



Web UI Reference Guide

Product Model: DGS-3710 Series
Layer 2 Managed Gigabit Switch
Release 1.00



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Table of Contents

Intended Readers.....	1
Typographical Conventions.....	1
Notes, Notices and Cautions.....	1
Safety Instructions.....	2
Safety Cautions	2
General Precautions for Rack-Mountable Products.....	3
Protecting Against Electrostatic Discharge	4
Chapter 2 Web-based Switch Configuration.....	5
Introduction.....	5
Login to the Web Manager.....	5
Web-based User Interface	6
Areas of the User Interface.....	6
Web Pages.....	7
Chapter 3 System Configuration.....	9
Device Information	9
System Information Settings	10
Dual Configuration Settings	11
Firmware Information Settings	12
Port Configuration	12
DDM.....	12
Port Settings	20
Port Description Settings	22
Port Error Disabled	22
Jumbo Frame Settings	23
EEE Settings	24
Serial Port Settings	24
Warning Temperature Settings	25
System Log configuration.....	26
System Log Settings.....	26
System Log Server Settings.....	26
System Log.....	27
System Severity Settings.....	29
Time Range Settings.....	29
Time Settings	30
User Accounts Settings.....	31
Synchronous Ethernet Settings.....	32
Chapter 4 Management.....	34
ARP	34

Static ARP Settings	34
ARP Table	35
IPv6 Neighbor Settings	35
IP Interface	36
System IP Address Settings	36
Interface Settings.....	38
Management Settings	41
Out of Band Management Settings	42
Session Table.....	43
Single IP Management.....	43
Single IP Settings	45
Topology.....	46
Firmware Upgrade.....	53
Configuration File Backup/Restore.....	53
Upload Log File	54
SNMP Settings	54
SNMP Global Settings.....	55
SNMP Traps Settings	56
SNMP Linkchange Traps Settings	57
SNMP View Table Settings	57
SNMP Community Table Settings.....	58
SNMP Group Table Settings	59
SNMP Engine ID Settings	61
SNMP User Table Settings.....	61
SNMP Host Table Settings.....	62
SNMP v6Host Table Settings	63
RMON Settings.....	64
Telnet Settings	65
Web Settings	65
Chapter 5 L2 Features	67
VLAN	67
802.1Q VLAN Settings	72
802.1v Protocol VLAN	76
GVRP.....	79
MAC-based VLAN Settings	81
PVID Auto Assign Settings.....	81
Subnet VLAN	82
VLAN Counter Settings	84
Voice VLAN	84
Browse VLAN	87
Show VLAN Ports.....	88

QinQ	89
QinQ Settings	90
VLAN Translation Settings	92
Layer 2 Protocol Tunneling Settings	92
Spanning Tree.....	93
STP Bridge Global Settings.....	96
STP Port Settings	97
MST Configuration Identification	99
STP Instance Settings	100
MSTP Port Information	101
Link Aggregation	102
Port Trunking Settings	103
LACP Port Settings.....	104
FDB	105
Static FDB Settings	105
MAC Notification Settings.....	107
MAC Address Aging Time Settings	108
MAC Address Table	108
ARP & FDB Table.....	109
L2 Multicast Control	110
IGMP Snooping	110
MLD Snooping.....	120
Multicast VLAN	130
Multicast Filtering	139
IPv4 Multicast Filtering	139
IPv6 Multicast Filtering	142
Multicast Filtering Mode.....	145
ERPS Settings.....	146
Local Loopback Port Settings	150
LLDP	151
LLDP.....	151
LLDP-MED.....	160
Chapter 6 L3 Features.....	163
IPv4 Static/Default Route Settings.....	163
IPv4 Route Table	164
IPv6 Static/Default Route Settings.....	164
IPv6 Route Table	165
IP Forwarding Table.....	166
Chapter 7 QoS.....	167
802.1p Settings	168
802.1p Default Priority Settings.....	168

802.1p User Priority Settings.....	169
802.1p Map Settings.....	170
Bandwidth Control.....	171
Bandwidth Control Settings	171
Queue Bandwidth Control Settings	172
Traffic Control Settings.....	173
DSCP	176
DSCP Trust Settings	176
DSCP Map Settings.....	177
HOL Blocking Prevention	179
Scheduling Settings	180
QoS Scheduling.....	180
QoS Scheduling Mechanism	181
Management Packet Priority Settings.....	181
SRED	182
SRED Settings.....	182
SRED Drop Counter	183
Chapter 8 ACL.....	185
ACL Configuration Wizard.....	185
Access Profile List.....	186
Adding an Ethernet ACL Profile	187
Adding an IPv4 ACL Profile	192
Adding an IPv6 ACL Profile.....	197
Adding a Packet Content ACL Profile	201
CPU Access Profile List	205
Adding a CPU Ethernet ACL Profile.....	206
Adding a CPU IPv4 ACL Profile	210
Adding a CPU IPv6 ACL Profile	214
Adding a CPU Packet Content ACL Profile.....	217
ACL Finder	221
ACL Flow Meter.....	222
Chapter 9 Security.....	226
802.1X.....	226
802.1X Global Settings.....	229
802.1X Port Settings.....	230
802.1X User Settings.....	232
Guest VLAN Settings.....	233
Authenticator State	234
Authenticator Statistics	234
Authenticator Session Statistics	235
Authenticator Diagnostics.....	236

Initialize Port-based Port(s)	237
Initialize MAC-based Port(s).....	238
Reauthenticate Port-based Port(s).....	238
Reauthenticate MAC-based Port(s)	239
RADIUS.....	240
Authentication RADIUS Server Settings	240
RADIUS Accounting Settings	241
RADIUS Authentication	241
RADIUS Account Client.....	243
IP-MAC-Port Binding (IMPB).....	245
IMPB Global Settings	245
IMPB Port Settings	246
IMPB Entry Settings	247
MAC Block List	248
DHCP Snooping	248
ND Snoop	250
MAC-based Access Control (MAC).....	251
MAC-based Access Control Settings	252
MAC-based Access Control Local Settings.....	253
MAC-based Access Control Authentication State	254
Web-based Access Control (WAC).....	255
WAC Global Settings.....	257
WAC User Settings.....	258
WAC Port Settings.....	259
WAC Authentication State	260
Compound Authentication	260
Compound Authentication Settings	261
Compound Authentication Guest VLAN Settings	262
Port Security.....	263
Port Security Settings	263
Port Security VLAN Settings	265
Port Security Entries.....	265
ARP Spoofing Prevention Settings	266
BPDU Attack Protection	267
Loopback Detection Settings	269
Traffic Segmentation Settings.....	270
NetBIOS Filtering Settings	271
DHCP Server Screening	272
DHCP Server Screening Port Settings.....	272
DHCP Offer Permit Entry Settings	273
Access Authentication Control	273

Enable Admin	275
Authentication Policy Settings	275
Application Authentication Settings	276
Authentication Server Group Settings	277
Authentication Server Settings	279
Login Method Lists Settings	280
Enable Method Lists Settings	281
Local Enable Password Settings	282
SSL Settings.....	283
SSH	286
SSH Settings	286
SSH Authentication Method and Algorithm Settings.....	287
SSH User Authentication List	289
Trusted Host Settings.....	290
Safeguard Engine Settings	292
Chapter 10 Network Application	295
DHCP	295
DHCP Relay	295
DHCP Server.....	301
DHCP Local Relay Settings.....	306
DHCPv6 Relay	307
DNS.....	309
DNS Relay.....	309
SNTP	311
SNTP Settings	311
Time Zone Settings	311
Chapter 11 OAM.....	314
CFM.....	314
CFM Settings.....	314
CFM Port Settings	321
CFM Loopback Settings	322
CFM Linktrace Settings	323
CFM Packet Counter	324
CFM Fault Table.....	325
CFM MP Table	325
Ethernet OAM.....	326
Ethernet OAM Settings.....	326
Ethernet OAM Configuration Settings	327
Ethernet OAM Event Log.....	329
Ethernet OAM Statistics	329
DULD Settings.....	330

Cable Diagnostics	331
Chapter 12 Monitoring	333
Utilization	333
CPU Utilization	333
DRAM & Flash Utilization	334
Port Utilization	334
Statistics	335
Port Statistics	335
Packet Size	346
VLAN Counter Statistics	348
Historical Counter & Utilization	348
Mirror	351
Port Mirror Settings	351
RSPAN Settings	352
sFlow	354
sFlow Global Settings	354
sFlow Analyzer Server Settings	354
sFlow Flow Sampler Settings	356
sFlow Counter Poller Settings	356
Ping Test	357
Trace Route	359
Peripheral	361
Device Environment	361
External Alarm Settings	361
Device Status	362
Chapter 13 Save and Tools	363
Save Configuration ID 1	363
Save Configuration ID 2	364
Save Log	364
Save All	365
Configuration File Backup & Restore	366
Upload Log File	367
Reset	369
Download Firmware	369
Reboot System	371
Appendix Section	373
Appendix A Password Recovery Procedure	373
Appendix B System Log Entries	375
Appendix C Trap Entries	398

Intended Readers

Typographical Conventions

Notes, Notices and Cautions

Safety Instructions

General Precautions for Rack-Mountable Products

Protecting Against Electrostatic Discharge

The **DGS-3710 Series Web UI Reference Guide** contains information for setup and management of the Switch. This manual is intended for network managers familiar with network management concepts and terminology.

Typographical Conventions

Convention	Description
[]	In a command line, square brackets indicate an optional entry. For example: [copy filename] means that optionally you can type copy followed by the name of the file. Do not type the brackets.
Bold font	Indicates a button, a toolbar icon, menu, or menu item. For example: Open the File menu and choose Cancel . Used for emphasis. May also indicate system messages or prompts appearing on screen. For example: You have mail . Bold font is also used to represent filenames, program names and commands. For example: use the copy command .
Boldface Typewriter Font	Indicates commands and responses to prompts that must be typed exactly as printed in the manual.
Initial capital letter	Indicates a window name. Names of keys on the keyboard have initial capitals. For example: Click Enter.
Menu Name > Menu Option	Menu Name > Menu Option Indicates the menu structure. Device > Port > Port Properties means the Port Properties menu option under the Port menu option that is located under the Device menu.

Notes, Notices and Cautions



A **NOTE** indicates important information that helps make better use of the device.



A **NOTICE** indicates either potential damage to hardware or loss of data and tells how to avoid the problem.



A **CAUTION** indicates a potential for property damage, personal injury, or death.

Safety Instructions

Use the following safety guidelines to ensure your own personal safety and to help protect your system from potential damage. Throughout this safety section, the caution icon () is used to indicate cautions and precautions that need to be reviewed and followed.

Safety Cautions

To reduce the risk of bodily injury, electrical shock, fire, and damage to the equipment observe the following precautions:

- Observe and follow service markings.
 - Do not service any product except as explained in the system documentation.
 - Opening or removing covers that are marked with the triangular symbol with a lightning bolt may expose the user to electrical shock.
 - Only a trained service technician should service components inside these compartments.
- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your trained service provider:
 - Damage to the power cable, extension cable, or plug.
 - An object has fallen into the product.
 - The product has been exposed to water.
 - The product has been dropped or damaged.
 - The product does not operate correctly when the operating instructions are correctly followed.
- Keep your system away from radiators and heat sources. Also, do not block cooling vents.
- Do not spill food or liquids on system components, and never operate the product in a wet environment. If the system gets wet, see the appropriate section in the troubleshooting guide or contact your trained service provider.
- Do not push any objects into the openings of the system. Doing so can cause fire or electric shock by shorting out interior components.
- Use the product only with approved equipment.
- Allow the product to cool before removing covers or touching internal components.
- Operate the product only from the type of external power source indicated on the electrical ratings label. If unsure of the type of power source required, consult your service provider or local power company.
- To help avoid damaging the system, be sure the voltage selection switch (if provided) on the power supply is set to match the power available at the Switch's location:
 - 115 volts (V)/60 hertz (Hz) in most of North and South America and some Far Eastern countries such as South Korea and Taiwan
 - 100 V/50 Hz in eastern Japan and 100 V/60 Hz in western Japan
 - 230 V/50 Hz in most of Europe, the Middle East, and the Far East
- Also, be sure that attached devices are electrically rated to operate with the power available in your location.
- Use only approved power cable(s). If you have not been provided with a power cable for your system or for any AC-powered option intended for your system, purchase a power cable that is approved for use in your country. The power cable must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cable should be greater than the ratings marked on the product.
- To help prevent electric shock, plug the system and peripheral power cables into properly grounded electrical outlets. These cables are equipped with three-prong plugs to help ensure proper grounding. Do

not use adapter plugs or remove the grounding prong from a cable. If using an extension cable is necessary, use a 3-wire cable with properly grounded plugs.

- Observe extension cable and power strip ratings. Make sure that the total ampere rating of all products plugged into the extension cable or power strip does not exceed 80 percent of the ampere ratings limit for the extension cable or power strip.
- To help protect the system from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).
- Position system cables and power cables carefully; route cables so that they cannot be stepped on or tripped over. Be sure that nothing rests on any cables.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local/national wiring rules.
- When connecting or disconnecting power to hot-pluggable power supplies, if offered with your system, observe the following guidelines:
 - Install the power supply before connecting the power cable to the power supply.
 - Unplug the power cable before removing the power supply.
 - If the system has multiple sources of power, disconnect power from the system by unplugging all power cables from the power supplies.
- Move products with care; ensure that all casters and/or stabilizers are firmly connected to the system. Avoid sudden stops and uneven surfaces.

General Precautions for Rack-Mountable Products

Observe the following precautions for rack stability and safety. Also, refer to the rack installation documentation accompanying the system and the rack for specific caution statements and procedures.

- Systems are considered to be components in a rack. Thus, "component" refers to any system as well as to various peripherals or supporting hardware.



CAUTION: Installing systems in a rack without the front and side stabilizers installed could cause the rack to tip over, potentially resulting in bodily injury under certain circumstances. Therefore, always install the stabilizers before installing components in the rack. After installing system/components in a rack, never pull more than one component out of the rack on its slide assemblies at one time. The weight of more than one extended component could cause the rack to tip over and may result in serious injury.

- Before working on the rack, make sure that the stabilizers are secured to the rack, extended to the floor, and that the full weight of the rack rests on the floor. Install front and side stabilizers on a single rack or front stabilizers for joined multiple racks before working on the rack.
- Always load the rack from the bottom up, and load the heaviest item in the rack first.
- Make sure that the rack is level and stable before extending a component from the rack.
- Use caution when pressing the component rail release latches and sliding a component into or out of a rack; the slide rails can pinch your fingers.
- After a component is inserted into the rack, carefully extend the rail into a locking position, and then slide the component into the rack.
- Do not overload the AC supply branch circuit that provides power to the rack. The total rack load should not exceed 80 percent of the branch circuit rating.
- Ensure that proper airflow is provided to components in the rack.

