all TACACS+ communications between the local TACACS+ client and the remote TACACS+ server. The IP address of the designated source interface is used in the IP header of TACACS+ management protocol packets. This allows security devices, such as firewalls, to identify all source packets coming from a specific device.

To access this page, click **Security** > **TACACS+** > **Source Interface Configuration**.

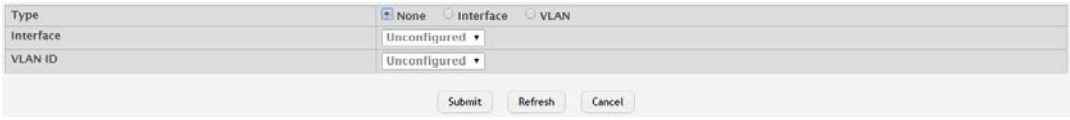


Figure 4.304 Security > TACACS+ > Source Interface Configuration

The following table describes the items in the previous figure.

Item	Description
Type	The type of interface to use as the source interface: ■ None: The primary IP address of the originating (outbound) interface is used as the source address. ■ Interface: The primary IP address of a physical port is used as the source address. ■ VLAN: The primary IP address of a VLAN routing interface is used as the source address.
Interface	When the selected Type is Interface, select the physical port to use as the source interface.
VLAN ID	When the selected Type is VLAN, select the VLAN to use as the source interface. The menu contains only the VLAN IDs for VLAN routing interfaces.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.7 QoS

4.7.1 Access Control Lists

4.7.1.1 Summary

Use the Access Control List Summary page to add and remove Access Control Lists (ACLs). ACLs are used to provide traffic flow control, restrict contents of routing updates, decide which types of traffic are forwarded or blocked, and above all provide security for the network. There are three main steps to configuring an ACL:

1. Create an ACL. (Use the current page.)
2. Add rules to the ACL and configure the rule criteria. (Use the Access Control List Configuration page.)
3. Apply the ACL to one or more interfaces. (Use the Access Control List Interface Summary page.)

To access this page, click **QoS** > **Access Control Lists** > **Summary**.

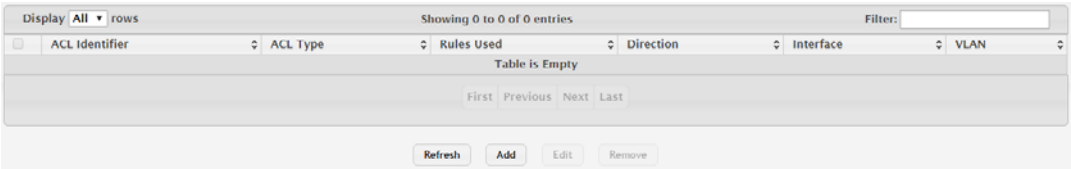


Figure 4.305 QoS > Access Control Lists > Summary

The following table describes the items in the previous figure.

Item	Description
ACL Identifier	The name or number that identifies the ACL. The permitted identifier depends on the ACL type. Standard and Extended IPv4 ACLs use numbers within a set range, and Named IPv4, IPv6, and MAC ACLs use alphanumeric characters. The ID of a Named IPv4 ACL must begin with a letter, and not a number.
ACL Type	The type of ACL. The ACL type determines the criteria that can be used to match packets. The type also determines which attributes can be applied to matching traffic. IPv4 ACLs classify Layer 3 and Layer 4 IPv4 traffic, IPv6 ACLs classify Layer 3 and Layer 4 IPv6 traffic, and MAC ACLs classify Layer 2 traffic. The ACL types are as follows: ■ IPv4 Standard: Match criteria is based on the source address of IPv4 packets. ■ IPv4 Extended: Match criteria can be based on the source and destination addresses, source and destination Layer 4 ports, and protocol type of IPv4 packets. ■ IPv4 Named: Match criteria is the same as IPv4 Extended ACLs, but the ACL ID can be an alphanumeric name instead of a number. ■ IPv6 Named: Match criteria can be based on information including the source and destination IPv6 addresses, source and destination Layer 4 ports, and protocol type within IPv6 packets. ■ Extended MAC: Match criteria can be based on the source and destination MAC addresses, 802.1p user priority, VLAN ID, and EtherType value within Ethernet frames.
Rules Used	The number of rules currently configured for the ACL.
Direction	Indicates whether the packet is checked against the rules in an ACL when it is received on an interface (Inbound) or after it has been received, routed, and is ready to exit an interface (Outbound).
Interface	Each interface to which the ACL has been applied.
VLAN	Each VLAN to which the ACL has been applied.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new ACL.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a new ACL:

Click **QoS** > **Access Control Lists** > **Summary** > **Add**.

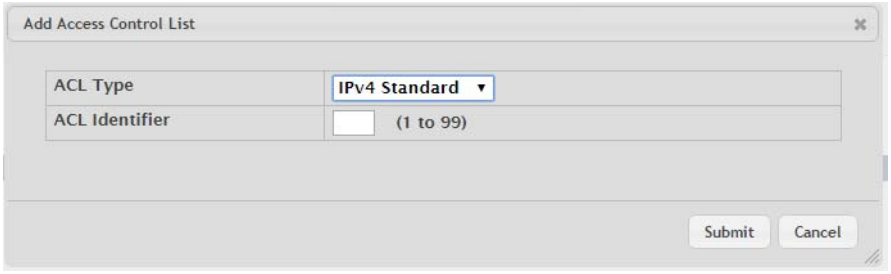


Figure 4.306 QoS > Access Control Lists > Summary > Add

The following table describes the items in the previous figure.

Item	Description
ACL Type	The type of ACL. The ACL type determines the criteria that can be used to match packets. The type also determines which attributes can be applied to matching traffic. IPv4 ACLs classify Layer 3 and Layer 4 IPv4 traffic, IPv6 ACLs classify Layer 3 and Layer 4 IPv6 traffic, and MAC ACLs classify Layer 2 traffic. The ACL types are as follows: ■ IPv4 Standard: Match criteria is based on the source address of IPv4 packets. ■ IPv4 Extended: Match criteria can be based on the source and destination addresses, source and destination Layer 4 ports, and protocol type of IPv4 packets. ■ IPv4 Named: Match criteria is the same as IPv4 Extended ACLs, but the ACL ID can be an alphanumeric name instead of a number. ■ IPv6 Named: Match criteria can be based on information including the source and destination IPv6 addresses, source and destination Layer 4 ports, and protocol type within IPv6 packets. ■ Extended MAC: Match criteria can be based on the source and destination MAC addresses, 802.1p user priority, VLAN ID, and EtherType value within Ethernet frames.
ACL Identifier	The name or number that identifies the ACL. The permitted identifier depends on the ACL type. Standard and Extended IPv4 ACLs use numbers within a set range, and Named IPv4 , IPv6, and MAC ACLs use alphanumeric characters. The ID of a Named IPv4 ACL must begin with a letter, and not a number.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.7.1.2 Configuration

Use the Access Control List Configuration page to configure rules for the existing Access Control Lists (ACLs) on the system and to view summary information about the rules that have been added to an ACL. Each ACL rule is configured to match one or more aspects of traffic on the network. When a packet matches the conditions in a rule, it is handled according to the configured action (permit or deny) and attributes. Each ACL can have multiple rules, but the final rule for every ACL is an implicit deny all rule. For each rule, a packet must match all the specified criteria in order for the specified rule action (Permit/Deny) to take place.

To access this page, click **QoS** > **Access Control Lists** > **Configuration**.

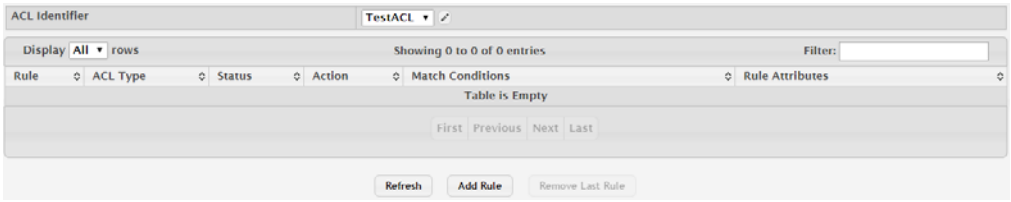


Figure 4.307 QoS > Access Control Lists > Configuration

The following table describes the items in the previous figure.

Item	Description
ACL Identifier	The menu contains the ID for each ACL that exists on the system. Before you add or remove a rule, you must select the ID of the ACL from the menu. For ACLs with alphanumeric names, click the Edit icon to change the ACL ID. The ID of a named ACL must begin with a letter, and not a number. The ACL identifier for IPv4 Standard and IPv4 Extended ACLs cannot be changed.
Rule	The number that identifies the rule. A number is automatically assigned to a rule when it is created. Rules are added in the order that they are created and cannot be renumbered. Packets are checked against the rule criteria in order, from the lowest-numbered rule to the highest. When the packet matches the criteria in a rule, it is handled according to the rule action and attributes. If no rule matches a packet, the packet is discarded based on the implicit deny all rule, which is the final rule in every ACL.
ACL Type	The type of ACL. The ACL type determines the criteria that can be used to match packets. The type also determines which attributes can be applied to matching traffic. IPv4 ACLs classify Layer 3 and Layer 4 IPv4 traffic, IPv6 ACLs classify Layer 3 and Layer 4 IPv6 traffic, and MAC ACLs classify Layer 2 traffic. The ACL types are as follows: ■ IPv4 Standard: Match criteria is based on the source address of IPv4 packets. ■ IPv4 Extended: Match criteria can be based on the source and destination addresses, source and destination Layer 4 ports, and protocol type of IPv4 packets. ■ IPv4 Named: Match criteria is the same as IPv4 Extended ACLs, but the ACL ID can be an alphanumeric name instead of a number. ■ IPv6 Named: Match criteria can be based on information including the source and destination IPv6 addresses, source and destination Layer 4 ports, and protocol type within IPv6 packets. ■ Extended MAC: Match criteria can be based on the source and destination MAC addresses, 802.1p user priority, VLAN ID, and EtherType value within Ethernet frames.
Status	Indicates whether the ACL is active. If the ACL is a time-based ACL that includes a time range, the ACL is active only during the periods specified within the time range. If an ACL does not include a time range, the status is always active.

Item	Description
Action	The action to take when a packet or frame matches the criteria in the rule: ■ Permit: The packet or frame is forwarded. ■ Deny: The packet or frame is dropped. *NOTE: When configuring ACL rules in the Add Access Control List Rule window, the selected action determines which fields can be configured. Not all fields are available for both Permit and Deny actions.*
Match Conditions	The criteria used to determine whether a packet or frame matches the ACL rule.
Rule Attributes	Each action - beyond the basic Permit and Deny actions - to perform on the traffic that matches the rule.
Refresh	Click **Refresh** to update the screen.
Add Rule	Click **Add Rule** to add a new ACL rule.
Remove Last Rule	Click **Remove Last Rule** to remove the selected entries.

To add a new ACL rule:

Click **QoS** > **Access Control Lists** > **Configuration** > **Add Rule**.

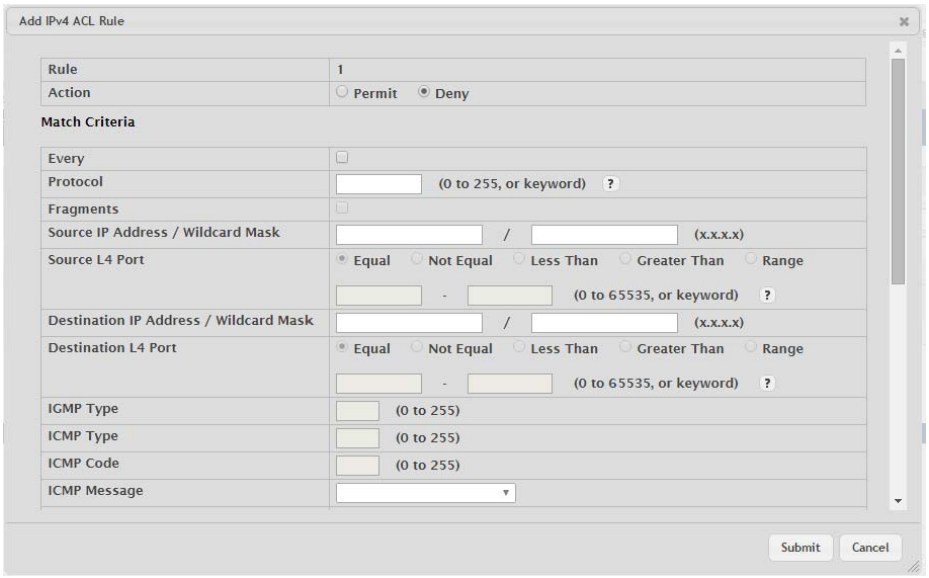


Figure 4.308 QoS > Access Control Lists > Configuration > Add Rule

The following table describes the items in the previous figure.

Item	Description
Rule	The number that identifies the rule. A number is automatically assigned to a rule when it is created. Rules are added in the order that they are created and cannot be renumbered. Packets are checked against the rule criteria in order, from the lowest-numbered rule to the highest. When the packet matches the criteria in a rule, it is handled according to the rule action and attributes. If no rule matches a packet, the packet is discarded based on the implicit deny all rule, which is the final rule in every ACL.

Item	Description
Action	The action to take when a packet or frame matches the criteria in the rule: ■ Permit: The packet or frame is forwarded. ■ Deny: The packet or frame is dropped. *NOTE: When configuring ACL rules in the Add Access Control List Rule window, the selected action determines which fields can be configured. Not all fields are available for both Permit and Deny actions.*
Match Criteria (IPv4 ACLs)	
Every	When this option is selected, all packets will match the rule and will be either permitted or denied. This option is exclusive to all other match criteria, so if Every is selected, no other match criteria can be configured. To configure specific match criteria, this option must be clear.
Protocol	The IANA-assigned protocol number to match within the IP packet. You can also specify one of the following keywords: EIGRP, GRE, ICMP, IGMP, IP, IPIP, OSPF, PIM, TCP, or UDP. The function is only available for IPv4 Extended and IPv4 Named ACLs.
Fragments	IP ACL rule to match on fragmented IP packets. The function is only available for IPv4 Extended and IPv4 Named ACLs.
Source IP Address / Wildcard Mask	The source port IP address in the packet and source IP wildcard mask (in the second field) to compare to the IP address in a packet header. Wild card masks determines which bits in the IP address are used and which bits are ignored. A wild card mask of 255.255.255.255 indicates that no bit is important. A wildcard of 0.0.0.0 indicates that all of the bits are important. For example, enter a wildcard mask of 0.0.0.0 to specify a host. Wildcard masking for ACLs operates differently from a subnet mask. A wildcard mask is in essence the inverse of a subnet mask. With a subnet mask, the mask has ones (1's) in the bit positions that are used for the network address, and has zeros (0's) for the bit positions that are not used. In contrast, a wildcard mask has (0's) in a bit position that must be checked. A '1' in a bit position of the ACL mask indicates the corresponding bit can be ignored. This field is required when you configure a source IP address.
Source L4 Port	The TCP/UDP source port to match in the packet header. Select one of the following options: Equal, Not Equal, Less Than, Greater Than, or Range and specify the port number or keyword. TCP port keywords include BGP, Domain, Echo, FTP, FTP Data, HTTP, SMTP, Telnet, WWW, POP2, and POP3. UDP port keywords include Domain, Echo, NTP, RIP, SNMP, TFTP, TIME, and WHO. The function is only available for IPv4 Extended and IPv4 Named ACLs.
Destination IP Address / Wildcard Mask	The destination port IP address in the packet and destination IP wildcard mask (in the second field) to compare to the IP address in a packet header. Wild card masks determines which bits in the IP address are used and which bits are ignored. A wild card mask of 255.255.255.255 indicates that no bit is important. A wildcard of 0.0.0.0 indicates that all of the bits are important. For example, enter a wildcard mask of 0.0.0.0 to specify a host. Wildcard masking for ACLs operates differently from a subnet mask. A wildcard mask is in essence the inverse of a subnet mask. With a subnet mask, the mask has ones (1's) in the bit positions that are used for the network address, and has zeros (0's) for the bit positions that are not used. In contrast, a wildcard mask has (0's) in a bit position that must be checked. A 1 in a bit position of the ACL mask indicates the corresponding bit can be ignored. This field is required when you configure a destination IP address.

Item	Description
IGMP Type	The TCP/UDP destination port to match in the packet header. Select one of the following options: Equal, Not Equal, Less Than, Greater Than, or Range and specify the port number or keyword. TCP port keywords include BGP, Domain, Echo, FTP, FTP Data, HTTP, SMTP, Telnet, WWW, POP2, and POP3. UDP port keywords include Domain, Echo, NTP, RIP, SNMP, TFTP, TIME, and WHO. The function is only available for IPv4 Extended and IPv4 Named ACLs.
ICMP Type	IP ACL rule to match on the specified IGMP message type. This option is available only if the protocol is IGMP. The function is only available for IPv4 Extended and IPv4 Named ACLs.
ICMP Code	IP ACL rule to match on the specified ICMP message code. This option is available only if the protocol is ICMP. The function is only available for IPv4 Extended and IPv4 Named ACLs.
ICMP Message	IP ACL rule to match on the ICMP message type and code. Specify one of the following supported ICMP messages: Echo, Echo-Reply, Host-Redirect, Mobile-Redirect, Net-Redirect, Net-Unreachable, Redirect, Packet-Too-Big, Port-Unreachable, Source-Quench, Router-Solicitation, Router-Advertisement, Time-Exceeded, TTL-Exceeded, and Unreachable. This option is available only if the protocol is ICMP. The function is only available for IPv4 Extended and IPv4 Named ACLs.
TCP Flags	IP ACL rule to match on the TCP flags. When a + flag is specified, a match occurs if the flag is set in the TCP header. When a - flag is specified, a match occurs if the flag is not set in the TCP header. When Established is specified, a match occurs if either RST or ACK bits are set in the TCP header. This option is available only if the protocol is TCP. The function is only available for IPv4 Extended and IPv4 Named ACLs.
Service Type	The service type to match in the IP header. The options in this menu are alternative ways of specifying a match condition for the same Service Type field in the IP header, but each service type uses a different user notation. After you select the service type, specify the value for the service type in the appropriate field. Only the field associated with the selected service type can be configured. The function is only available for IPv4 Extended and IPv4 Named ACLs. The services types are as follows: ■ IP DSCP: Matches the packet IP DiffServ Code Point (DSCP) value to the rule. The DSCP value is defined as the high-order six bits of the Service Type octet in the IP header. ■ IP Precedence: Matches the IP Precedence value to the rule. The IP Precedence field in a packet is defined as the high-order three bits of the Service Type octet in the IP header. ■ IP TOS Bits: Matches on the Type of Service (TOS) bits in the IP header. The IP TOS field in a packet is defined as all eight bits of the Service Type octet in the IP header. For example, to check for an IP TOS value having bits 7 and 5 set and bit 1 clear, where bit 7 is most significant, use a TOS Bits value of 0xA0 and a TOS Mask of 0xFF. – TOS Bits: Requires the bits in a packet's TOS field to match the two-digit hexadecimal number entered in this field. – TOS Mask: The bit positions that are used for comparison against the IP TOS field in a packet. Specifying TOS Mask is optional.
Match Criteria (IPv6 ACLs)	