- Do not step on or stand on any component when servicing other components in a rack.



NOTE: A qualified electrician must perform all connections to DC power and to safety grounds. All electrical wiring must comply with applicable local or national codes and practices.



CAUTION: Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if uncertain that suitable grounding is available.



CAUTION: The system chassis must be positively grounded to the rack cabinet frame. Do not attempt to connect power to the system until grounding cables are connected. Completed power and safety ground wiring must be inspected by a qualified electrical inspector. An energy hazard will exist if the safety ground cable is omitted or disconnected.

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside the system. To prevent static damage, discharge static electricity from your body before touching any of the electronic components, such as the microprocessor. This can be done by periodically touching an unpainted metal surface on the chassis.

The following steps can also be taken prevent damage from electrostatic discharge (ESD):

When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until ready to install the component in the system. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.

When transporting a sensitive component, first place it in an antistatic container or packaging.

Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads, workbench pads and an antistatic grounding strap.

Chapter 2 Web-based Switch Configuration

Introduction

Login to the Web Manager

Web-based User Interface

Web Pages

Introduction

All software functions of the DGS-3710 Series Switch can be managed, configured and monitored via the embedded web-based (HTML) interface. Manage the Switch from remote stations anywhere on the network through a standard browser. The browser acts as a universal access tool and can communicate directly with the Switch using the HTTP protocol.

The Web-based management module and the Console program (and Telnet) are different ways to access the same internal switching software and configure it. Thus, all settings encountered in web-based management are the same as those found in the console program.

Login to the Web Manager

To begin managing the Switch, simply run the browser installed on your computer and point it to the IP address you have defined for the device. The URL in the address bar should read something like: `http://123.123.123.123`, where the numbers 123 represent the IP address of the Switch.



NOTE: The factory default IP address is 10.90.90.90. To be able to connect to the Web User Interface, the user must configure an IP address for this Switch first, using the Command Line Interface.



NOTE: By default, there is one administrator account already created. The username for this default account is **admin** and the password is **1234**.

This opens the management module's user authentication window, as seen below.



Figure 2-1 Enter Network Password window

Enter the username and password and click **OK**. This will open the Web-based user interface. The Switch management features available in the web-based manager are explained below.

Web-based User Interface

The user interface provides access to various Switch configuration and management windows, allows you to view performance statistics, and permits you to graphically monitor the system status.

Areas of the User Interface

The figure below shows the user interface. Three distinct areas divide the user interface, as described in the table.

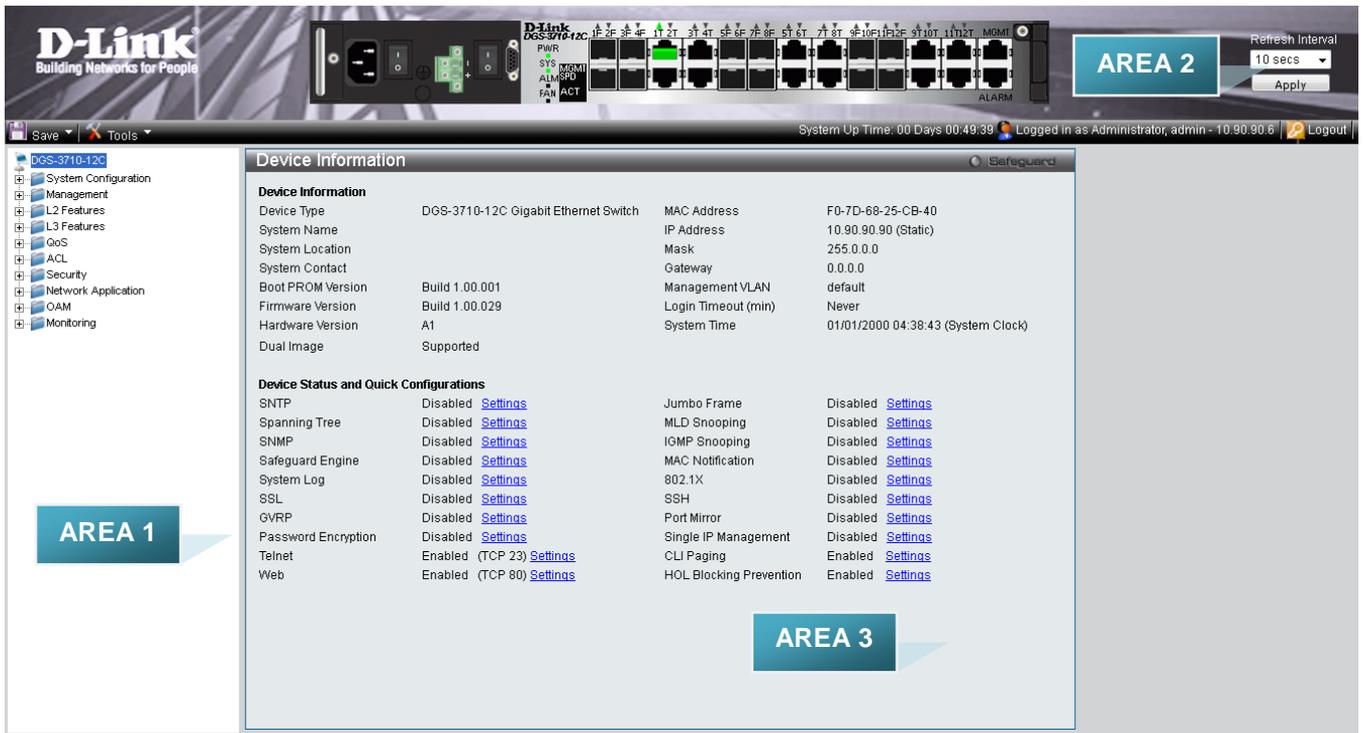


Figure 2-2 Main Web-Manager page

Area Number	Function
Area 1	Select the menu or window to display. Open folders and click the hyperlinked menu buttons and subfolders contained within them to display menus. Click the D-Link logo to go to the D-Link website.
Area 2	Presents a graphical near real-time image of the front panel of the Switch. This area displays the Switch's ports, console and management port, showing port activity. Some management functions, including save, reboot, download and upload are accessible here.
Area 3	Presents switch information based on user selection and the entry of configuration data.



NOTE: Any changes made to the Switch configuration during the current session must be saved in the Save Configuration window or use the command line interface (CLI) command save.

Web Pages

When connecting to the management mode of the Switch with a web browser, a login screen is displayed. Enter a user name and password to access the Switch's management mode.

Below is a list of the main folders available in the Web interface:

System Configuration - In this section the user will be able to configure features regarding the Switch's configuration.

Management - In this section the user will be able to configure features regarding the Switch's management.

L2 Features - In this section the user will be able to configure features regarding the Layer 2 functionality of the Switch.

L3 Features - In this section the user will be able to configure features regarding the Layer 3 functionality of the Switch.

QoS - In this section the user will be able to configure features regarding the Quality of Service functionality of the Switch.

ACL - In this section the user will be able to configure features regarding the Access Control List functionality of the Switch.

Security - In this section the user will be able to configure features regarding the Switch's security.

Network Application - In this section the user will be able to configure features regarding network applications handled by the Switch.

OAM - In this section the user will be able to configure features regarding the Switch's operations, administration and maintenance (OAM).

Monitoring - In this section the user will be able to monitor the Switch's configuration and statistics.



NOTE: Be sure to configure the user name and password in the User Accounts menu before connecting the Switch to the greater network.

Chapter 3 System Configuration

Device Information

System Information Settings

Dual Configuration Settings

Firmware Information Settings

Port Configuration

Serial Port Settings

Warning Temperature Settings

System Log configuration

Time Range Settings

Time Settings

User Accounts Settings

Synchronous Ethernet Settings

Device Information

This window contains the main settings for all the major functions for the Switch. It appears automatically when you log on to the Switch. To return to the Device Information window after viewing other windows, click the **DGS-3710-12C** link.

The Device Information window shows the Switch's MAC Address (assigned by the factory and unchangeable), the Boot PROM Version, Firmware Version, Hardware Version, and many other important types of information. This is helpful to keep track of PROM and firmware updates and to obtain the Switch's MAC address for entry into another network device's address table, if necessary. In addition, this window displays the status of functions on the Switch to quickly assess their current global status.

Many functions are hyper-linked for easy access to enable quick configuration from this window.

Device Information			
Device Information			
Device Type	DGS-3710-12C Gigabit Ethernet Switch	MAC Address	F0-7D-68-25-CB-40
System Name		IP Address	10.90.90.90 (Static)
System Location		Mask	255.0.0.0
System Contact		Gateway	0.0.0.0
Boot PROM Version	Build 1.00.001	Management VLAN	default
Firmware Version	Build 1.00.029	Login Timeout (min)	Never
Hardware Version	A1	System Time	01/01/2000 04:38:43 (System Clock)
Dual Image	Supported		
Device Status and Quick Configurations			
SNTP	Disabled Settings	Jumbo Frame	Disabled Settings
Spanning Tree	Disabled Settings	MLD Snooping	Disabled Settings
SNMP	Disabled Settings	IGMP Snooping	Disabled Settings
Safeguard Engine	Disabled Settings	MAC Notification	Disabled Settings
System Log	Disabled Settings	802.1X	Disabled Settings
SSL	Disabled Settings	SSH	Disabled Settings
GVRP	Disabled Settings	Port Mirror	Disabled Settings
Password Encryption	Disabled Settings	Single IP Management	Disabled Settings
Telnet	Enabled (TCP 23) Settings	CLI Paging	Enabled Settings
Web	Enabled (TCP 80) Settings	HOL Blocking Prevention	Enabled Settings

Figure 3-1 Device Information window

Click the [Settings](#) link to navigate to the appropriate feature page for configuration.

System Information Settings

The user can enter a **System Name**, **System Location**, and **System Contact** to aid in defining the Switch.

To view the following window, click **System Configuration > System Information Settings**, as show below:

System Information Settings	
MAC Address	F0-7D-68-25-CB-40
Firmware Version	Build 1.00.029
Hardware Version	A1
System Name	<input type="text"/>
System Location	<input type="text"/>
System Contact	<input type="text"/>
<input type="button" value="Apply"/>	

Figure 3-2 System Information Settings window

The fields that can be configured are described below:

Parameter	Description
System Name	Enter a system name for the Switch, if so desired. This name will identify it in the Switch network.
System Location	Enter the location of the Switch, if so desired.

System Contact

Enter a contact name for the Switch, if so desired.

Click the **Apply** button to implement changes made.

Dual Configuration Settings

The following window is used to configure configuration information set in the Switch. This Switch has the capability to store two configuration images in its memory.

To access this window, click **System Configuration > Dual Configuration Settings**, as shown below:

ID	Version	Size (byte)	Update Time	From	User	Boot
1	1.00.029	22752	2000/01/01 04:42:11	Local save	admin(Cons...	*
*2	(Empty)					

** means the current active configuration
(R) means configuration update through Serial Port(RS232)
(T) means configuration update through TELNET
(S) means configuration update through SNMP
(W) means configuration update through WEB
(SSH) means configuration update through SSH
(SIM) means configuration update through Single IP Management

Figure 3-3 Dual Configuration Settings window

This window displays the following information:

Parameter	Description
ID	States the ID number of the configuration file located in the Switch's memory. The Switch can store two configuration files for use. ID 1 will be the default boot up configuration file for the Switch unless otherwise configured by the user.
Version	Displays the firmware version set in the Switch.
Size	Displays the size of the configuration file, in bytes.
Update Time	Displays the time that the configuration file was updated to the Switch.
From	Displays the location from which the configuration file was uploaded.
User	Displays the name of the user (device) that updated this configuration file. Unknown users will be displayed as Anonymous.
Boot	Indicates which configuration file is set as the boot up configuration for the Switch.

Click the **Set Boot** button to toggle which configuration ID will be used as the boot up configuration.

Click the **Active** button to enable the configuration file settings.

Click the **Delete** button to delete the specified configuration file from the Switch's memory.

Firmware Information Settings

The following window allows the user to view information about current firmware images stored on the Switch. To view this window, click **System Configuration > Firmware Information Settings**, as shown below:

ID	Version	Size (Bytes)	Update Time	From	User
*1	1.00.029	3397938	2000/01/01 00:20:05	10.90.90.6	admin(WEB)
2	(Empty)				

** means boot up firmware

(R) means firmware update through Serial Port (RS232)

(T) means firmware update through Telnet

(S) means firmware update through SNMP

(W) means firmware update through Web

(SSH) means firmware update through SSH

(SIM) means firmware update through Single IP Management

Figure 3-4 Firmware Information Settings Window

This window displays the following information:

Parameter	Description
ID	States the ID number of the firmware file located in the Switch's memory. The Switch can store two firmware files for use. ID 1 will be the default boot up firmware file for the Switch unless otherwise configured by the user.
Version	Displays the firmware version set in the Switch.
Size	Displays the size of the firmware file, in bytes.
Update Time	Displays the time that the firmware file was updated to the Switch.
From	Displays the location from which the firmware file was uploaded.
User	Displays the name of the user (device) that updated this firmware file. Unknown users will be displayed as Anonymous.

Click the **Set Boot** button to toggle which configuration ID will be used as the boot up configuration.

Click the **Delete** button to delete the specified configuration file from the Switch's memory.

Port Configuration

This section contains information for configuring various attributes and properties for individual physical ports, including port speed and flow control.

DDM

This folder contains windows that perform Digital Diagnostic Monitoring functions on the Switch. There are windows that allow the user to view the digital diagnostic monitoring status of SFP modules inserting to the Switch and to configure alarm settings, warning settings, temperature threshold settings, voltage threshold settings, bias current threshold settings, Tx power threshold settings, and Rx power threshold settings.

DDM Settings

The DDM settings window allows the user to configure the action that will occur for specific ports when an exceeding alarm threshold or warning threshold event is encountered.