Item	Description
Every	When this option is selected, all packets will match the rule and will be either permitted or denied. This option is exclusive to all other match criteria, so if Every is selected, no other match criteria can be configured. To configure specific match criteria, this option must be clear.
Protocol	The IANA-assigned protocol number to match within the IP packet. You can also specify one of the following keywords: ICMPv6, IPv6, TCP, or UDP.
Fragments	IPv6 ACL rule to match on fragmented IP packets.
Source Prefix / Prefix Length	The IPv6 prefix combined with IPv6 prefix length of the network or host from which the packet is being sent. To indicate a destination host, specify an IPv6 prefix length of 128.
Source L4 Port	The TCP/UDP source port to match in the packet header. Select one of the following options: Equal, Not Equal, Less Than, Greater Than, or Range and specify the port number or keyword. TCP port keywords include BGP, Domain, Echo, FTP, FTP Data, HTTP, SMTP, Telnet, WWW, POP2, and POP3. UDP port keywords include Domain, Echo, NTP, RIP, SNMP, TFTP, TIME, and WHO.
Destination Prefix / Prefix Length	The IPv6 prefix combined with the IPv6 prefix length to be compared to a packet's destination IPv6 address as a match criteria for the IPv6 ACL rule. To indicate a destination host, specify an IPv6 prefix length of 128.
Destination L4 Port	The TCP/UDP destination port to match in the packet header. Select one of the following options: Equal, Not Equal, Less Than, Greater Than, or Range and specify the port number or keyword. TCP port keywords include BGP, Domain, Echo, FTP, FTP Data, HTTP, SMTP, Telnet, WWW, POP2, and POP3. UDP port keywords include Domain, Echo, NTP, RIP, SNMP, TFTP, TIME, and WHO.
ICMP Type	IPv6 ACL rule to match on the specified ICMP message type. This option is available only if the protocol is ICMPv6.
ICMP Code	IPv6 ACL rule to match on the specified ICMP message code. This option is available only if the protocol is ICMPv6.
ICMP Message	IPv6 ACL rule to match on the ICMP message type and code. Specify one of the following supported ICMPv6 messages: Destination-Unreachable, Echo-Request, Echo-Reply, Header, Hop-Limit, MLD-Query, MLD-Reduction, MLD-Report, ND-NA, ND-NS, Next-Header, No-Admin, No-Route, Packet-Too-Big, Port-Unreachable, Router-Solicitation, Router-Advertisement, Router-Renumbering, Time-Exceeded, and Unreachable. This option is available only if the protocol is ICMPv6.
TCP Flags	IPv6 ACL rule to match on the TCP flags. When a + flag is specified, a match occurs if the flag is set in the TCP header. When a - flag is specified, a match occurs if the flag is not set in the TCP header. When Established is specified, a match occurs if either RST or ACK bits are set in the TCP header. This option is available only if the protocol is TCP.
Flow Label	A 20-bit number that is unique to an IPv6 packet, used by end stations to signify quality-of-service handling in routers.
IP DSCP	The IP DSCP value in the IPv6 packet to match to the rule. The DSCP value is defined as the high-order six bits of the Service Type octet in the IPv6 header.
Routing	IPv6 ACL rule to match on routed packets.
Match Criteria (MAC ACLs)	

Item	Description
Every	When this option is selected, all packets will match the rule and will be either permitted or denied. This option is exclusive to all other match criteria, so if Every is selected, no other match criteria can be configured. To configure specific match criteria, this option must be clear.
CoS	The 802.1p user priority value to match within the Ethernet frame.
Ethertype	The EtherType value to match in an Ethernet frame. Specify the number associated with the EtherType or specify one of the following keywords: AppleTalk, ARP, IBM SNA, IPv4, IPv6, IPX, MPLS, Unicast, NETBIOS, NOVELL, PPPoE, or RARP.
Source MAC Address / Mask	The MAC address to match to an Ethernet frame's source port MAC address. If desired, enter the MAC Mask associated with the source MAC to match. The MAC address mask specifies which bits in the source MAC to compare against an Ethernet frame. Use F's and zeros in the MAC mask, which is in a wildcard format. An F means that the bit is not checked, and a zero in a bit position means that the data must equal the value given for that bit. For example, if the MAC address is aa:bb:cc:dd:ee:ff, and the mask is 00:00:ff:ff:ff:ff, all MAC addresses with aa:bb:xx:xx:xx:xx result in a match (where x is any hexadecimal number).
Destination MAC Address / Mask	The MAC address to match to an Ethernet frame's destination port MAC address. If desired, enter the MAC Mask associated with the destination MAC to match. The MAC address mask specifies which bits in the destination MAC to compare against an Ethernet frame. Use F's and zeros in the MAC mask, which is in a wildcard format. An F means that the bit is not checked, and a zero in a bit position means that the data must equal the value given for that bit. For example, if the MAC address is aa:bb:cc:dd:ee:ff, and the mask is 00:00:ff:ff:ff:ff, all MAC addresses with aa:bb:xx:xx:xx:xx result in a match (where x is any hexadecimal number).
VLAN	The VLAN ID to match within the Ethernet frame.
Rule Attributes	
Assign Queue	The number that identifies the hardware egress queue that will handle all packets matching this rule.
Interface	The interface to use for the action: ■ Redirect: Allows traffic that matches a rule to be redirected to the selected interface instead of being processed on the original port. The redirect function and mirror function are mutually exclusive. ■ Mirror: Provides the ability to mirror traffic that matches a rule to the selected interface. Mirroring is similar to the redirect function, except that in flow-based mirroring a copy of the permitted traffic is delivered to the mirror interface while the packet itself is forwarded normally through the device.
Log	When this option is selected, logging is enabled for this ACL rule (subject to resource availability in the device). If the Access List Trap Flag is also enabled, this will cause periodic traps to be generated indicating the number of times this rule went into effect during the current report interval. A fixed 5 minute report interval is used for the entire system. A trap is not issued if the ACL rule hit count is zero for the current interval.

Item	Description
Time Range Name	The name of the time range that will impose a time limitation on the ACL rule. If a time range with the specified name does not exist, and the ACL containing this ACL rule is associated with an interface, the ACL rule is applied immediately. If a time range with specified name exists, and the ACL containing this ACL rule is associated with an interface, the ACL rule is applied when the time-range with specified name becomes active. The ACL rule is removed when the time-range with specified name becomes inactive.
Committed Rate / Burst Size	The allowed transmission rate for packets on the interface (Committed Rate), and the number of bytes allowed in a temporary traffic burst (Burst Rate).
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.7.1.3 Interfaces

Use the Access Control List Interface Summary page to associate one or more ACLs with one or more interfaces on the device. When an ACL is associated with an interface, traffic on the port is checked against the rules defined within the ACL until a match is found. If the traffic does not match any rules within an ACL, it is dropped because of the implicit deny all rule at the end of each ACL.

To access this page, click **QoS** > **Access Control Lists** > **Interfaces**.

Figure 4.309 QoS > Access Control Lists > Interfaces

The following table describes the items in the previous figure.

Item	Description
Interface	The interface that has an associated ACL.
Direction	Indicates whether the packet is checked against the rules in an ACL when it is received on an interface (Inbound) or after it has been received, routed, and is ready to exit an interface (Outbound).
Sequence Number	The order the ACL is applied to traffic on the interface relative to other ACLs associated with the interface in the same direction. When multiple ACLs are applied to the same interface in the same direction, the ACL with the lowest sequence number is applied first, and the other ACLs are applied in ascending numerical order.

Item	Description
ACL Type	The type of ACL. The ACL type determines the criteria that can be used to match packets. The type also determines which attributes can be applied to matching traffic. IPv4 ACLs classify Layer 3 and Layer 4 IPv4 traffic, IPv6 ACLs classify Layer 3 and Layer 4 IPv6 traffic, and MAC ACLs classify Layer 2 traffic. The ACL types are as follows: ■ IPv4 Standard: Match criteria is based on the source address of IPv4 packets. ■ IPv4 Extended: Match criteria can be based on the source and destination addresses, source and destination Layer 4 ports, and protocol type of IPv4 packets. ■ IPv4 Named: Match criteria is the same as IPv4 Extended ACLs, but the ACL ID can be an alphanumeric name instead of a number. ■ IPv6 Named: Match criteria can be based on information including the source and destination IPv6 addresses, source and destination Layer 4 ports, and protocol type within IPv6 packets. ■ Extended MAC: Match criteria can be based on the source and destination MAC addresses, 802.1p user priority, VLAN ID, and EtherType value within Ethernet frames.
ACL Identifier	The name or number that identifies the ACL. When applying an ACL to an interface, the ACL Identifier menu includes only the ACLs within the selected ACL Type.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to apply an ACL to an interface.
Remove	Click **Remove** to remove the association between an interface and an ACL.

To apply an ACL to an interface:

Click **QoS** > **Access Control Lists** > **Interfaces** > **Add**.

Figure 4.310 QoS > Access Control Lists > Interfaces > Add

The following table describes the items in the previous figure.

Item	Description
Interface	The interface that has an associated ACL.
Direction	Indicates whether the packet is checked against the rules in an ACL when it is received on an interface (Inbound) or after it has been received, routed, and is ready to exit an interface (Outbound).
Sequence Number	The order the ACL is applied to traffic on the interface relative to other ACLs associated with the interface in the same direction. When multiple ACLs are applied to the same interface in the same direction, the ACL with the lowest sequence number is applied first, and the other ACLs are applied in ascending numerical order.

Item	Description
ACL Identifier	The name or number that identifies the ACL. When applying an ACL to an interface, the ACL Identifier menu includes only the ACLs within the selected ACL Type.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.7.1.4 VLANs

Use the Access Control List VLAN Summary page to associate one or more ACLs with one or more VLANs on the device.

To access this page, click **QoS** > **Access Control Lists** > **VLANs**.

Figure 4.311 QoS > Access Control Lists > VLANs

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The ID of the VLAN associated with the rest of the data in the row. When associating a VLAN with an ACL, use this field to select the desired VLAN.
Direction	Indicates whether the packet is checked against the rules in an ACL when it is received on a VLAN (Inbound) or after it has been received, routed, and is ready to exit a VLAN (Outbound).
Sequence Number	The order the ACL is applied to traffic on the VLAN relative to other ACLs associated with the VLAN in the same direction. When multiple ACLs are applied to the same VLAN in the same direction, the ACL with the lowest sequence number is applied first, and the other ACLs are applied in ascending numerical order.
ACL Type	The type of ACL. The ACL type determines the criteria that can be used to match packets. The type also determines which attributes can be applied to matching traffic. IPv4 ACLs classify Layer 3 and Layer 4 IPv4 traffic, IPv6 ACLs classify Layer 3 and Layer 4 IPv6 traffic, and MAC ACLs classify Layer 2 traffic. The ACL types are as follows: ■ IPv4 Standard: Match criteria is based on the source address of IPv4 packets. ■ IPv4 Extended: Match criteria can be based on the source and destination addresses, source and destination Layer 4 ports, and protocol type of IPv4 packets. ■ IPv4 Named: Match criteria is the same as IPv4 Extended ACLs, but the ACL ID can be an alphanumeric name instead of a number. ■ IPv6 Named: Match criteria can be based on information including the source and destination IPv6 addresses, source and destination Layer 4 ports, and protocol type within IPv6 packets. ■ Extended MAC: Match criteria can be based on the source and destination MAC addresses, 802.1p user priority, VLAN ID, and EtherType value within Ethernet frames.
ACL Identifier	The name or number that identifies the ACL. The permitted identifier depends on the ACL type. Standard and Extended IPv4 ACLs use numbers within a set range, and Named IPv4, IPV6, and MAC ACLs use alphanumeric characters.

Item	Description
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to associate an ACL with a VLAN.
Remove	Click **Remove** to remove the association between a VLAN and an ACL.

To associate an ACL with a VLAN:

Click **QoS** > **Access Control Lists** > **VLANs** > **Add**.

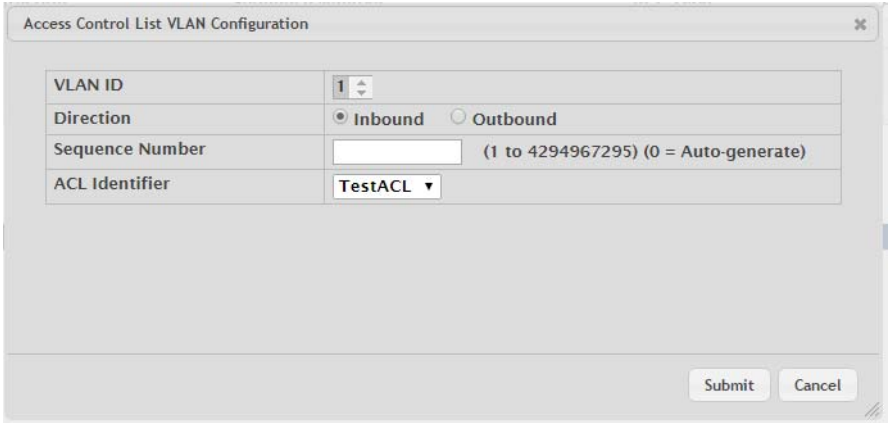


Figure 4.312 QoS > Access Control Lists > VLANs > Add

The following table describes the items in the previous figure.

Item	Description
VLAN ID	The ID of the VLAN associated with the rest of the data in the row. When associating a VLAN with an ACL, use this field to select the desired VLAN.
Direction	Indicates whether the packet is checked against the rules in an ACL when it is received on a VLAN (Inbound) or after it has been received, routed, and is ready to exit a VLAN (Outbound).
Sequence Number	The order the ACL is applied to traffic on the VLAN relative to other ACLs associated with the VLAN in the same direction. When multiple ACLs are applied to the same VLAN in the same direction, the ACL with the lowest sequence number is applied first, and the other ACLs are applied in ascending numerical order.
ACL Identifier	The name or number that identifies the ACL. The permitted identifier depends on the ACL type. Standard and Extended IPv4 ACLs use numbers within a set range, and Named IPv4, IPV6, and MAC ACLs use alphanumeric characters
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.7.2 Class of Service

4.7.2.1 IP DSCP

Use the CoS IP DSCP Mapping Configuration page to configure the per-interface mapping between the IP DiffServ Code Point (DSCP) value and the traffic class. A DSCP value can be included in the Service Type field of an IP header. When traffic is queued for transmission on the interface, the DSCP value in the IP header is mapped to the traffic class specified on this page. A traffic class with a higher value has priority over a traffic class with a lower value.

To access this page, click **QoS** > **Class of Service** > **IP DSCP**.

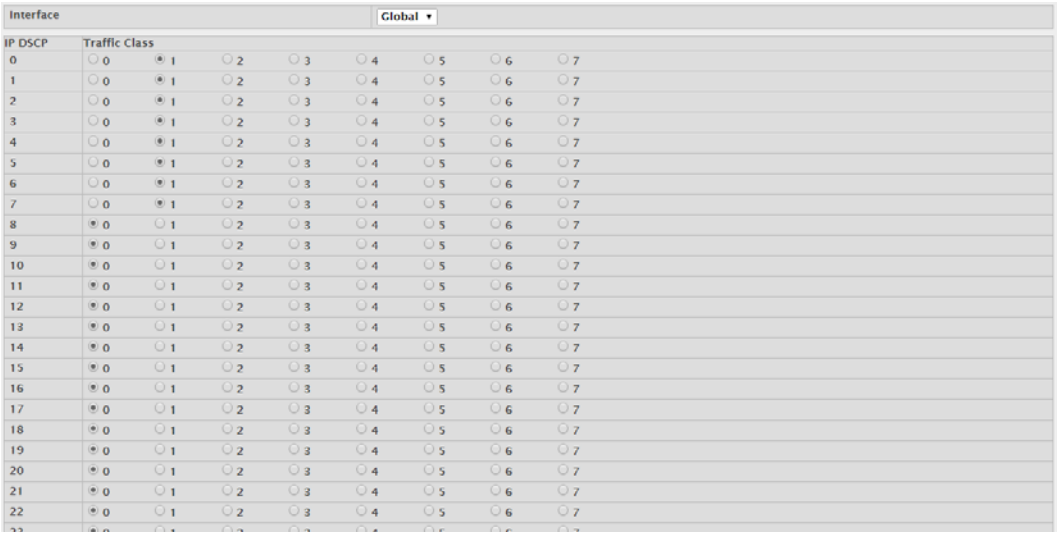


Figure 4.313 QoS > Class of Service > IP DSCP

The following table describes the items in the previous figure.

Item	Description
Interface	The interface to configure. To configure the same IP DSCP-to-Traffic Class mappings on all interfaces, select the Global menu option.
IP DSCP	The list of possible IP DSCP values the IP header can include.
Traffic Class	The internal traffic class to which the corresponding IP DSCP priority value is mapped. The higher the traffic class value, the higher its priority is for sending traffic.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.

4.7.2.2 Interface

Use the CoS Interface Configuration page to configure the per-interface Class of Service (CoS) settings. The CoS feature allows preferential treatment for certain types of traffic over others. To set up this preferential treatment, you can configure the CoS interface settings and individual queues on the egress ports to provide customization that suits the network environment. The level of service is determined by the egress port queue to which the traffic is assigned. When traffic is queued for transmission, the rate at which it is serviced depends on how the queue is configured and possibly the amount of traffic present in other queues for that port.

To access this page, click **QoS** > **Class of Service** > **Interface**.

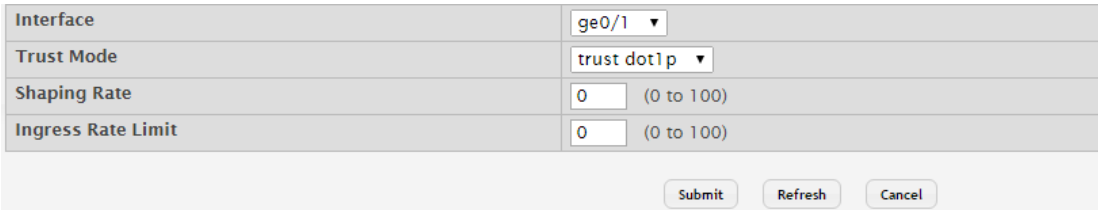


Figure 4.314 QoS > Class of Service > Interface

The following table describes the items in the previous figure.