To view the following window, click **System Configuration > Port Configuration > DDM > DDM Settings**, as show below:

Port	DDM State	Shutdown
1	Enabled	None
2	Enabled	None
3	Enabled	None
4	Enabled	None
5	Enabled	None
6	Enabled	None
7	Enabled	None
8	Enabled	None
9	Enabled	None
10	Enabled	None
11	Enabled	None
12	Enabled	None

Figure 3-5 DDM Settings window

The fields that can be configured are described below:

Parameter	Description
Trap State	Specifies whether or not to send the trap, when the operating parameter exceeds the alarm or warning threshold. By default, this option is enabled.
Log State	Specifies whether or not to send the log, when the operating parameter exceeds the alarm or warning threshold.
Power Unit	Specifies the power unit used for the DDM settings.
From Port ~ To Port	Specifies a port or range of ports to be configured.
State	Specifies to enable or disable the DDM settings state.
Shutdown	Specifies whether or not to shutdown the port, when the operating parameter exceeds the <i>Alarm</i> or <i>Warning</i> threshold.

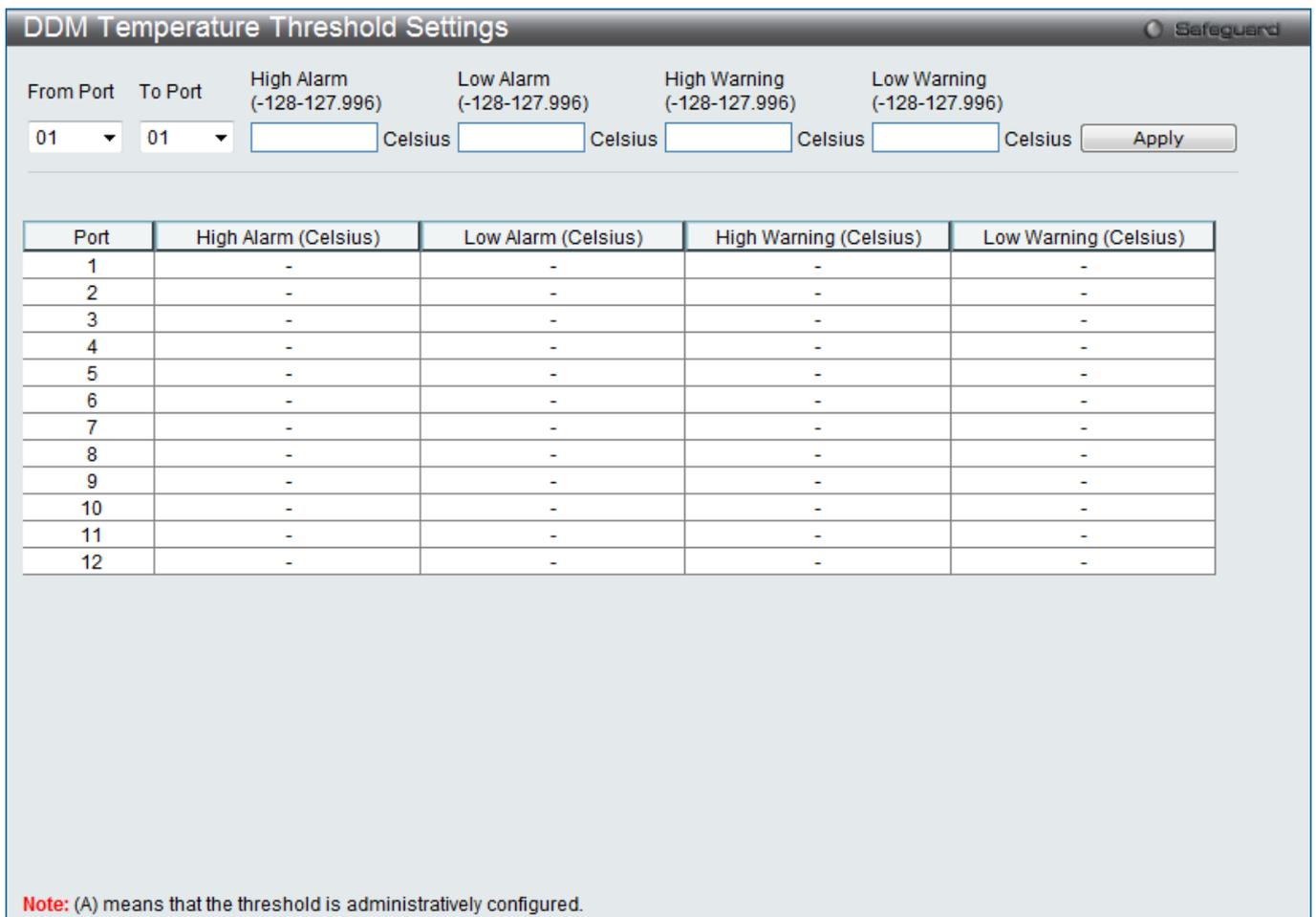
Click the **Apply** button to implement changes made.

Click the **Reload Threshold** button to reload the threshold for the range of ports specified.

DDM Temperature Threshold Settings

This table is used to configure the DDM Temperature Threshold Settings for specific ports on the Switch.

To view the following window, click **System Configuration > Port Configuration > DDM > DDM Temperature Threshold Settings**, as show below:



Port	High Alarm (Celsius)	Low Alarm (Celsius)	High Warning (Celsius)	Low Warning (Celsius)
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-
11	-	-	-	-
12	-	-	-	-

Note: (A) means that the threshold is administratively configured.

Figure 3-6 DDM Temperature Threshold Settings window

The fields that can be configured are described below:

Parameter	Description
From Port ~ To Port	Specifies a port or range of ports to be configured.
High Alarm	This is the highest threshold for the alarm. When the operating parameter rises above this value, action associated with the alarm will be taken.
Low Alarm	This is the lowest threshold for the alarm. When the operating parameter falls below this value, action associated with the alarm will be taken.
High Warning	This is the highest threshold for the warning. When the operating parameter rises

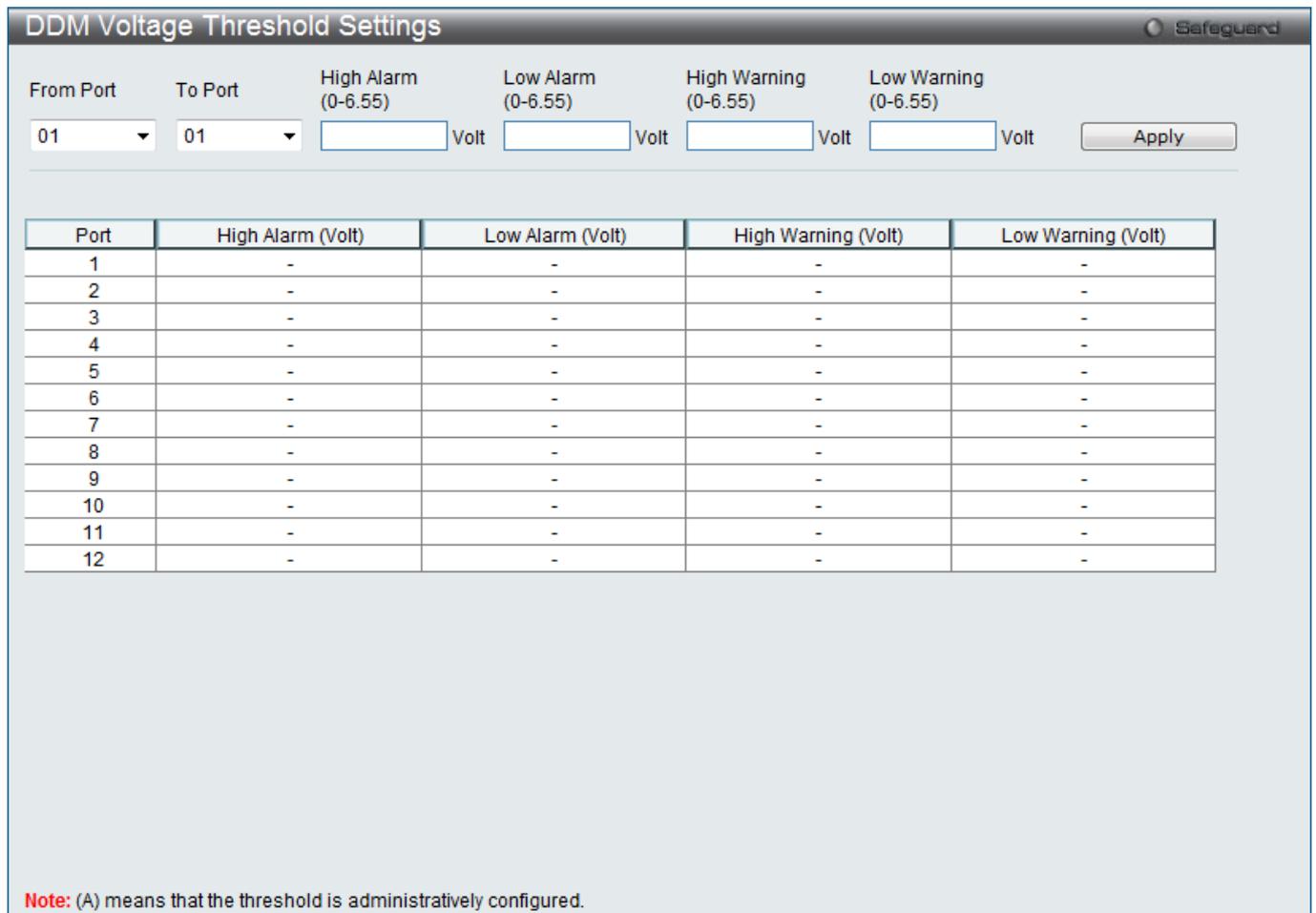
	above this value, action associated with the warning will be taken.
Low Warning	This is the lowest threshold for the warning. When the operating parameter falls below this value, action associated with the warning will be taken.

Click the **Apply** button to implement changes made.

DDM Voltage Threshold Settings

This table is used to configure the DDM Voltage Threshold Settings for specific ports on the Switch.

To view the following window, click **System Configuration > Port Configuration > DDM > DDM Voltage Threshold Settings**, as show below:



DDM Voltage Threshold Settings Safeguard

From Port: 01 To Port: 01 High Alarm (0-6.55) Volt: [] Low Alarm (0-6.55) Volt: [] High Warning (0-6.55) Volt: [] Low Warning (0-6.55) Volt: []

Port	High Alarm (Volt)	Low Alarm (Volt)	High Warning (Volt)	Low Warning (Volt)
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-
11	-	-	-	-
12	-	-	-	-

Note: (A) means that the threshold is administratively configured.

Figure 3-7 DDM Voltage Threshold Settings window

The fields that can be configured are described below:

Parameter	Description
From Port ~ To Port	Specifies a port or range of ports to be configured.
High Alarm	This is the highest threshold for the alarm. When the operating parameter rises above this value, action associated with the alarm will be taken.

Low Alarm	This is the lowest threshold for the alarm. When the operating parameter falls below this value, action associated with the alarm will be taken.
High Warning	This is the highest threshold for the warning. When the operating parameter rises above this value, action associated with the warning will be taken.
Low Warning	This is the lowest threshold for the warning. When the operating parameter falls below this value, action associated with the warning will be taken.

Click the **Apply** button to implement changes made.

DDM Bias Current Threshold Settings

This table is used to configure the threshold of the bias current for specific ports on the Switch.

To view the following window, click **System Configuration > Port Configuration > DDM > DDM Bias Current Threshold Settings**, as show below:

DDM Bias Current Threshold Settings
Safeguard

From Port
To Port

High Alarm (0-131)
Low Alarm (0-131)
High Warning (0-131)
Low Warning (0-131)

01
01

mA
 mA
 mA
 mA

Port	High Alarm (mA)	Low Alarm (mA)	High Warning (mA)	Low Warning (mA)
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-
11	-	-	-	-
12	-	-	-	-

Note: (A) means that the threshold is administratively configured.

Figure 3-8 DDM Bias Current Threshold Settings window

The fields that can be configured are described below:

Parameter	Description
From Port ~ To Port	Specifies a port or range of ports to be configured.

High Alarm	This is the highest threshold for the alarm. When the operating parameter rises above this value, action associated with the alarm will be taken.
Low Alarm	This is the lowest threshold for the alarm. When the operating parameter falls below this value, action associated with the alarm will be taken.
High Warning	This is the highest threshold for the warning. When the operating parameter rises above this value, action associated with the warning will be taken.
Low Warning	This is the lowest threshold for the warning. When the operating parameter falls below this value, action associated with the warning will be taken.

Click the **Apply** button to implement changes made.

DDM TX Power Threshold Settings

This table is used to configure the threshold of TX power for specific ports on the Switch.

To view the following window, click **System Configuration > Port Configuration > DDM > DDM TX Power Threshold Settings**, as show below:

DDM TX Power Threshold Settings
Safeguard

From Port

01

To Port

01

High Alarm
(-40-8.1647)

dBm

Low Alarm
(-40-8.1647)

dBm

High Warning
(-40-8.1647)

dBm

Low Warning
(-40-8.1647)

dBm

Port	High Alarm (dBm)	Low Alarm (dBm)	High Warning (dBm)	Low Warning (dBm)
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-
11	-	-	-	-
12	-	-	-	-

Note: (A) means that the threshold is administratively configured.

Figure 3-9 DDM TX Power Threshold Settings window

The fields that can be configured are described below:

Parameter	Description
From Port ~ To Port	Specifies a port or range of ports to be configured.
High Alarm	This is the highest threshold for the alarm. When the operating parameter rises above this value, action associated with the alarm will be taken.
Low Alarm	This is the lowest threshold for the alarm. When the operating parameter falls below this value, action associated with the alarm will be taken.
High Warning	This is the highest threshold for the warning. When the operating parameter rises above this value, action associated with the warning will be taken.
Low Warning	This is the lowest threshold for the warning. When the operating parameter falls below this value, action associated with the warning will be taken.

Click the **Apply** button to implement changes made.

DDM RX Power Threshold Settings

This table is used to configure the threshold of RX power for specific ports on the Switch.

To view the following window, click **System Configuration > Port Configuration > DDM > DDM RX Power Threshold Settings**, as show below:

DDM RX Power Threshold Settings
Safeguard

From Port
01

To Port
01

High Alarm
(-40-8.1647)
 dBm

Low Alarm
(-40-8.1647)
 dBm

High Warning
(-40-8.1647)
 dBm

Low Warning
(-40-8.1647)
 dBm

Port	High Alarm (dBm)	Low Alarm (dBm)	High Warning (dBm)	Low Warning (dBm)
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-
11	-	-	-	-
12	-	-	-	-

Note: (A) means that the threshold is administratively configured.