Item	Description
Interface	The interface to configure. To configure the same settings on all interfaces, select the Global menu option.

Item	Description
Trust Mode	The trust mode for ingress traffic on the interface, which is one of the following: ■ untrusted: The interface ignores any priority designations encoded in incoming packets, and instead sends the packets to a traffic queue based on the ingress port's default priority. ■ trust dot1p: The port accepts at face value the 802.1p priority designation encoded within packets arriving on the port. ■ trust ip dscp: The port accepts at face value the IP DSCP priority designation encoded within packets arriving on the port.
Shaping Rate	The upper limit on how much traffic can leave a port. The limit on maximum transmission bandwidth has the effect of smoothing temporary traffic bursts over time so that the transmitted traffic rate is bounded. The specified value represents a percentage of the maximum negotiated bandwidth.
Ingress Rate Limit	The upper limit on how much traffic can enter a port. The limit on maximum reception bandwidth has the effect of smoothing temporary traffic bursts over time so that the received traffic rate is bounded. The specified value represents a percentage of the maximum negotiated bandwidth.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.7.2.3 Queue

Use the CoS Interface Queue Configuration page to define the behavior of the egress CoS queues on each interface. User-configurable parameters control the amount of bandwidth used by the queue, the queue depth during times of congestion, and the scheduling of packet transmission from the set of all queues on an interface. Each interface has its own CoS queue-related configuration.

To access this page, click **QoS** > **Class of Service** > **Queue**.

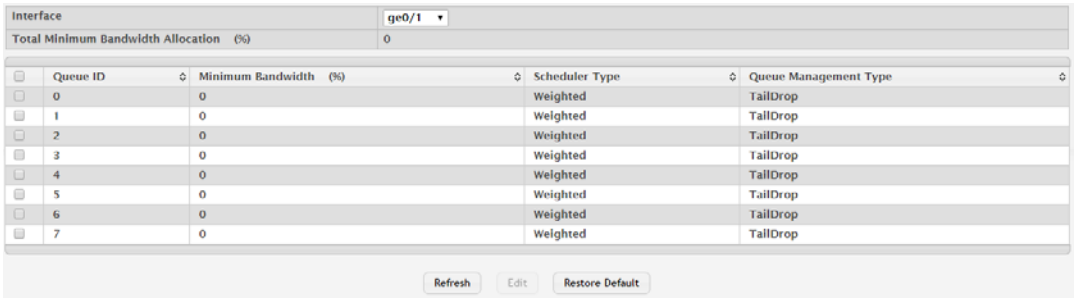


Figure 4.315 QoS > Class of Service > Queue

The following table describes the items in the previous figure.

Item	Description
Interface	The interface to configure. To configure the same settings on all interfaces, select the Global menu option.
Total Minimum Bandwidth Allocation	Shows the total minimum bandwidth allocation to the selected interface for all the queues.
Queue ID	The CoS queue. The higher the queue value, the higher its priority is for sending traffic.

Item	Description
Minimum Bandwidth	The minimum guaranteed bandwidth allocated to the selected queue on the interface. Setting this value higher than its corresponding Maximum Bandwidth automatically increases the maximum to the same value. A zero value (0) means no guaranteed minimum. The sum of individual Minimum Bandwidth values for all queues in the selected interface cannot exceed defined maximum 100.
Scheduler Type	The type of queue processing. Defining this value on a per-queue basis allows you to create the desired service characteristics for different types of traffic. The options are as follows: ■ Weighted: Weighted round robin associates a weight to each queue. ■ Strict: Strict priority services traffic with the highest priority on a queue first.
Queue Management Type	The type of queue depth management techniques used for all queues on this interface. The options are as follows: ■ Taildrop: All packets on a queue are safe until congestion occurs. At this point, any additional packets queued are dropped. ■ WRED: Weighted Random Early Detection (WRED) drops packets selectively based their drop precedence level.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.
Restore Default	Click **Restore Default** to restore all CoS queue settings on the select interface to the default values.

4.7.2.4 Drop Precedence

Use the CoS Interface Queue Drop Precedence Configuration page to configure the queue drop precedence on a per-queue, per-interface basis. When an interface is configured with taildrop queue management, all packets on a queue are safe until congestion occurs. If congestion occurs, any additional packets queued are dropped. Weighted Random Early Detection (WRED) drops packets selectively based their drop precedence level.

To access this page, click **QoS** > **Class of Service** > **Drop Precedence**.

Figure 4.316 QoS > Class of Service > Drop Precedence

The following table describes the items in the previous figure.

Item	Description
Interface	The interface on which to configure the queue drop precedence settings. To configure the same settings on all interfaces, select the Global menu option.
Queue ID	The CoS queue on which to configure the drop precedence settings. The higher the queue value, the higher its priority is for sending traffic.
Drop Precedence Level	The four drop precedence levels.

Item	Description
WRED Minimum Threshold	The minimum queue threshold below which now packets are dropped for the associated drop precedence level. After the minimum is reached, WRED randomly drops packets based on their priority (DSCP or IP precedence). This setting applies to the interface if it is configured with a WRED queue management type.
WRED Maximum Threshold	The maximum queue threshold above which all packets are dropped for the associated drop precedence level. After the maximum is reached, WRED drops all packets based on their priority (DSCP or IP precedence). This setting applies to the interface if it is configured with a WRED queue management type.
WRED Drop Probability Scale	The packet drop probability for the drop precedence level. This setting applies to the interface if it is configured with a WRED queue management type.
Refresh	Click **Refresh** to update the screen.
Edit	Click **Edit** to edit the selected entries.
Restore Default	Click **Restore Default** to restore all drop precedence settings on the select interface to the default values.

4.7.3 Diffserv

4.7.3.1 Global

Use the Diffserv Global Configuration and Status page to configure the administrative mode of Differentiated Services (DiffServ) support on the device and to view the current and maximum number of entries in each of the main DiffServ private MIB tables. DiffServ allows traffic to be classified into streams and given certain QoS treatment in accordance with defined per-hop behaviors.

Packets are classified and processed based on defined criteria. The classification criteria is defined by a class. The processing is defined by a policy's attributes. Policy attributes may be defined on a per-class instance basis, and it is these attributes that are applied when a match occurs. A policy can contain multiples classes. When the policy is active, the actions taken depend on which class matches the packet.

To access this page, click **QoS** > **Diffserv** > **Global**.

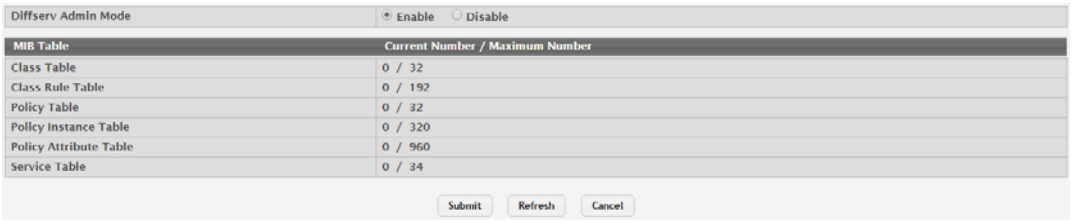


Figure 4.317 QoS > Diffserv > Global

The following table describes the items in the previous figure.

Item	Description
Diffserv Admin Mode	The administrative mode of DiffServ on the device. While disabled, the DiffServ configuration is retained and can be changed, but it is not active. While enabled, Differentiated Services are active.
MIB Table	
Class Table	The current and maximum number of classifier entries in the table. DiffServ classifiers differentiate among traffic types.
Class Rule Table	The current and maximum number of class rule entries in the table. Class rules specify the match criteria that belong to a class definition.

Item	Description
Policy Table	The current and maximum number of policy entries in the table. The policy determines the traffic conditioning or service provisioning actions applied to a traffic class.
Policy Instance Table	The current and maximum number of policy-class instance entries in the table. A policy-class instance is a policy that is associated with an existing DiffServ class.
Policy Attribute Table	The current and maximum number of policy attribute entries in the table. A policy attribute entry attaches various policy attributes to a policy-class instance.
Service Table	The current and maximum number of service entries in the table. A service entry associates a DiffServ policy with an interface and inbound or outbound direction.
Submit	Click **Submit** to save the values and update the screen.
Refresh	Click **Refresh** to update the screen.
Cancel	Click **Cancel** to restore default value.

4.7.3.2 Class Summary

Use the Diffserv Class Summary page to create or remove DiffServ classes and to view summary information about the classes that exist on the device. Creating a class is the first step in using DiffServ to provide Quality of Service. After a class is created, you can define the match criteria for the class.

To access this page, click **QoS** > **Diffserv** > **Class Summary**.

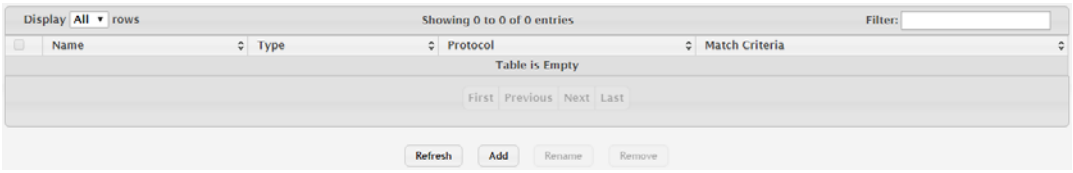


Figure 4.318 QoS > Diffserv > Class Summary

The following table describes the items in the previous figure.