Figure 3-10 DDM RX Power Threshold Settings window

The fields that can be configured are described below:

Parameter	Description
From Port ~ To Port	Specifies a port or range of ports to be configured.
High Alarm	This is the highest threshold for the alarm. When the operating parameter rises above this value, action associated with the alarm will be taken.
Low Alarm	This is the lowest threshold for the alarm. When the operating parameter falls below this value, action associated with the alarm will be taken.
High Warning	This is the highest threshold for the warning. When the operating parameter rises above this value, action associated with the warning will be taken.
Low Warning	This is the lowest threshold for the warning. When the operating parameter falls below this value, action associated with the warning will be taken.

Click the **Apply** button to implement changes made.

DDM Status Table

This window displays the current operating digital diagnostic monitoring parameters and their values on the SFP module for specified ports.

To view the following window, click **System Configuration > Port Configuration > DDM > DDM Status Table**, as show below:

DDM Status Table					
Port	Temperature (Celsius)	Voltage (V)	Bias Current (mA)	TX Power (dBm)	RX Power (dBm)
1	-	-	-	-	-
2	-	-	-	-	-
3	-	-	-	-	-
4	-	-	-	-	-
5	-	-	-	-	-
6	-	-	-	-	-
7	-	-	-	-	-
8	-	-	-	-	-
9	-	-	-	-	-
10	-	-	-	-	-
11	-	-	-	-	-
12	-	-	-	-	-

Note: (A) means that the threshold is administratively configured.

Figure 3-11 DDM Status Table window

Port Settings

This page used to configure the details of the switch ports.

To view the following window, click **System Configuration > Port Configuration > Port Settings**, as show below:

From Port	To Port	State	Speed/Duplex	Flow Control	Address Learning	MDIX	Medium Type
01	01	Enabled	Auto	Disabled	Enabled	Auto	Copper

Apply Refresh

Port	State	Speed/Duplex	Flow Control	Connection	MDIX	Address Learning
01 (C)	Enabled	Auto	Disabled	1000M/Full/None	Auto	Enabled
01 (F)	Enabled	Auto	Disabled	Link Down	Auto	Enabled
02 (C)	Enabled	Auto	Disabled	Link Down	Auto	Enabled
02 (F)	Enabled	Auto	Disabled	Link Down	Auto	Enabled
03 (C)	Enabled	Auto	Disabled	Link Down	Auto	Enabled
03 (F)	Enabled	Auto	Disabled	Link Down	Auto	Enabled
04 (C)	Enabled	Auto	Disabled	Link Down	Auto	Enabled
04 (F)	Enabled	Auto	Disabled	Link Down	Auto	Enabled
05 (C)	Enabled	Auto	Disabled	Link Down	Auto	Enabled
05 (F)	Enabled	Auto	Disabled	Link Down	Auto	Enabled
06 (C)	Enabled	Auto	Disabled	Link Down	Auto	Enabled
06 (F)	Enabled	Auto	Disabled	Link Down	Auto	Enabled

Figure 3-12 Port Settings window

To configure switch ports:

1. Choose the port or sequential range of ports using the **From Port** and **To Port** drop-down menus.
2. Use the remaining drop-down menus to configure the parameters described below:

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select the appropriate port range used for the configuration here.
State	Toggle the State field to either enable or disable a given port or group of ports.
Speed/Duplex	<p>Use the drop-down menu to select the speed in <i>Auto</i>, <i>10M Half</i>, <i>10M Full</i>, <i>100M Half</i>, <i>100M Full</i>, <i>1000M Full_Master</i> and <i>1000M Full_Slave</i>. <i>Auto</i> denotes auto-negotiation among 10, 100 and 1000 Mbps devices, in full- or half-duplex (except 1000 Mbps which is always full duplex). The <i>Auto</i> setting allows the port to automatically determine the fastest settings the device the port is connected to can handle, and then to use those settings. The other options are <i>10M Half</i>, <i>10M Full</i>, <i>100M Half</i>, <i>100M Full</i>, <i>1000M Full_Master</i>, <i>1000M Full_Slave</i>, and <i>1000M Full</i>. There is no automatic adjustment of port settings with any option other than <i>Auto</i>.</p> <p>The Switch allows the user to configure two types of gigabit connections; <i>1000M Full_Master</i>, and <i>1000M Full_Slave</i> which refer to connections running a 1000BASE-T cable for connection between the Switch port and other device capable of a gigabit connection. The master setting (<i>1000M Full_Master</i>) will allow the port to advertise capabilities related to duplex, speed and physical layer type. The master setting will also determine the master and slave relationship between the two connected physical layers. This relationship is necessary for establishing the timing control between the two physical layers. The timing control is set on a master physical layer by a local source. The slave setting (<i>1000M Full_Slave</i>) uses loop timing, where the timing comes from a data stream received from the master. If one connection is set for <i>1000M Full_Master</i>, the other side of the connection must be set for <i>1000M Full_Slave</i>. Any other configuration will result in a link down status for both ports.</p>
Flow Control	Displays the flow control scheme used for the various port configurations. Ports configured for full-duplex use 802.3x flow control, half-duplex ports use backpressure flow control, and Auto ports use an automatic selection of the two. The default is Disabled.
Address Learning	Enable or disable MAC address learning for the selected ports. When <i>Enabled</i> , destination and source MAC addresses are automatically listed in the forwarding table. When address learning is <i>Disabled</i> , MAC addresses must be manually entered into the forwarding table. This is sometimes done for reasons of security or efficiency. See the section on Forwarding/Filtering for information on entering MAC addresses into the forwarding table. The default setting is Enabled.
MDIX	<p><i>Auto</i> - Select auto for auto sensing of the optimal type of cabling.</p> <p><i>Normal</i> - Select normal for normal cabling. If set to normal state, the port is in MDI mode and can be connected to a PC NIC using a straight-through cable or a port (in MDI mode) on another switch through a cross-over cable.</p> <p><i>Cross</i> - Select cross for cross cabling. If set to cross state, the port is in MDIX mode, and can be connected to a port (in MDI mode) on another switch through a straight cable.</p>

Medium Type	If configuring the Combo ports, this defines the type of transport medium to be used.
Connection	Here the current connection speed will be displayed.

Click the **Apply** button to implement changes made.

Click the **Refresh** button to refresh the display section of this page.

Port Description Settings

The Switch supports a port description feature where the user may name various ports.

To view the following window, click **System Configuration > Port Configuration > Port Description Settings**, as show below:

Port	Description
01 (C)	
01 (F)	
02 (C)	
02 (F)	
03 (C)	
03 (F)	
04 (C)	
04 (F)	
05 (C)	
05 (F)	
06 (C)	
06 (F)	
07 (C)	

Figure 3-13 Port Description Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select the appropriate port range used for the configuration here.
Medium Type	Specify the medium type for the selected ports. If configuring the Combo ports, the Medium Type defines the type of transport medium to be used, whether <i>Copper</i> or <i>Fiber</i> .
Description	Users may then enter a description for the chosen port(s).

Click the **Apply** button to implement changes made.

Port Error Disabled

The following window displays the information about ports that have been disconnected by the Switch when a packet storm occurs, when a loop was detected, or when a shutdown was initiated by the DDM function.

To view the following window, click **System Configuration > Port Configuration > Port Error Disabled**, as show below:

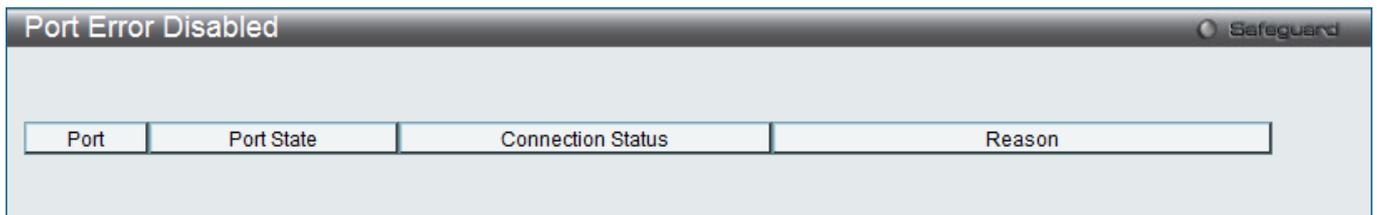


Figure 3-14 Port Error Disabled window

The fields that can be displayed are described below:

Parameter	Description
Port	Display the port that has been error disabled.
Port State	Describe the current running state of the port, whether enabled or disabled.
Connection Status	Display the uplink status of the individual ports, whether enabled or disabled.
Reason	Describe the reason why the port has been error-disabled, such as it has become a shutdown port for storm control.

Jumbo Frame Settings

The Switch supports jumbo frames. Jumbo frames are Ethernet frames with more than 1,518 bytes of payload. The Switch supports jumbo frames with a maximum frame size of up to 13312 bytes.

To view the following window, click **System Configuration > Port Configuration > Jumbo Frame Settings**, as show below:

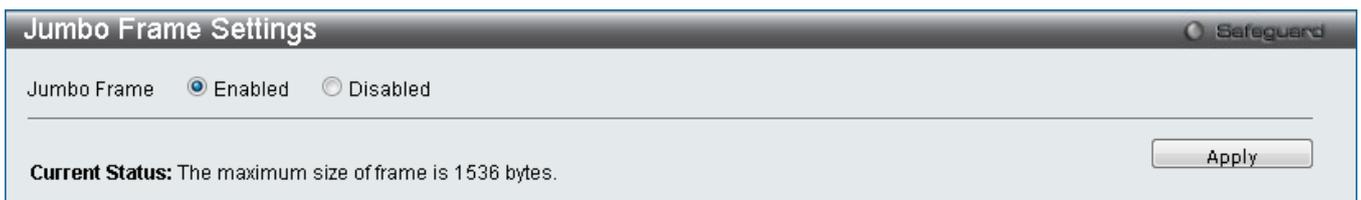


Figure 3-15 Jumbo Frame Settings window

The fields that can be configured are described below:

Parameter	Description
Jumbo Frame	Use the radio buttons to enable or disable the Jumbo Frame function on the Switch. When disabled, the maximum frame size is 1536 bytes. When enabled, the maximum frame size is 13312 bytes. By default, this option is enabled.

Click the **Apply** button to implement changes made.

EEE Settings

EEE is a short of Energy Efficient Ethernet which is defined in IEEE 802.3az. It is designed to reduce the energy consumption of a link when no packets are being sent.

To view the following window, click **System Configuration > Port Configuration > EEE Settings**, as show below:

From Port	To Port	State
01	01	Disabled

Port	State
01	Disabled
02	Disabled
03	Disabled
04	Disabled
05	Disabled
06	Disabled
07	Disabled
08	Disabled
09	Disabled
10	Disabled
11	Disabled
12	Disabled

Figure 3-16 EEE Settings window

The fields that can be configured are described below:

Parameter	Description
From Port ~ To Port:	Specifies the list of port that will be used for this configuration.
State	Specifies the EEE function state, for a specific port, on this Switch.

Click the **Apply** button to implement changes made.

Serial Port Settings

This window allows the user to adjust the Baud Rate and the Auto Logout values.

To view the following window, click **System Configuration > Serial Port Settings**, as show below:

Baud Rate: 115200

Auto Logout: 10 minutes

Data Bits: 8

Parity Bits: None

Stop Bits: 1

Figure 3-17 Serial Port Settings window

The fields that can be configured are described below:

Parameter	Description
Baud Rate	Specify the baud rate for the serial port on the Switch. There are four possible baud rates to choose from, <i>9600</i> , <i>19200</i> , <i>38400</i> and <i>115200</i> . For a connection to the Switch using the console port, the baud rate must be set to 115200, which is the default setting.
Auto Logout	Select the logout time used for the console interface. This automatically logs the user out after an idle period of time, as defined. Choose from the following options: <i>2</i> , <i>5</i> , <i>10</i> , <i>15 minutes</i> or <i>Never</i> . The default setting is 10 minutes.
Data Bits	Display the data bits used for the serial port connection.
Parity Bits	Display the parity bits used for the serial port connection.
Stop Bits	Display the stop bits used for the serial port connection.

Click the **Apply** button to implement changes made.

Warning Temperature Settings

This window allows the user to configure the system warning temperature parameters.

To view the following window, click **System Configuration > Warning Temperature Settings**, as show below:

Figure 3-18 Warning Temperature Settings window

The fields that can be configured are described below:

Parameter	Description
Traps State	Use the drop-down menu to enable or disable the traps state option of the warning temperature setting.
Log State	Use the drop-down menu to enable or disable the log state option of the warning temperature setting.
High Threshold (-500-500)	Enter the high threshold value of the warning temperature setting.
Low Threshold (-500-500)	Enter the low threshold value of the warning temperature setting.

Click the **Apply** button to implement changes made.

System Log configuration

System Log Settings

The Switch allows users to choose a method for which to save the switch log to the flash memory of the Switch.

To view the following window, click **System Configuration > System Log Configuration > System Log Settings**, as show below:

Figure 3-19 System Log Settings window

The fields that can be configured are described below:

Parameter	Description
System Log	Use the radio buttons to enable or disable the system log settings. Click the Apply button to accept the changes made.
Save Mode	Use the drop-down menu to choose the method for saving the switch log to the flash memory. The user has three options: <i>On Demand</i> – Users who choose this method will only save log files when they manually tell the Switch to do so, either using the Save Log link in the Save folder. <i>Time Interval</i> – Users who choose this method can configure a time interval by which the Switch will save the log files, in the box adjacent to this configuration field. The user may set a time between 1 and 65535 minutes. <i>Log Trigger</i> – Users who choose this method will have log files saved to the Switch every time a log event occurs on the Switch.

Click the **Apply** button to implement changes made.

System Log Server Settings

The Switch can send System log messages to up to four designated servers using the System Log Server.

To view the following window, click **System Configuration > System Log Configuration > System Log Server Settings**, as show below:

Figure 3-20 System Log Server Settings

The fields that can be configured are described below:

Parameter	Description
Server ID	Syslog server settings index (1 to 4).
Severity	Use the drop-down menu to select the higher level of messages that will be sent. All messages which level is higher than selecting level will be sent. The options are <i>Emergency(0)</i> , <i>Alert(1)</i> , <i>Critical(2)</i> , <i>Error(3)</i> , <i>Warning(4)</i> , <i>Notice(5)</i> , <i>Informational(6)</i> and <i>Debug(7)</i> .
Server IPv4 Address	The IPv4 address of the Syslog server.
Server IPv6 Address	The IPv6 address of the Syslog server.
Facility	Use the drop-down menu to select <i>Local 0</i> , <i>Local 1</i> , <i>Local 2</i> , <i>Local 3</i> , <i>Local 4</i> , <i>Local 5</i> , <i>Local 6</i> , or <i>Local 7</i> .
UDP Port (514 or 6000-65535)	Type the UDP port number used for sending Syslog messages. The default is 514.
Status	Choose <i>Enabled</i> or <i>Disabled</i> to activate or deactivate.