Item	Description
Name	The name of the DiffServ class. When adding a new class or renaming an existing class, the name of the class is specified in the Class field of the dialog window.
Type	The class type, which is one of the following: ■ All: All the various match criteria defined for the class should be satisfied for a packet match. All signifies the logical AND of all the match criteria.
Protocol	The Layer 3 protocol to use for filtering class types, which is either IPv4 or IPv6.
Match Criteria	The criteria used to match packets.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new DiffServ class.
Rename	Click **Rename** to rename the name of an existing class.
Remove	Click **Remove** to remove the selected entries.

To add a new DiffServ class:

Click **QoS** > **Diffserv** > **Class Summary** > **Add**.

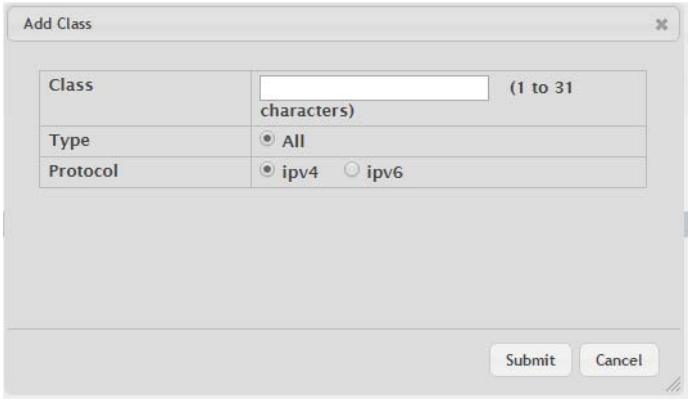


Figure 4.319 QoS > Diffserv > Class Summary > Add

The following table describes the items in the previous figure.

Item	Description
Class	Enter the name of the DiffServ class.
Type	The class type, which is one of the following: ■ All: All the various match criteria defined for the class should be satisfied for a packet match. All signifies the logical AND of all the match criteria.
Protocol	The Layer 3 protocol to use for filtering class types, which is either IPv4 or IPv6.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.7.3.3 Class Configuration

Use the Diffserv Class Configuration page to define the criteria to associate with a DiffServ class. As packets are received or transmitted, these DiffServ classes are used to classify and prioritize packets. Each class can contain multiple match criteria.

To access this page, click **QoS** > **Diffserv** > **Class Configuration**.

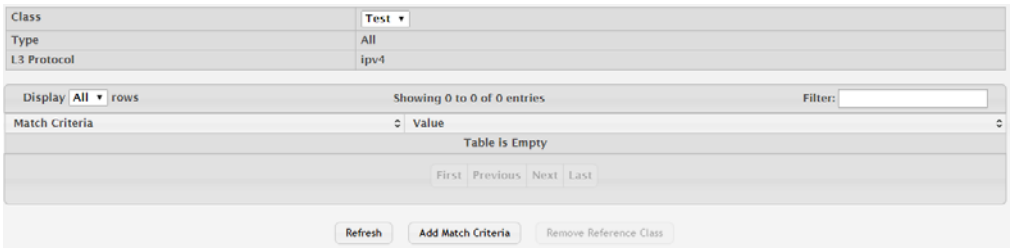


Figure 4.320 QoS > Diffserv > Class Configuration

The following table describes the items in the previous figure.

Item	Description
Class	The name of the class. To configure match criteria for a class, select its name from the menu.
Type	The class type, which is one of the following: ■ All: All the various match criteria defined for the class should be satisfied for a packet match. All signifies the logical AND of all the match criteria.
L3 Protocol	The Layer 3 protocol to use for filtering class types, which is either IPv4 or IPv6.
Match Criteria	The type of match criteria defined for the selected class.

Item	Description
Value	The configured value of the match criteria that corresponds to the match type.
Refresh	Click **Refresh** to update the screen.
Add Match Criteria	Click **Add Match Criteria** to define criteria for matching packets within a class.
Remove Reference Class	Click **Remove Reference Class** to remove the associated reference class from the selected class.

To define criteria for matching packets within a class:

Click **QoS** > **Diffserv** > **Class Configuration** > **Add Match Criteria**.

Figure 4.321 QoS > Diffserv > Class Configuration > Add Match Criteria

The following table describes the items in the previous figure.

Item	Description
Any	Select this option to specify that all packets are considered to match the specified class. There is no need to configure additional match criteria if Any is selected because a match will occur on all packets.
Reference Class	Select this option to reference another class for criteria. The match criteria defined in the referenced class is as match criteria in addition to the match criteria you define for the selected class. After selecting this option, the classes that can be referenced are displayed. Select the class to reference. A class can reference at most one other class of the same type.
CoS	Select this option to require the Class of Service (CoS) value in an Ethernet frame header to match the specified CoS value.
Secondary CoS	Select this option to require the secondary CoS value in an Ethernet frame header to match the specified secondary CoS value.
Ethertype	Select this option to require the EtherType value in the Ethernet frame header to match the specified EtherType value. After you select this option, specify the EtherType value in one of the following two fields: ■ Ethertype Keyword: The menu includes several common protocols that are mapped to their EtherType values. ■ Ethertype Value: This field accepts custom EtherType values.

Item	Description
VLAN	Select this option to require a packet's VLAN ID to match a VLAN ID or a VLAN ID within a continuous range. If you configure a range, a match occurs if a packet's VLAN ID is the same as any VLAN ID within the range. After you select this option, use the following fields to configure the VLAN match criteria: ■ VLAN ID: The VLAN ID to match.
Secondary VLAN	Select this option to require a packet's VLAN ID to match a secondary VLAN ID or a secondary VLAN ID within a continuous range. If you configure a range, a match occurs if a packet's secondary VLAN ID is the same as any secondary VLAN ID within the range. After you select this option, use the following fields to configure the secondary VLAN match criteria: ■ Secondary VLAN ID: The secondary VLAN ID to match.
Source MAC Address	Select this option to require a packet's source MAC address to match the specified MAC address. After you select this option, use the following fields to configure the source MAC address match criteria: ■ MAC Address: The source MAC address to match. ■ MAC Mask: The MAC mask, which specifies the bits in the source MAC address to compare against an Ethernet frame. Use F's and zeros to configure the MAC mask. An F means that the bit is checked, and a zero in a bit position means that the data is not significant. For example, if the MAC address is aa:bb:cc:dd:ee:ff, and the mask is ff:ff:00:00:00:00, all MAC addresses with aa:bb:xx:xx:xx:xx result in a match (where x is any hexadecimal number). Note that this is not a wildcard mask, which ACLs use.
Destination MAC Address	Select this option to require a packet's destination MAC address to match the specified MAC address. After you select this option, use the following fields to configure the destination MAC address match criteria: ■ MAC Address: The destination MAC address to match. ■ MAC Mask: The MAC mask, which specifies the bits in the destination MAC address to compare against an Ethernet frame. Use F's and zeros to configure the MAC mask. An F means that the bit is checked, and a zero in a bit position means that the data is not significant. For example, if the MAC address is aa:bb:cc:dd:ee:ff, and the mask is ff:ff:00:00:00:00, all MAC addresses with aa:bb:xx:xx:xx:xx result in a match (where x is any hexadecimal number). Note that this is not a wildcard mask, which ACLs use.
Source IP Address	Select this option to require the source IP address in a packet header to match the specified values. After you select this option, use the following fields to configure the source IP address match criteria: ■ IP Address: The source IP address to match. ■ IP Mask: A valid subnet mask, which determines the bits in the IP address that are significant. Note that this is not a wildcard mask.
Destination IP Address	Select this option to require the destination IP address in a packet header to match the specified values. After you select this option, use the following fields to configure the destination IP address match criteria: ■ IP Address: The destination IP address to match. ■ IP Mask: A valid subnet mask, which determines the bits in the IP address that are significant. Note that this is not a wildcard mask.

Item	Description
Source IPv6 Address	Select this option to require the source IPv6 address in a packet header to match the specified values. After you select this option, use the following fields to configure the source IPv6 address match criteria: ■ Source Prefix: The source IPv6 prefix to match. ■ Source Prefix Length: The IPv6 prefix length.
Destination IPv6 Address	Select this option to require the destination IPv6 address in a packet header to match the specified values. After you select this option, use the following fields to configure the destination IPv6 address match criteria: ■ Destination Prefix: The destination IPv6 prefix to match. ■ Destination Prefix Length: The IPv6 prefix length.
Source L4 Port	Select this option to require a packet's TCP/UDP source port to match the specified port or the port number within a range of port numbers. If you configure a range, a match occurs if a packet's source port number is the same as any source port number within the range. After you select this option, use the following fields to configure a source port keyword, source port number, or source port range for the match criteria: ■ Protocol: Select the desired L4 keyword from the list on which the match is based. If you select a keyword, the other source port configuration fields are not configurable. ■ Port: The source port number to match.
Destination L4 Port	Select this option to require a packet's TCP/UDP destination port to match the specified port or the port number within a range of port numbers. If you configure a range, a match occurs if a packet's destination port number is the same as any destination port number within the range. After you select this option, use the following fields to configure a destination port keyword, destination port number, or destination port range for the match criteria: ■ Protocol: Select the desired L4 keyword from the list on which the match is based. If you select a keyword, the other destination port configuration fields are not configurable. ■ Port: The destination port number to match.
IP DSCP	Select this option to require the packet's IP DiffServ Code Point (DSCP) value to match the specified value. The DSCP value is defined as the high-order six bits of the Service Type octet in the IP header. After you select this option, use one of the following fields to configure the IP DSCP match criteria: ■ IP DSCP Keyword: The IP DSCP keyword code that corresponds to the IP DSCP value to match. If you select a keyword, you cannot configure an IP DSCP Value. ■ IP DSCP Value: The IP DSCP value to match.
IP Precedence	Select this option to require the packet's IP Precedence value to match the number configured in the IP Precedence Value field. The IP Precedence field in a packet is defined as the high-order three bits of the Service Type octet in the IP header.
IP TOS	Select this option to require the packet's Type of Service (ToS) bits in the IP header to match the specified value. The IP ToS field in a packet is defined as all eight bits of the Service Type octet in the IP header. After you select this option, use the following fields to configure the ToS match criteria: ■ IP TOS Bits: Enter a two-digit hexadecimal number to match the bits in a packet's ToS field. ■ IP TOS Mask: Specify the bit positions that are used for comparison against the IP ToS field in a packet.