Click the **Apply** button to accept the changes made.

Click the **Delete All** button to remove all servers configured.

System Log

Users can view and delete the local history log as compiled by the Switch's management agent.

To view the following window, click **System Configuration > System Log Configuration > System Log**, as show below:

System Log Safeguard

Log Type: Severity ▾ Emergency Alert Critical Error Warning Notice Informational Debug All

Module List: (Log Software Module: MSTP, ERPS, ERROR_LOG, CFM_EXT)

Find Clear Log Clear Attack Log

Total Entries: 8

Index	Time	Level	Log Text
8	2012-11-05 15:43:13	INFO(6)	Configuration saved to flash by console (Username: admin)
7	2000-01-01 04:43:07	INFO(6)	Successful login through Web (Username: admin, IP: 10.90.90.6)
6	2000-01-01 04:43:02	INFO(6)	Successful login through Console (Username: admin)
5	2000-01-01 04:43:00	INFO(6)	Port 1 link up, 1000Mbps FULL duplex
4	2000-01-01 04:42:59	INFO(6)	Port 1 link down
3	2000-01-01 04:42:59	INFO(6)	Port 1 link up, 1000Mbps FULL duplex
2	2000-01-01 04:42:56	CRIT(2)	System cold start
1	2000-01-01 04:42:56	ERRO(3)	System has reset without management command

1/1 1 Go

Figure 3-21 System Log window

The Switch can record event information in its own log. Click **Go** to go to the next page of the **System Log** window.

The fields that can be configured or displayed are described below:

Parameter	Description
Log Type	<p>In the drop-down menu the user can select the log type that will be displayed.</p> <p><i>Severity</i> - When selecting <i>Severity</i> from the drop-down menu, a secondary tick must be made. Secondary ticks are Emergency, Alert, Critical, Error, Warning, Notice, Informational and Debug. To view all information in the log, simply tick the All check box. Enter the module name to search for the specific module.</p> <p><i>Module List</i> - When selecting <i>Module List</i>, the module name must be manually entered. Available modules are CFM_EXT, DHCPv6_CLIENT, DHCPv6_RELAY, DHCPv6_SERVER, ERPS, ERROR_LOG MSTP, OSPFV2 and VRRP.</p> <p><i>Attack Log</i> - When selecting <i>Attack Log</i> all attacks will be listed. Select a unit from the drop-down menu to display the result of the unit.</p>
Index	A counter incremented whenever an entry to the Switch's history log is made. The table displays the last entry (highest sequence number) first.
Time	Display the time in days, hours, minutes, and seconds since the Switch was last restarted.
Level	Display the level of the log entry.
Log Text	Display text describing the event that triggered the history log entry.

Click the **Find** button to display the log in the display section according to the selection made.

Click the **Clear Log** button to clear the entries from the log in the display section.

Click the **Clear Attack Log** button to clear the entries from the attack log in the display section.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

System Severity Settings

The Switch can be configured to allow alerts be logged or sent as a trap to an SNMP agent. The level at which the alert triggers either a log entry or a trap message can be set as well. Use the System Severity Settings window to set the criteria for alerts. The current settings are displayed below the System Severity Table.

To view the following window, click **System Configuration > System Log Configuration > System Severity Settings**, as show below:

System Severity	Severity Level
Trap	Information (6)
Log	Information (6)

Figure 3-22 System Severity Settings window

The fields that can be configured are described below:

Parameter	Description
System Severity	Choose how the alerts are used from the drop-down menu. Select <i>Log</i> to send the alert of the Severity Type configured to the Switch's log for analysis. Choose <i>Trap</i> to send it to an SNMP agent for analysis, or select <i>All</i> to send the chosen alert type to an SNMP agent and the Switch's log for analysis.
Severity Level	This drop-down menu allows you to select the level of messages that will be sent. The options are <i>Emergency (0)</i> , <i>Alert (1)</i> , <i>Critical (2)</i> , <i>Error (3)</i> , <i>Warning (4)</i> , <i>Notice (5)</i> , <i>Information (6)</i> and <i>Debug (7)</i> .

Click the **Apply** button to accept the changes made.

Time Range Settings

Time range is a time period that the respective function will take an effect on, such as ACL. For example, the administrator can configure the time-based ACL to allow users to surf the Internet on every Saturday and every Sunday, meanwhile to deny users to surf the Internet on weekdays.

The user may enter up to 64 time range entries on the Switch.

To view the following window, click **System Configuration > Time Range Settings**, as show below:

Figure 3-23 Time Range Settings window

The fields that can be configured are described below:

Parameter	Description
Range Name	Enter a name of no more than 32 alphanumeric characters that will be used to identify this time range on the Switch. This range name will be used in the Access Profile table to identify the access profile and associated rule to be enabled during this time range.
Hours (HH MM SS)	This parameter is used to set the time in the day that this time range is to be enabled using the following parameters: <i>Start Time</i> - Use this parameter to identify the starting time of the time range, in hours, minutes and seconds, based on the 24-hour time system. <i>End Time</i> - Use this parameter to identify the ending time of the time range, in hours, minutes and seconds, based on the 24-hour time system.
Weekdays	Use the check boxes to select the corresponding days of the week that this time range is to be enabled. Tick the Select All Days check box to configure this time range for every day of the week.

Click the **Apply** button to accept the changes made. Current configured entries will be displayed in the **Time Range Information** table in the bottom half of the window shown above.

Time Settings

Users can configure the time settings for the Switch.

To view the following window, click **System Configuration > Time Settings**, as show below:

Figure 3-24 Time Settings window

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

Date (DD/MM/YYYY)	Enter the current day, month, and year to update the system clock.
Time (HH:MM:SS)	Enter the current time in hours, minutes, and seconds.

Click the **Apply** button to accept the changes made.

User Accounts Settings

The Switch allows the control of user privileges.

To view the following window, click **System Configuration > User Accounts Settings**, as show below:

Figure 3-25 User Accounts Settings window

To add a new user, type in a User Name and New Password and retype the same password in the Confirm New Password field. Choose the level of privilege (Admin, Operator, or User) from the Access Right drop-down menu.



NOTE: By default, there is one administrator account already created. The username for this default account is **admin** and the password is **1234**.

Management	Admin	Operator	User
Configuration	Read/Write	Read/Write–partly	No
Network Monitoring	Read/Write	Read/Write	Read-only
Community Strings and Trap Stations	Read/Write	Read-only	Read-only
Update Firmware and Configuration Files	Read/Write	No	No
System Utilities	Read/Write	Read-only	Read-only
Factory Reset	Read/Write	No	No
User Account Management			

Add/Update/Delete User Accounts	Read/Write	No	No
View User Accounts	Read/Write	No	No

The fields that can be configured are described below:

Parameter	Description
User Name	Enter a new user name for the Switch.
Access Right	Specify the access right for this user.
Encryption	Specifies that encryption will be applied to this account. Option to choose from are <i>Plain Text</i> , and <i>SHA-1</i> .
Password	Enter a new password for the Switch.
Confirm Password	Re-type in a new password for the Switch.

Click the **Apply** button to accept the changes made.



NOTICE: In case of lost passwords or password corruption, refer to Appendix A Password Recovery Procedure which will guide you through the steps necessary to resolve this issue.



NOTE: User Name should be less than 16 characters. Password should be less than 16 or 35 characters.

Synchronous Ethernet Settings

This page is used to configure the port Synchronous Ethernet state and source port.

To view the following window, click **System Configuration > Synchronous Ethernet Settings**, as show below:

Figure 3-26 Synchronous Ethernet Settings Window

The fields that can be configured are described below:

Parameter	Description
Synchronous Ethernet State	Specifies the synchronous Ethernet feature's state.

Source Port Number	Specifies the port used for synchronizing with partners.
Clock Source	Displays the clock source used.

Click the **Apply** button to accept the changes made.

Chapter 4 Management

ARP

IPv6 Neighbor Settings

IP Interface

Management Settings

Out of Band Management Settings

Session Table

Single IP Management

SNMP Settings

Telnet Settings

Web Settings

ARP

Static ARP Settings

The Address Resolution Protocol is a TCP/IP protocol that converts IP addresses into physical addresses. This table allows network managers to view, define, modify, and delete ARP information for specific devices. Static entries can be defined in the ARP table. When static entries are defined, a permanent entry is entered and is used to translate IP addresses to MAC addresses.

To view the following window, click **Management > ARP > Static ARP Settings**, as show below:

Static ARP Settings Safeguard

Global Settings
 ARP Aging Time (0-65535) min

Add Static ARP Entry
 IP Address MAC Address

Total Entries: 3

Interface	IP Address	MAC Address	Type		
System	10.0.0.0	FF-FF-FF-FF-FF-FF	Local/Broadcast	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
System	10.90.90.90	F0-7D-68-25-CB-40	Local	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
System	10.255.255.255	FF-FF-FF-FF-FF-FF	Local/Broadcast	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>

Figure 4-1 Static ARP Settings window

The fields that can be configured are described below:

Parameter	Description
ARP Aging Time (0-65535)	The ARP entry age-out time, in minutes. The default is 20 minutes.
IP Address	The IP address of the ARP entry.
MAC Address	The MAC address of the ARP entry.

Click the **Apply** button, located in the **Global Settings** section to accept the changes made in this section.

Click the **Apply** button, located in the **Add Static ARP Entry** section to accept the changes made in this section.

Click the **Delete All** button to remove all the entries listed.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

ARP Table

Users can display current ARP entries on the Switch.

To view the following window, click **Management > ARP > ARP Table**, as show below:

Interface Name	IP Address	MAC Address	Type
System	10.0.0.0	FF-FF-FF-FF-FF-FF	Local/Broadcast
System	10.90.90.6	10-BF-48-D6-E2-E2	Dynamic
System	10.90.90.90	F0-7D-68-25-CB-40	Local
System	10.255.255.255	FF-FF-FF-FF-FF-FF	Local/Broadcast

Figure 4-2 ARP Table window

The fields that can be configured are described below:

Parameter	Description
Interface Name	Enter or view the Interface name used.
IP Address	Enter or view the IP Address used.
MAC Address	Enter or view the MAC Address used.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Show Static** button to display only the static entries in the display table.

Click the **Clear All** button to remove all the entries listed in the table.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

IPv6 Neighbor Settings

The user can configure the Switch's IPv6 neighbor settings. The Switch's current IPv6 neighbor settings will be displayed in the table at the bottom of this window.

To view the following window, click **Management > IPv6 Neighbor Settings**, as show below:

Figure 4-3 IPv6 Neighbor Settings window

The fields that can be configured are described below:

Parameter	Description
Interface Name	Enter the interface name of the IPv6 neighbor.
Neighbor IPv6 Address	Enter the neighbor IPv6 address.
Link Layer MAC Address	Enter the link layer MAC address.
Interface Name	Enter the interface name of the IPv6 neighbor. Tick the All check box to search for all current interfaces on the Switch.
State	Use the drop-down menu to select All, Address, Static, or Dynamic. When the user selects address from the drop-down menu, the user will be able to enter an IPv6 address in the space provided next to the state option.

Click the **Add** button to add a new entry based on the information entered.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Clear** button to clear all the information entered in the fields.

IP Interface

System IP Address Settings

The IP address may initially be set using the console interface prior to connecting to it through the Ethernet. The Web manager will display the Switch's current IP settings.



NOTE: The Switch's factory default IP address is 0.0.0.0 with a subnet mask of 255.0.0.0 and a default gateway of 0.0.0.0.

To view the following window, click **Management > IP Interface > System IP Address Settings**, as show below:

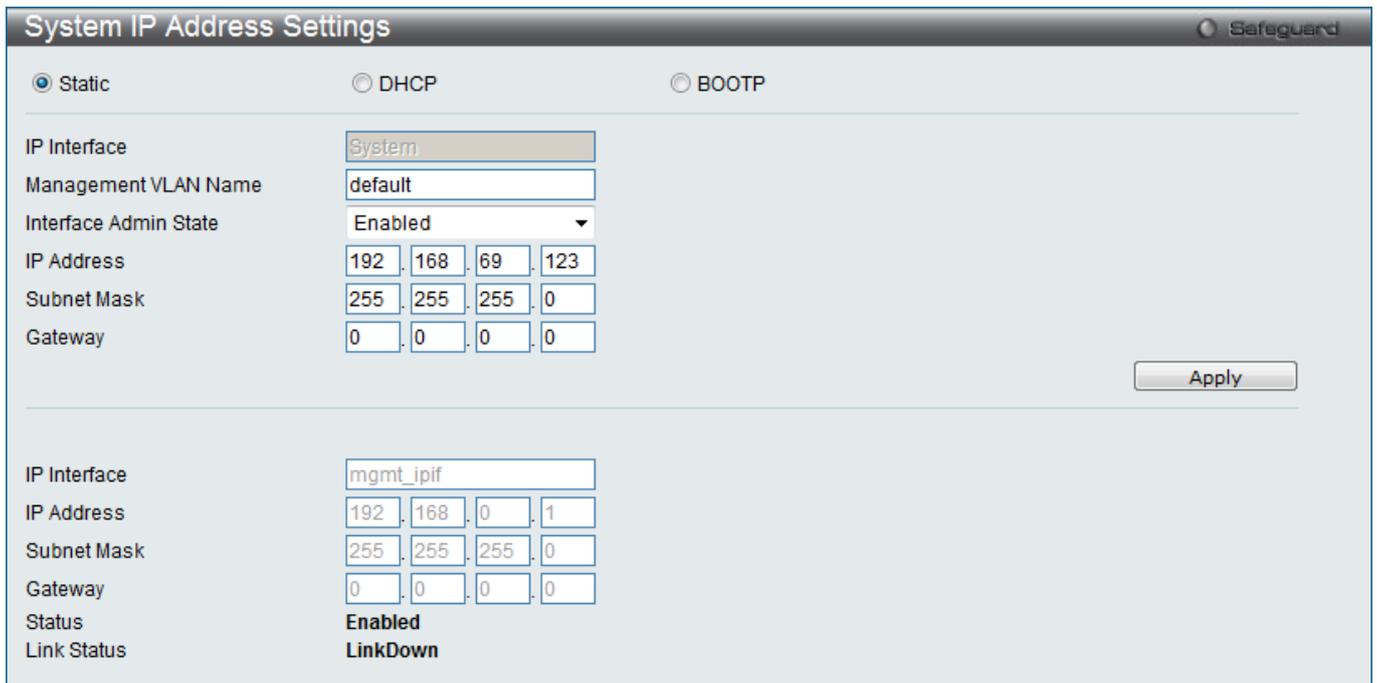


Figure 4-4 System IP Address Settings window

The fields that can be configured are described below:

Parameter	Description
Static	Allow the entry of an IP address, subnet mask, and a default gateway for the Switch. These fields should be of the form xxx.xxx.xxx.xxx, where each xxx is a number (represented in decimal form) between 0 and 255. This address should be a unique address on the network assigned for use by the network administrator.
DHCP	The Switch will send out a DHCP broadcast request when it is powered up. The DHCP protocol allows IP addresses, network masks, and default gateways to be assigned by a DHCP server. If this option is set, the Switch will first look for a DHCP server to provide it with this information before using the default or previously entered settings.
BOOTP	The Switch will send out a BOOTP broadcast request when it is powered up. The BOOTP protocol allows IP addresses, network masks, and default gateways to be assigned by a central BOOTP server. If this option is set, the Switch will first look for a BOOTP server to provide it with this information before using the default or previously entered settings.