Item	Description
Protocol	Select this option to require a packet header's Layer 4 protocol to match the specified value. After you select this option, use one of the following fields to configure the protocol match criteria: ■ Protocol: The L4 keyword that corresponds to value of the IANA protocol number to match. If you select a keyword, you cannot configure a Protocol Value. ■ Protocol Value: The IANA L4 protocol number value to match.
Flow Label	Select this option to require an IPv6 packet's flow label to match the configured value. The flow label is a 20-bit number that is unique to an IPv6 packet, used by end stations to signify quality-of-service handling in routers.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.7.3.4 Policy Summary

Use the Diffserv Policy Summary page to create or remove DiffServ policies and to view summary information about the policies that exist on the device. A policy defines the QoS attributes for one or more traffic classes. A policy attribute identifies the action taken when a packet matches a class rule. A policy is applied to a packet when a class match within that policy is found.

To access this page, click **QoS** > **Diffserv** > **Policy Summary**.

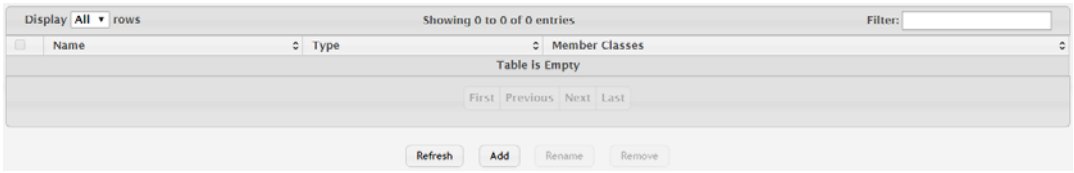


Figure 4.322 QoS > Diffserv > Policy Summary

The following table describes the items in the previous figure.

Item	Description
Name	The name of the DiffServ policy. When adding a new policy or renaming an existing policy, the name of the policy is specified in the Policy field of the dialog window.
Type	The traffic flow direction to which the policy is applied: ■ In: The policy is specific to inbound traffic. ■ Out: The policy is specific to outbound traffic.
Member Classes	The DiffServ class or classes that have been added to the policy.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a new DiffServ policy.
Rename	Click **Rename** to rename the name of an existing policy.
Remove	Click **Remove** to remove the selected entries.

To add a new DiffServ policy:

Click **QoS** > **Diffserv** > **Policy Summary** > **Add**.

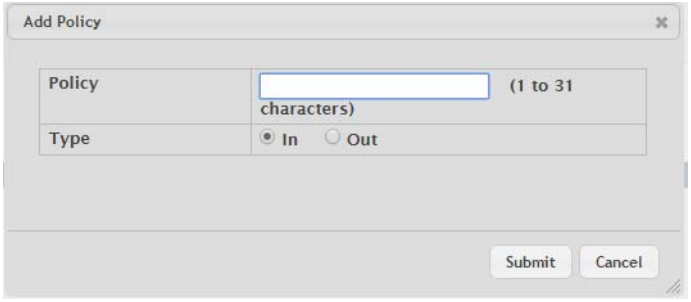


Figure 4.323 QoS > Diffserv > Policy Summary > Add

The following table describes the items in the previous figure.

Item	Description
Policy	Enter the name of the policy.
Type	The traffic flow direction to which the policy is applied: ■ In: The policy is specific to inbound traffic. ■ Out: The policy is specific to outbound traffic.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.7.3.5 Policy Configuration

Use the Diffserv Policy Configuration page to add or remove a DiffServ policy-class association and to configure the policy attributes. The policy attributes identify the action or actions taken when a packet matches a class rule.

To access this page, click **QoS** > **Diffserv** > **Policy Configuration**.

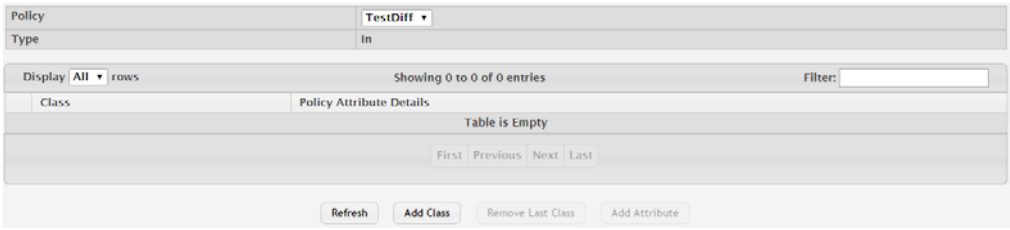


Figure 4.324 QoS > Diffserv > Policy Configuration

The following table describes the items in the previous figure.

Item	Description
Policy	The name of the policy. To add a class to the policy, remove a class from the policy, or configure the policy attributes, you must first select its name from the menu.
Type	The traffic flow direction to which the policy is applied.
Class	The DiffServ class or classes associated with the policy. The policy is applied to a packet when a class match within that policy-class is found.
Policy Attribute Details	The policy attribute types and their associated values that are configured for the policy.
Refresh	Click **Refresh** to update the screen.
Add Class	Click **Add Class** to add a class to the policy.
Add Attribute	Click **Add Attribute** to add attributes to a policy or to change the policy attributes.
Remove Last Class	Click **Remove Last Class** to remove the most recently associated class from the selected policy.

To add a class to the policy:

Click **QoS** > **Diffserv** > **Policy Configuration** > **Add Class**.

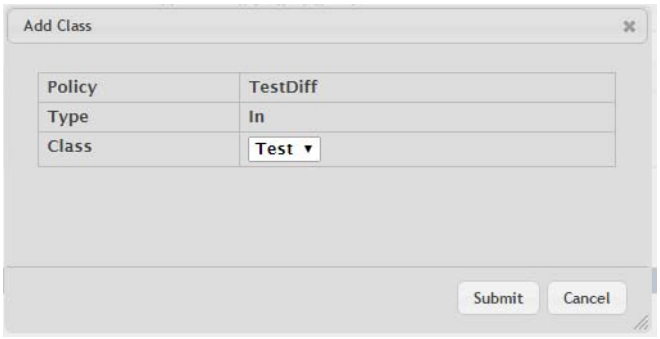


Figure 4.325 QoS > Diffserv > Policy Configuration > Add Class

The following table describes the items in the previous figure.

Item	Description
Policy	The name of the policy. To add a class to the policy, remove a class from the policy, or configure the policy attributes, you must first select its name from the menu.
Type	The traffic flow direction to which the policy is applied.
Class	The DiffServ class or classes associated with the policy. The policy is applied to a packet when a class match within that policy-class is found.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

To add attributes to a policy or to change the policy attributes:

Click **QoS** > **Diffserv** > **Policy Configuration** > **Add Attribute**.

Figure 4.326 QoS > Diffserv > Policy Configuration > Add Attribute

The following table describes the items in the previous figure.

Item	Description
Assign Queue	Select this option to assign matching packets to a traffic queue. Use the Queue ID Value field to select the queue to which the packets of this policy-class are assigned.
Drop	Select this option to drop packets that match the policy-class.

Item	Description
Mark CoS	Select this option to mark all packets in a traffic stream with the specified Class of Service (CoS) queue value. Use the Class of Service field to select the CoS value to mark in the priority field of the 802.1p header (the only tag in a single tagged packet or the first or outer 802.1Q tag of a double VLAN tagged packet). If the packet does not already contain this header, one is inserted.
Mark CoS as Secondary CoS	Select this option to mark the priority field of the 802.1p header in the outer tag of a double-VLAN tagged packet with the same CoS value that is included in the inner tag.
Mark IP DSCP	Select this option to mark all packets in the associated traffic stream with the specified IP DSCP value. After you select this option, use one of the following fields to configure the IP DSCP value to mark in packets that match the policy-class: ■ IP DSCP Keyword: The IP DSCP keyword code that corresponds to the IP DSCP value. If you select a keyword, you cannot configure an IP DSCP Value. ■ IP DSCP Value: The IP DSCP value.
Mark IP Precedence	Select this option to mark all packets in the associated traffic stream with the specified IP Precedence value. After you select this option, use the IP Precedence Value field to select the IP Precedence value to mark in packets that match the policy-class.
Mirror Interface	Select this option to copy the traffic stream to a specified egress port (physical or LAG) without bypassing normal packet forwarding. This action can occur in addition to any marking or policing action. It may also be specified along with a QoS queue assignment. Use the Interface menu to select the interface to which traffic is mirrored.
Police Simple	Select this option to enable the simple traffic policing style for the policy-class. The simple form of the police attribute uses a single data rate and burst size, resulting in two outcomes (conform and violate). After you select this option, configure the following policing criteria: ■ Color Mode: The type of color policing used in DiffServ traffic conditioning. ■ Color Conform Class: For color-aware policing, packets in this class are metered against both the committed information rate (CIR) and the peak information rate (PIR). The class definition used for policing color awareness is only allowed to contain a single, non-excluded class match condition identifying one of the supported comparison fields: CoS, IP DSCP, IP Precedence, or Secondary COS. ■ Committed Rate (Kbps): The maximum allowed arrival rate of incoming packets for this class. ■ Committed Burst Size (Kbytes): The amount of conforming traffic allowed in a burst. ■ Conform Action: The action taken on packets that are considered conforming (below the police rate). ■ Violate Action: The action taken on packets that are considered non-conforming (above the police rate).