The following table will describe the fields that are about the **System** Interface.

Parameter	Description
Interface Name	Display the System interface name.
Management VLAN Name	This allows the entry of a VLAN name from which a management station will be allowed to manage the Switch using TCP/IP (in-band via Web manager or Telnet). Management stations that are on VLANs other than the one entered here will not be able to manage the Switch in-band unless their IP addresses are entered in the Trusted Host window (Security > Trusted Host). If VLANs have not yet been configured for the Switch, the default VLAN contains all of the Switch's ports. There

	are no entries in the Trusted Host table, by default, so any management station that can connect to the Switch can access the Switch until a management VLAN is specified or Management Station IP addresses are assigned.
Interface Admin State	Use the drop-down menu to enable or disable the configuration on this interface. If the state is disabled, the IP interface cannot be accessed.
IP Address	This field allows the entry of an IPv4 address to be assigned to this IP interface.
Subnet Mask	A Bitmask that determines the extent of the subnet that the Switch is on. Should be of the form xxx.xxx.xxx.xxx, where each xxx is a number (represented in decimal) between 0 and 255. The value should be 255.0.0.0 for a Class A network, 255.255.0.0 for a Class B network, and 255.255.255.0 for a Class C network, but custom subnet masks are allowed.
Gateway	IP address that determines where packets with a destination address outside the current subnet should be sent. This is usually the address of a router or a host acting as an IP gateway. If your network is not part of an intranet, or you do not want the Switch to be accessible outside your local network, you can leave this field unchanged.

Click the **Apply** button to accept the changes made.

Interface Settings

Users can display the Switch's current IP interface settings.

To view the following window, click **Management > IP Interface > Interface Settings**, as show below:

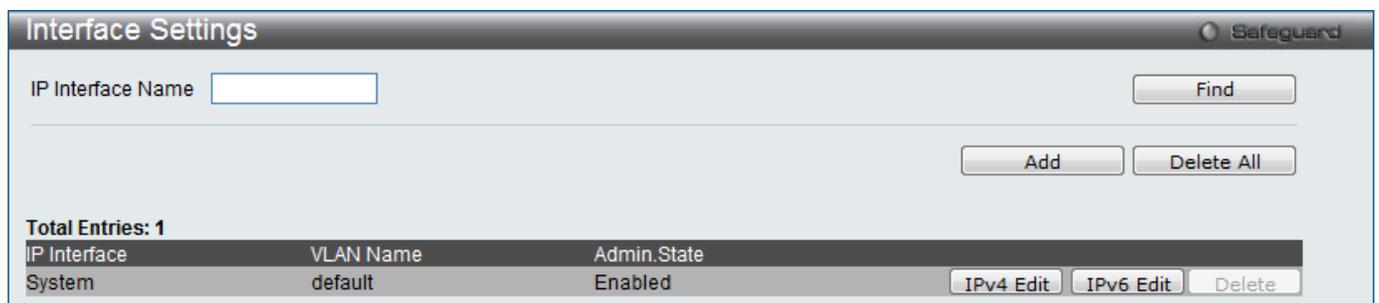


Figure 4-5 Interface Settings window

The fields that can be configured are described below:

Parameter	Description
Interface Name	Enter the name of the IP interface to search for.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete All** button to remove all the entries listed.

Click the **IPv4 Edit** button to edit the IPv4 settings for the specific entry.

Click the **IPv6 Edit** button to edit the IPv6 settings for the specific entry.

Click the **Delete** button to remove the specific entry.



NOTE: To create IPv6 interfaces, the user has to create an IPv4 interface then edit it to IPv6.

Click the **Add** button to see the following window.

Figure 4-6 IPv4 Interface Settings window

The fields that can be configured are described below:

Parameter	Description
IP Interface Name	Enter the name of the IP interface being created.
IPv4 Address	Enter the IPv4 address used.
Subnet Mask	Enter the IPv4 subnet mask used.
VLAN Name	Enter the VLAN Name used.
Interface Admin State	Use the drop-down menu to enable or disable the Interface Admin State.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **IPv4 Edit** button to see the following window.

Figure 4-7 IPv4 Interface Settings – Edit window

The fields that can be configured are described below:

Parameter	Description
Get IP From	Use the drop-down menu to specify the method that this Interface uses to acquire an IP address.
IP Interface Name	Enter the name of the IP interface being configured.
IPv4 Address	Enter the IPv4 address used.
Subnet Mask	Enter the IPv4 subnet mask used.
VLAN Name	Enter the VLAN Name used.
IPv4 State	Use the drop-down menu to enable or disable IPv4 State.
Interface Admin State	Use the drop-down menu to enable or disable the Interface Admin State.

Click the **Apply** button to accept the changes made for each individual section.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **IPv6 Edit** button to see the following window.

IPv6 Interface Settings Safeguard

IPv6 Interface Settings

Interface Name: System IPv6 State: Enabled

Interface Admin State: Enabled IPv6 Network Address (e.g.: 3710::1/64):

DHCPv6 Client: Disabled

NS Retransmit Time Settings

NS Retransmit Time (0-4294967295): ms

Automatic Link Local State Settings

Automatic Link Local Address: Disabled

[View All IPv6 Address](#)

Figure 4-8 IPv6 Interface Settings window

The fields that can be configured or displayed are described below:

Parameter	Description
Interface Name	Display the IPv6 interface name.
IPv6 State	Use the drop-down menu to enable or disable IPv6 State.
Interface Admin State	Use the drop-down menu to enable or disable the Interface Admin State.
IPv6 Network Address	Enter the neighbor's global or local link address.

DHCPv6 Client	Use the drop-down menu to enable or disable DHCPv6 client.
NS Retransmit Time (0-4294967295)	Enter the Neighbor solicitation's retransmit timer in millisecond here. It has the same value as the RA retransmit time in the config ipv6 nd ra command. If this field is configured, it will duplicate the entry into the RA field.
Automatic Link Local Address	Use the drop-down menu to enable or disable the Automatic Link Local Address.

Click the **Apply** button to accept the changes made for each individual section.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the [View All IPv6 Address](#) link to view all the current IPv6 address.

Click the [View Neighbor Discover](#) link to view all IPv6 neighbor discover.

Click the [View All IPv6 Address](#) link to see the following window.

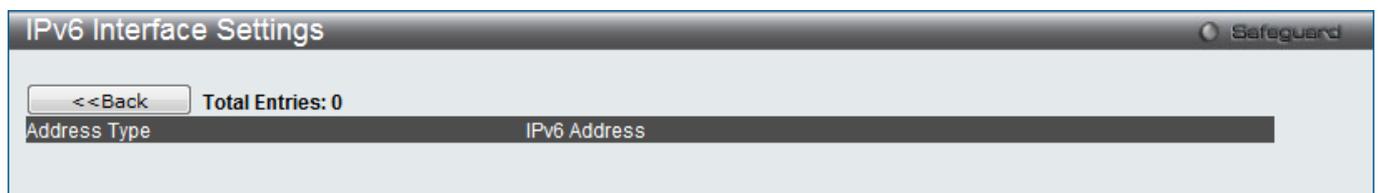


Figure 4-9 IPv6 Interface Settings – View All IPv6 Address window

Click the **<<Back** button to return to the previous page.

Management Settings

Users can stop the scrolling of multiple pages beyond the limits of the console when using the Command Line Interface.

This window is also used to enable the DHCP auto configuration feature on the Switch. When enabled, the Switch is instructed to receive a configuration file from a TFTP server, which will set the Switch to become a DHCP client automatically on boot-up. To employ this method, the DHCP server must be set up to deliver the TFTP server IP address and configuration file name information in the DHCP reply packet. The TFTP server must be up and running and hold the necessary configuration file stored in its base directory when the request is received from the Switch. For more information about loading a configuration file for use by a client, see the DHCP server and/or TFTP server software instructions. The user may also consult the **Upload Log File** window description located in the **Tools** section of this manual.

If the Switch is unable to complete the DHCP auto configuration, the previously saved configuration file present in the Switch's memory will be used.

This window also allows the user to implement the Switch's built-in power saving feature. When power saving is enabled, a port which has a link down status will be turned off to save power to the Switch. This will not affect the port's capabilities when the port status is link up.

Users can also configure Password Encryption on the Switch.

To view the following window, click **Management > Management Settings**, as show below:

Figure 4-10 Management Settings window

The fields that can be configured are described below:

Parameter	Description
CLI Paging State	Command Line Interface paging stops each page at the end of the console. This allows you to stop the scrolling of multiple pages of text beyond the limits of the console. CLI Paging is Enabled by default. To disable it, click the Disabled radio button.
DHCP Auto Configuration State	Enable or disable the Switch's DHCP auto configuration feature. When enabled, the Switch is instructed to receive a configuration file from a TFTP server, which will set the Switch to become a DHCP client automatically on boot-up. To employ this method, the DHCP server must be set up to deliver the TFTP server IP address and configuration file name information in the DHCP reply packet. The TFTP server must be up and running and hold the necessary configuration file stored in its base directory when the request is received from the Switch.
Power Saving State	Enable or disable the link down power saving mode of each physical port. The switch port will go into sleep mode when a port is not connected.
Password Encryption State	Password encryption will encrypt the password configuration in configuration files. Password encryption is Disabled by default. To enable password encryption, click the Enabled radio button.

Click the **Apply** button to accept the changes made.

To learn more about the D-Link Green Technologies, go to <http://green.dlink.com/> for more details.

Out of Band Management Settings

This window is used to configure the out of band management port settings.

To view the following window, click **Management > Out of Band Management Settings**, as show below:

Out of Band Management Settings

IP Address: 192 . 168 . 0 . 1

Subnet Mask: 255 . 255 . 255 . 0

Gateway: 0 . 0 . 0 . 0

Status: Enabled

Link Status: LinkDown

Apply

Figure 4-11 Out of Band management Settings window

The fields that can be configured are described below:

Parameter	Description
IP Address	Enter the IP address of the interface.
Subnet Mask	Enter the subnet mask of the IP address.
Gateway	Enter the gateway IP address of the out-of-band management network.
Status	Use the drop-down menu to enable or disable the interface status.

Click the **Apply** button to accept the changes made.

Session Table

Users can display the management sessions since the Switch was last rebooted.

To view the following window, click **Management > Session Table**, as show below:

Session Table

Refresh

ID	Live Time	From	Level	Name
8	02:25:02.950	Serial Port	5	admin

Figure 4-12 Session Table window

Click the **Refresh** button to refresh the display table so that new entries will appear.

Single IP Management

Simply put, D-Link Single IP Management is a concept that will stack switches together over Ethernet instead of using stacking ports or modules. There are some advantages in implementing the “Single IP Management” feature:

- SIM can simplify management of small workgroups or wiring closets while scaling the network to handle increased bandwidth demand.
- SIM can reduce the number of IP address needed in your network.
- SIM can eliminate any specialized cables for stacking connectivity and remove the distance barriers that typically limit your topology options when using other stacking technology.

Switches using D-Link Single IP Management (labeled here as SIM) must conform to the following rules:

- SIM is an optional feature on the Switch and can easily be enabled or disabled through the Command Line Interface or Web Interface. SIM grouping has no effect on the normal operation of the Switch in the user's network.
- There are three classifications for switches using SIM. The **Commander Switch (CS)**, which is the master switch of the group, **Member Switch (MS)**, which is a switch that is recognized by the CS as a member of a SIM group, and a **Candidate Switch (CaS)**, which is a Switch that has a physical link to the SIM group but has not been recognized by the CS as a member of the SIM group.
- A SIM group can only have one Commander Switch (CS).
- A SIM group accepts up to 32 switches (numbered 1-32), not including the Commander Switch (numbered 0).
- Members of a SIM group cannot cross a router.
- There is no limit to the number of SIM groups in the same IP subnet (broadcast domain); however a single switch can only belong to one group.
- If multiple VLANs are configured, the SIM group will only utilize the default VLAN on any switch.
- SIM allows intermediate devices that do not support SIM. This enables the user to manage switches that are more than one hop away from the CS.

The SIM group is a group of switches that are managed as a single entity. The Switch may take on three different roles:

Commander Switch (CS) – This is a switch that has been manually configured as the controlling device for a group, and takes on the following characteristics:

It has an IP Address.

It is not a command switch or member switch of another Single IP group.

It is connected to the member switches through its management VLAN.

Member Switch (MS) – This is a switch that has joined a single IP group and is accessible from the CS, and it takes on the following characteristics:

It is not a CS or MS of another IP group.

It is connected to the CS through the CS management VLAN.

Candidate Switch (CaS) – This is a switch that is ready to join a SIM group but is not yet a member of the SIM group. The Candidate Switch may join the SIM group of the Switch by manually configuring it to be a MS of a SIM group. A switch configured as a CaS is not a member of a SIM group and will take on the following characteristics:

It is not a CS or MS of another Single IP group.

It is connected to the CS through the CS management VLAN

The following rules also apply to the above roles:

1. Each device begins in a Candidate state.
2. CSs must change their role to CaS and then to MS, to become a MS of a SIM group. Thus, the CS cannot directly be converted to a MS.
3. The user can manually configure a CS to become a CaS.
4. A MS can become a CaS by:
 5. Being configured as a CaS through the CS.
 6. If report packets from the CS to the MS time out.
7. The user can manually configure a CaS to become a CS

8. The CaS can be configured through the CS to become a MS.

After configuring one switch to operate as the CS of a SIM group, additional DGS-3710 Series switches may join the group by manually configuring the Switch to be a MS. The CS will then serve as the in band entry point for access to the MS. The CS's IP address will become the path to all MS's of the group and the CS's Administrator's password, and/or authentication will control access to all MS's of the SIM group.

With SIM enabled, the applications in the CS will redirect the packet instead of executing the packets. The applications will decode the packet from the administrator, modify some data, and then send it to the MS. After execution, the CS may receive a response packet from the MS, which it will encode and send it back to the administrator.

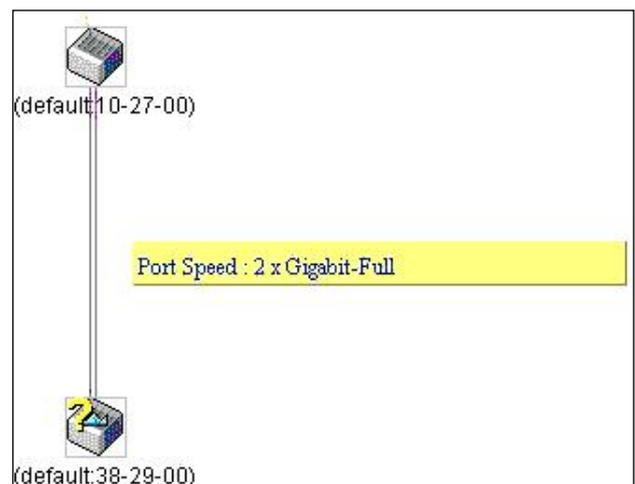
When a CaS becomes a MS, it automatically becomes a member of the first SNMP community (includes read/write and read only) to which the CS belongs. However, if a MS has its own IP address, it can belong to SNMP communities to which other switches in the group, including the CS, do not belong.

Upgrade to v1.61

To better improve SIM management, the DGS-3710 Series switches have been upgraded to version 1.61 in this release. Many improvements have been made, including:

- The Commander Switch (CS) now has the capability to automatically rediscover member switches that have left the SIM group, either through a reboot or web malfunction. This feature is accomplished through the use of Discover packets and Maintenance packets that previously set SIM members will emit after a reboot. Once a MS has had its MAC address and password saved to the CS's database, if a reboot occurs in the MS, the CS will keep this MS information in its database and when a MS has been rediscovered, it will add the MS back into the SIM tree automatically. No configuration will be necessary to rediscover these switches.

There are some instances where pre-saved MS switches cannot be rediscovered. For example, if the Switch is still powered down, if it has become the member of another group, or if it has been configured to be a Commander Switch, the rediscovery process cannot occur.



- The topology map now includes new features for connections that are a member of a port trunking group. It will display the speed and number of Ethernet connections creating this port trunk group, as shown in the adjacent picture.
- This version will support switch upload and downloads for firmware, configuration files and log files, as follows:
 - **Firmware** – The switch now supports MS firmware downloads from a TFTP server.
 - **Configuration Files** – This switch now supports downloading and uploading of configuration files both to (for configuration restoration) and from (for configuration backup) MS's, using a TFTP server.
 - **Log** – The Switch now supports uploading MS log files to a TFTP server.
- The user may zoom in and zoom out when utilizing the topology window to get a better, more defined view of the configurations.

Single IP Settings

The Switch is set as a Candidate (CaS) as the factory default configuration and Single IP Management is disabled.

To view the following window, click **Management > Single IP Management > Single IP Settings**, as show below:

The screenshot shows a web interface window titled "Single IP Settings". It contains several configuration fields:

- SIM State:** A dropdown menu set to "Disabled".
- Role State:** A dropdown menu set to "Candidate".
- Group Name:** An empty text input field.
- Discovery Interval (30 - 90):** A text input field containing "30" followed by "sec".
- Hold Time Count (100-255):** A text input field containing "100" followed by "sec".

 An "Apply" button is located at the bottom right of the window.

Figure 4-13 Single IP Settings window

The fields that can be configured are described below:

Parameter	Description
SIM State	Use the drop-down menu to either enable or disable the SIM state on the Switch. <i>Disabled</i> will render all SIM functions on the Switch inoperable.
Role State	Use the drop-down menu to change the SIM role of the Switch. The two choices are: <i>Candidate</i> – A Candidate Switch (CaS) is not the member of a SIM group but is connected to a Commander Switch. This is the default setting for the SIM role of the Switch. <i>Commander</i> – Choosing this parameter will make the Switch a Commander Switch (CS). The user may join other switches to this Switch, over Ethernet, to be part of its SIM group. Choosing this option will also enable the Switch to be configured for SIM.
Group Name	Enter a Group Name in this textbox. This is optional. This name is used to segment switches into different SIM groups.
Discovery Interval (30-90)	The user may set the discovery protocol interval, in seconds that the Switch will send out discovery packets. Returning information to a Commander Switch will include information about other switches connected to it. (Ex. MS, CaS). The user may set the Discovery Interval from 30 to 90 seconds. The default value is 30 seconds.
Hold Time Count (100-255)	This parameter may be set for the time, in seconds; the Switch will hold information sent to it from other switches, utilizing the Discovery Interval. The user may set the hold time from 100 to 255 seconds. The default value is 100 seconds.

Click the **Apply** button to accept the changes made.

After enabling the Switch to be a Commander Switch (CS), the **Single IP Management** folder will then contain four added links to aid the user in configuring SIM through the web, including **Topology**, **Firmware Upgrade**, **Configuration Backup/Restore** and **Upload Log File**.

Topology

This window will be used to configure and manage the Switch within the SIM group and requires Java script to function properly on your computer.

The Java Runtime Environment on your server should initiate and lead you to the Topology window, as seen below.

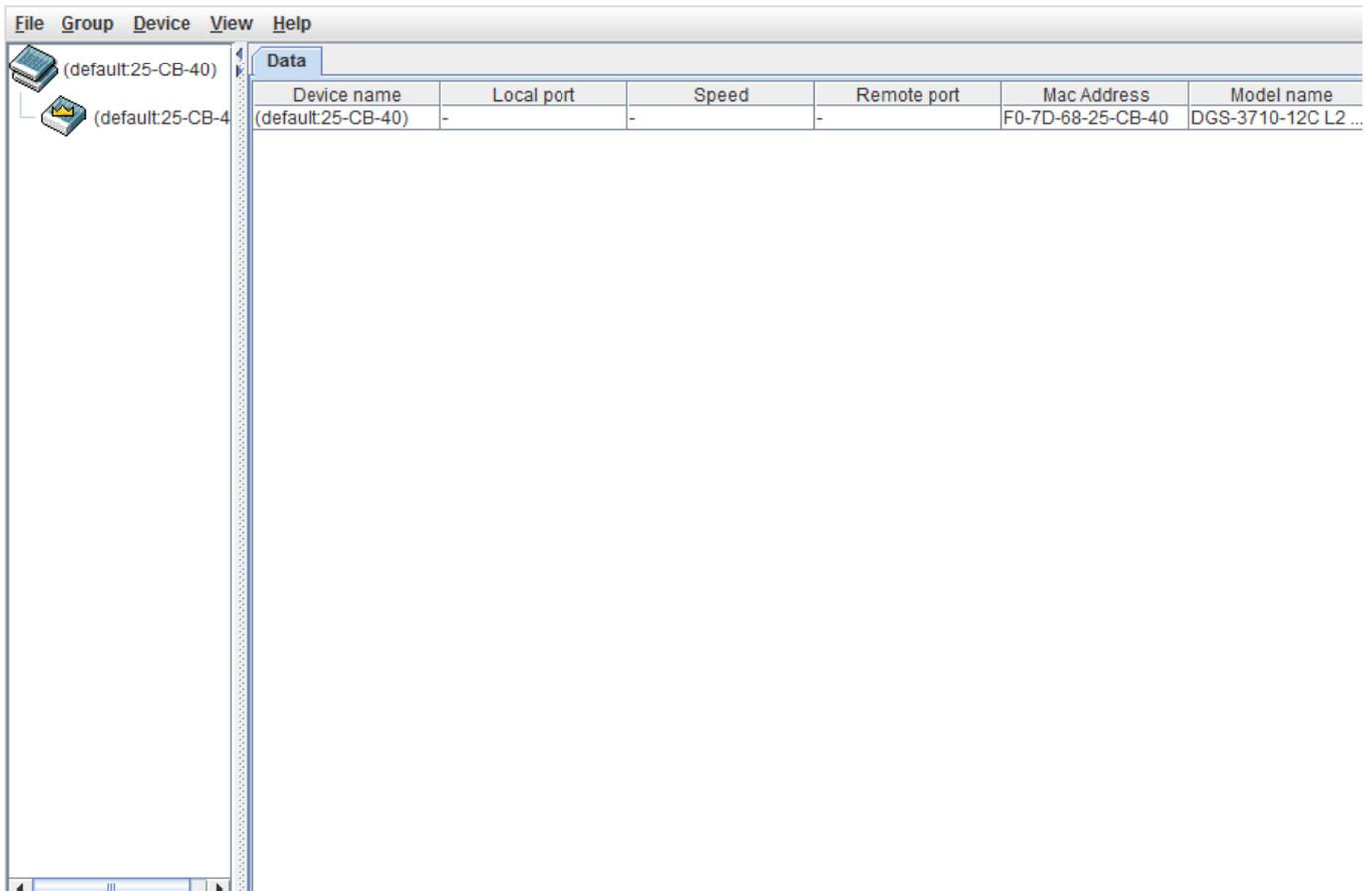


Figure 4-14 Single IP Management window - Tree View

The Topology window holds the following information on the **Data** tab:

Parameter	Description
Device Name	This field will display the Device Name of the switches in the SIM group configured by the user. If no device is configured by the name, it will be given the name default and tagged with the last six digits of the MAC Address to identify it.
Local Port	Displays the number of the physical port on the CS that the MS or CaS is connected to. The CS will have no entry in this field.
Speed	Displays the connection speed between the CS and the MS or CaS.
Remote Port	Displays the number of the physical port on the MS or CaS to which the CS is connected. The CS will have no entry in this field.
MAC Address	Displays the MAC Address of the corresponding Switch.
Model Name	Displays the full Model Name of the corresponding Switch.

To view the Topology View window, open the **View** drop-down menu in the toolbar and then click **Topology**, which will open the following Topology Map. This window will refresh itself periodically (20 seconds by default).

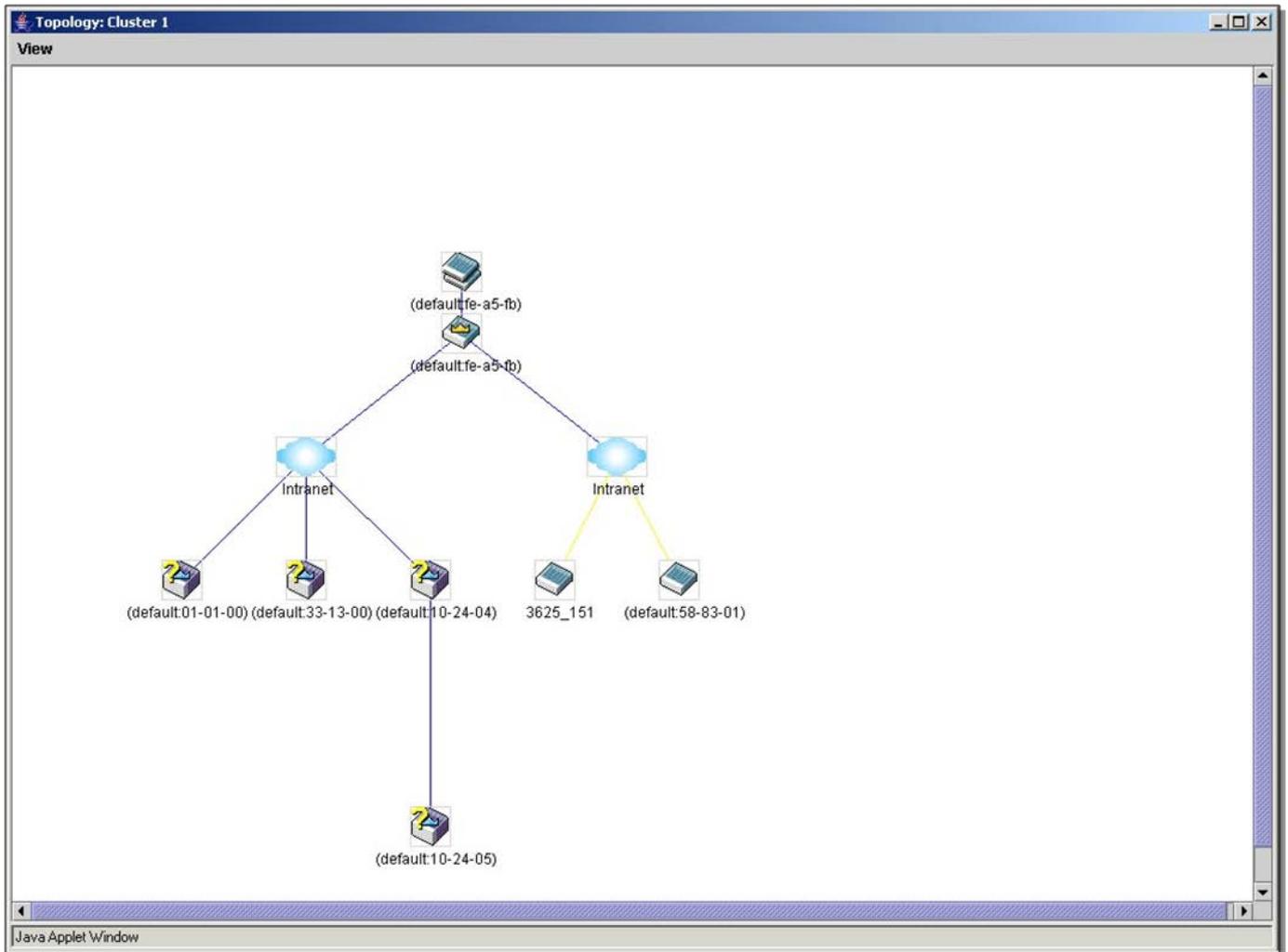


Figure 4-15 Topology view

This window will display how the devices within the Single IP Management Group connect to other groups and devices. Possible icons on this window are as follows:

Icon	Description	Icon	Description
	Group		Layer 3 member switch
	Layer 2 commander switch		Member switch of other group
	Layer 3 commander switch		Layer 2 candidate switch
	Commander switch of other group		Layer 3 candidate switch
	Layer 2 member switch.		Unknown device

Right-clicking on a device will allow the user to perform various functions, depending on the role of the Switch in the SIM group and the icon associated with it.