Item	Description
Police Single Rate	Select this option to enable the single-rate traffic policing style for the policy-class. The single-rate form of the police attribute uses a single data rate and two burst sizes, resulting in three outcomes (conform, exceed, and violate). After you select this option, configure the following policing criteria: ■ Color Mode: The type of color policing used in DiffServ traffic conditioning. ■ Color Conform Class: For color-aware policing, packets are metered against the committed information rate (CIR) and the peak information rate (PIR). The class definition used for policing color awareness is only allowed to contain a single, non-excluded class match condition identifying one of the supported comparison fields: CoS, IP DSCP, IP Precedence, or Secondary COS. This field is available only if one or more classes that meets the color-awareness criteria exist. ■ Color Exceed Class: For color-aware policing, packets are metered against the PIR only. ■ Committed Rate (Kbps): The maximum allowed arrival rate of incoming packets for this class. ■ Committed Burst Size (Kbytes): The amount of conforming traffic allowed in a burst. ■ Excess Burst Size (Kbytes): The amount of conforming traffic allowed to accumulate beyond the Committed Burst Size (Kbytes) value during longer-than-normal idle times. This value allows for occasional bursting. ■ Conform Action: The action taken on packets that are considered conforming (below the police rate). ■ Exceed Action: The action taken on packets that are considered to exceed the committed burst size but are within the excessive burst size. ■ Violate Action: The action taken on packets that are considered non-conforming (above the police rate).

Item	Description
Police Two Rate	Select this option to enable the two-rate traffic policing style for the policy-class. The two-rate form of the police attribute uses two data rates and two burst sizes. Only the smaller of the two data rates is intended to be guaranteed. After you select this option, configure the following policing criteria: ■ Color Mode: The type of color policing used in DiffServ traffic conditioning. ■ Color Conform Class: For color-aware policing, packets are metered against the committed information rate (CIR) and the peak information rate (PIR). The class definition used for policing color awareness is only allowed to contain a single, non-excluded class match condition identifying one of the supported comparison fields: CoS, IP DSCP, IP Precedence, or Secondary COS. This field is available only if one or more classes that meets the color-awareness criteria exist. ■ Color Exceed Class: For color-aware policing, packets are metered against the PIR. ■ Committed Rate (Kbps): The maximum allowed arrival rate of incoming packets for this class. ■ Committed Burst Size (Kbytes): The amount of conforming traffic allowed in a burst. ■ Peak Rate (Kbps): The maximum peak information rate for the arrival of incoming packets for this class. ■ Excess Burst Size (Kbytes): The maximum size of the packet burst that can be accepted to maintain the Peak Rate (Kbps). ■ Conform Action: The action taken on packets that are considered conforming (below the police rate). ■ Exceed Action: The action taken on packets that are considered to exceed the committed burst size but are within the excessive burst size. ■ Violate Action: The action taken on packets that are considered non-conforming (above the police rate).
Redirect Interface	Select this option to force a classified traffic stream to the specified egress port (physical port or LAG). Use the Interface field to select the interface to which traffic is redirected.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.7.3.6 Service Summary

Use the DiffServ Service Summary page to add DiffServ policies to interfaces, remove policies from interfaces, and edit policy-interface mappings.

To access this page, click **QoS** > **Diffserv** > **Service Summary**.

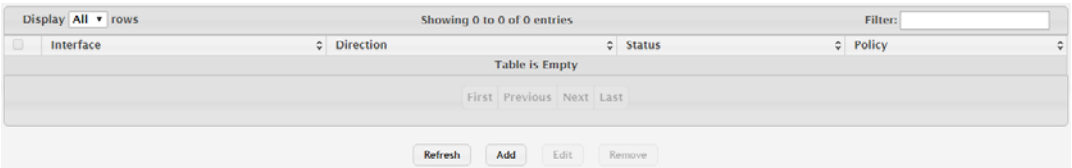


Figure 4.327 QoS > Diffserv > Service Summary

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. Only interfaces that have an associated policy are listed in the table.

Item	Description
Direction	The traffic flow direction to which the policy is applied: ■ Inbound: The policy is applied to traffic as it enters the interface. ■ Outbound: The policy is applied to traffic as it exits the interface.
Status	The status of the policy on the interface. A policy is Up if DiffServ is globally enabled, and if the interface is administratively enabled and has a link. Otherwise, the status is Down.
Policy	The DiffServ policy associated with the interface.
Refresh	Click **Refresh** to update the screen.
Add	Click **Add** to add a policy to an interface.
Edit	Click **Edit** to edit the selected entries.
Remove	Click **Remove** to remove the selected entries.

To add a policy to an interface:

Click **QoS** > **Diffserv** > **Service Summary** > **Add**.

Figure 4.328 QoS > Diffserv > Service Summary > Add

The following table describes the items in the previous figure.

Item	Description
Interface	Select an interface to associate with a policy.
Policy In	The menu lists all policies configured with a type of In. Select the policy to apply to traffic as it enters the interface.
Submit	Click **Submit** to save the values.
Cancel	Click **Cancel** to close the window.

4.7.3.7 Service Statistics

The Diffserv Service Performance Statistics page displays service-level statistical information for all interfaces in the system to which a DiffServ policy has been attached.

To access this page, click **QoS** > **Diffserv** > **Service Statistics**.

Figure 4.329 QoS > Diffserv > Service Statistics

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. The table displays all interfaces that have a DiffServ policy currently attached in a traffic flow direction.
Direction	The traffic flow direction to which the policy is applied: ■ In: The policy is applied to traffic as it enters the interface.
Status	The operational status of this service interface, either Up or Down.
Refresh	Click **Refresh** to update the screen.

4.7.3.8 Policy Statistics

The Diffserv Policy Performance Statistics page displays class-oriented statistical information for the policy, which is specified by the interface and direction.

To access this page, click **QoS** > **Diffserv** > **Policy Statistics**.

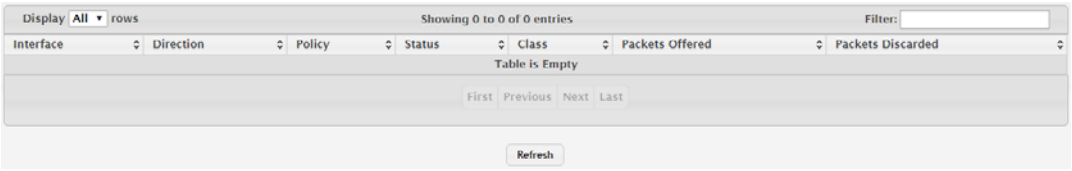


Figure 4.330 QoS > Diffserv > Policy Statistics

The following table describes the items in the previous figure.

Item	Description
Interface	The interface associated with the rest of the data in the row. The table displays all interfaces that have a DiffServ policy currently attached in a traffic flow direction.
Direction	The traffic flow direction to which the policy is applied: ■ In: The policy is applied to traffic as it enters the interface.
Policy	The name of the policy currently attached to the interface.
Status	The operational status of the policy currently attached to the interface.
Class	The DiffServ class currently defined for the attached policy.
Packets Offered	The total number of packets offered to all class instances in this service policy before their defined DiffServ treatment is applied. This is the overall count per-interface, per-direction.
Packets Discarded	The total number of packets discarded for all class instances in this service policy for any reason due to DiffServ treatment. This is the overall count per-interface, per-direction.
Refresh	Click **Refresh** to update the screen.

Appendix A

Troubleshooting

A.1 Troubleshooting

- Verify that the device is using the right power cord/adapter (DC 24-110V); please do not use a power adapter with DC output higher than 110V, or the device may be damaged.
- Select the proper UTP/STP cable to construct the user network. Use unshielded twisted-pair (UTP) or shield twisted-pair (STP) cable for M12 connections that depend on the connector type the switch equipped: 100R Category 3, 4 or 5 cable for 10Mbps connections, 100R Category 5 cable for 100Mbps connections, or 100R Category 5e/above cable for 1000Mbps connections. Also ensure that the length of any twisted-pair connection does not exceed 100 meters (328 feet).
- R = replacement letter for Ohm symbol.
- **Diagnosing LED Indicators:** To assist in identifying problems, the switch can be easily monitored through panel indicators, which describe common problems the user may encounter, so the user can be guided towards possible solutions.
- If the power indicator does not light on when the power cord is plugged in, you may have a problem with power cord. Check for loose power connections, power losses, or surges, at the power outlet. If you still cannot resolve the problem, contact a local dealer for assistance.
- If the LED indicators are normal and the connected cables are correct but packets still cannot be transmitted, please check the user system's Ethernet device configuration or status.

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Please verify specifications before quoting. This guide is intended for reference purposes only.

All product specifications are subject to change without notice.