Group Icon

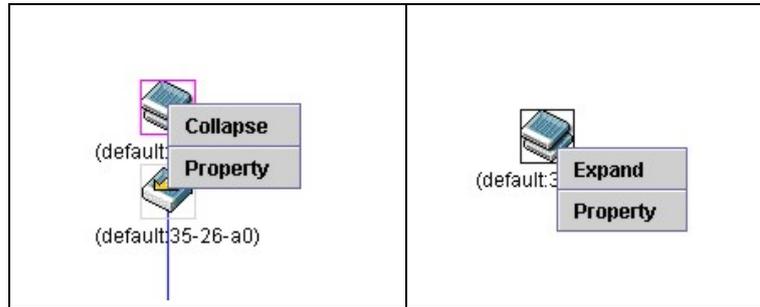


Figure 4-18 Right-Clicking a Group Icon

The following options may appear for the user to configure:

1. **Collapse** – To collapse the group that will be represented by a single icon.
2. **Expand** – To expand the SIM group, in detail.
3. **Property** – To pop up a window to display the group information.

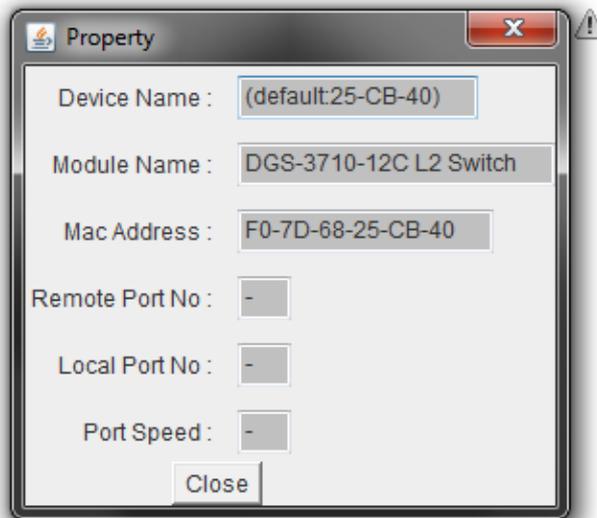


Figure 4-19 Property window

Parameter	Description
Device Name	This field will display the Device Name of the switches in the SIM group configured by the user. If no Device Name is configured by the name, it will be given the name default and tagged with the last six digits of the MAC Address to identify it.
Module Name	Displays the full module name of the switch that was right-clicked.
MAC Address	Displays the MAC Address of the corresponding Switch.
Remote Port No	Displays the number of the physical port on the MS or CaS that the CS is connected to. The CS will have no entry in this field.

Local Port No	Displays the number of the physical port on the CS that the MS or CaS is connected to. The CS will have no entry in this field.
Port Speed	Displays the connection speed between the CS and the MS or CaS

Click the **Close** button to close the property window.

Commander Switch Icon

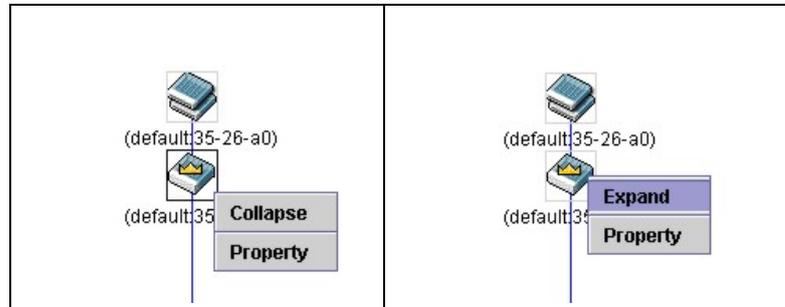


Figure 4-20 Right-clicking a Commander Icon

The following options may appear for the user to configure:

1. **Collapse** – To collapse the group that will be represented by a single icon.
2. **Expand** – To expand the SIM group, in detail.
3. **Property** – To pop up a window to display the group information.

Member Switch Icon

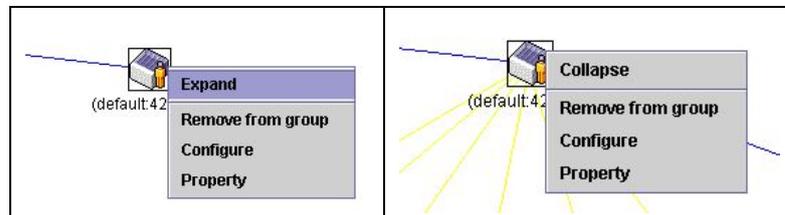


Figure 4-21 Right-clicking a Member icon

The following options may appear for the user to configure:

1. **Collapse** – To collapse the group that will be represented by a single icon.
2. **Expand** – To expand the SIM group, in detail.
3. **Remove from group** – Remove a member from a group.
4. **Configure** – Launch the web management to configure the Switch.
5. **Property** – To pop up a window to display the device information.

Candidate Switch Icon

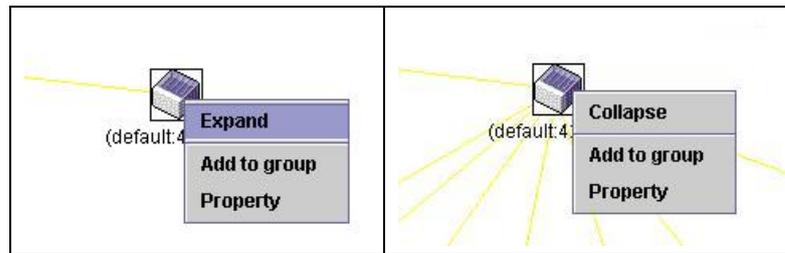


Figure 4-22 Right-clicking a Candidate icon

The following options may appear for the user to configure:

- **Collapse** – To collapse the group that will be represented by a single icon.
- **Expand** – To expand the SIM group, in detail.
- **Add to group** – Add a candidate to a group. Clicking this option will reveal the following dialog box for the user to enter a password for authentication from the Candidate Switch before being added to the SIM group. Click **OK** to enter the password or **Cancel** to exit the dialog box.



Figure 4-23 Input password window

Chapter 1 **Property** – To pop up a window to display the device information.

Menu Bar

The **Single IP Management** window contains a menu bar for device configurations, as seen below.



Figure 4-24 Menu Bar of the Topology View

File

Chapter 2 **Print Setup** – Will view the image to be printed.

Chapter 3 **Print Topology** – Will print the topology map.

Chapter 4 **Preference** – Will set display properties, such as polling interval, and the views to open at SIM startup.

Group

- **Add to group** – Add a candidate to a group. Clicking this option will reveal the following dialog box for the user to enter a password for authentication from the Candidate Switch before being added to the SIM group. Click **OK** to enter the password or **Cancel** to exit the dialog box.



Figure 4-25 Input password window

- **Remove from Group** – Remove an MS from the group.

Device

- **Configure** – Will open the Web manager for the specific device.

View

- **Refresh** – Update the views with the latest status.
- **Topology** – Display the Topology view.

Help

- **About** – Will display the SIM information, including the current SIM version.



Figure 4-26 About window

Firmware Upgrade

This screen is used to upgrade firmware from the Commander Switch to the Member Switch. Member Switches will be listed in the table and will be specified by **Port** (port on the CS where the MS resides), **MAC Address**, **Model Name** and **Version**. To specify a certain Switch for firmware download, click its corresponding check box under the **Port** heading. To update the firmware, enter the **Server IP Address** where the firmware resides and enter the **Path/Filename** of the firmware. Click **Download** to initiate the file transfer.

To view the following window, click **Management > Single IP Management > Firmware Upgrade**, as show below:

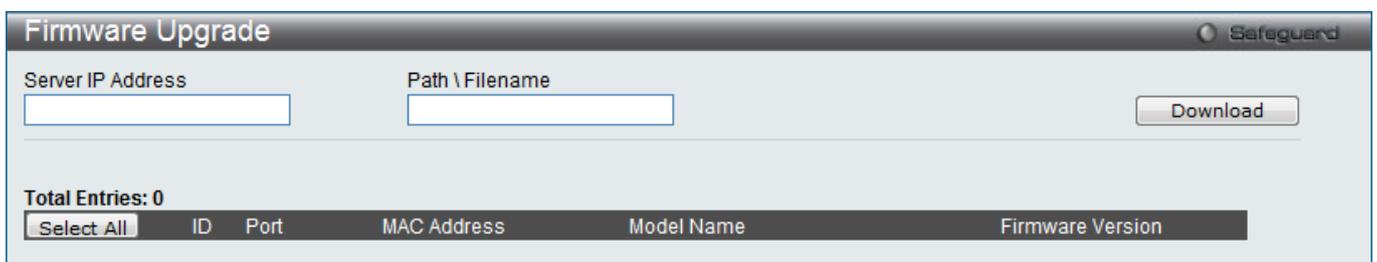


Figure 4-27 Firmware Upgrade window

Configuration File Backup/Restore

This screen is used to upgrade configuration files from the Commander Switch to the Member Switch using a TFTP server. Member Switches will be listed in the table and will be specified by **ID**, **Port** (port on the CS where the MS resides), **MAC Address**, **Model Name** and **Firmware Version**. To update the configuration file, enter the **Server IP Address** where the file resides and enter the **Path/Filename** of the configuration file. Click **Restore** to initiate the file transfer from a TFTP server to the Switch. Click **Backup** to backup the configuration file to a TFTP server.

To view the following window, click **Management > Single IP Management > Configuration File Backup/Restore**, as show below:

Figure 4-28 Configuration File Backup/Restore window

Upload Log File

The following window is used to upload log files from SIM member switches to a specified PC. To upload a log file, enter the Server IP address of the SIM member switch and then enter a Path\Filename on your PC where you wish to save this file. Click **Upload** to initiate the file transfer.

To view the following window, click **Management > Single IP Management > Upload Log File**, as show below:

Figure 4-29 Upload Log File window

SNMP Settings

Simple Network Management Protocol (SNMP) is an OSI Layer 7 (Application Layer) designed specifically for managing and monitoring network devices. SNMP enables network management stations to read and modify the settings of gateways, routers, switches, and other network devices. Use SNMP to configure system features for proper operation, monitor performance and detect potential problems in the Switch, switch group or network.

Managed devices that support SNMP include software (referred to as an agent), which runs locally on the device. A defined set of variables (managed objects) is maintained by the SNMP agent and used to manage the device. These objects are defined in a Management Information Base (MIB), which provides a standard presentation of the information controlled by the on-board SNMP agent. SNMP defines both the format of the MIB specifications and the protocol used to access this information over the network.

The Switch supports the SNMP versions 1, 2c, and 3. The three versions of SNMP vary in the level of security provided between the management station and the network device.

In SNMP v.1 and v.2, user authentication is accomplished using 'community strings', which function like passwords. The remote user SNMP application and the Switch SNMP must use the same community string. SNMP packets from any station that has not been authenticated are ignored (dropped).

The default community strings for the Switch used for SNMP v.1 and v.2 management access are:

- **public** – Allows authorized management stations to retrieve MIB objects.
- **private** – Allows authorized management stations to retrieve and modify MIB objects.

SNMPv3 uses a more sophisticated authentication process that is separated into two parts. The first part is to maintain a list of users and their attributes that are allowed to act as SNMP managers. The second part describes what each user on that list can do as an SNMP manager.

The Switch allows groups of users to be listed and configured with a shared set of privileges. The SNMP version may also be set for a listed group of SNMP managers. Thus, you may create a group of SNMP managers that are allowed to view read-only information or receive traps using SNMPv1 while assigning a higher level of security to another group, granting read/write privileges using SNMPv3.

Using SNMPv3 individual users or groups of SNMP managers can be allowed to perform or be restricted from performing specific SNMP management functions. The functions allowed or restricted are defined using the Object Identifier (OID) associated with a specific MIB. An additional layer of security is available for SNMPv3 in that SNMP messages may be encrypted. To read more about how to configure SNMPv3 settings for the Switch read the next section.

Traps

Traps are messages that alert network personnel of events that occur on the Switch. The events can be as serious as a reboot (someone accidentally turned OFF the Switch), or less serious like a port status change. The Switch generates traps and sends them to the trap recipient (or network manager). Typical traps include trap messages for Authentication Failure, Topology Change and Broadcast\Multicast Storm.

MIBs

The Switch in the Management Information Base (MIB) stores management and counter information. The Switch uses the standard MIB-II Management Information Base module. Consequently, values for MIB objects can be retrieved from any SNMP-based network management software. In addition to the standard MIB-II, the Switch also supports its own proprietary enterprise MIB as an extended Management Information Base. Specifying the MIB Object Identifier may also retrieve the proprietary MIB. MIB values can be either read-only or read-write.

The Switch incorporates a flexible SNMP management for the switching environment. SNMP management can be customized to suit the needs of the networks and the preferences of the network administrator. Use the SNMP V3 menus to select the SNMP version used for specific tasks.

The Switch supports the Simple Network Management Protocol (SNMP) versions 1, 2c, and 3. The administrator can specify the SNMP version used to monitor and control the Switch. The three versions of SNMP vary in the level of security provided between the management station and the network device.

SNMP settings are configured using the menus located on the SNMP V3 folder of the Web manager. Workstations on the network that are allowed SNMP privileged access to the Switch can be restricted with the Management Station IP Address menu.

SNMP Global Settings

SNMP global state settings can be enabled or disabled.

To view the following window, click **Management > SNMP Settings > SNMP Global Settings**, as show below:

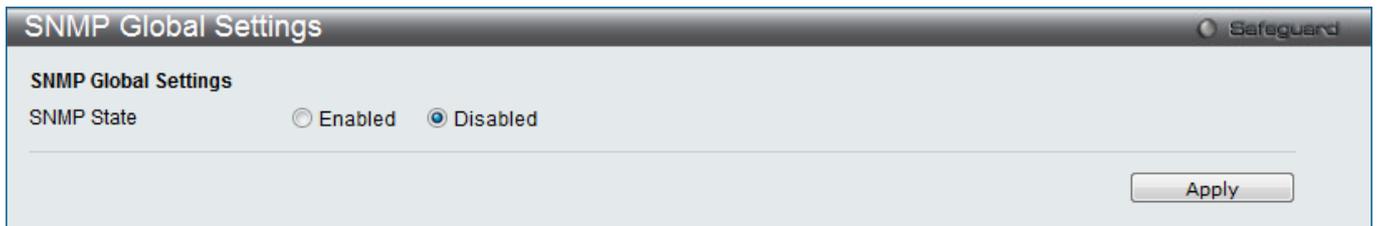


Figure 4-30 SNMP Global Settings window

The fields that can be configured are described below:

Parameter	Description
SNMP State	Enable this option to use the SNMP feature.

Click the **Apply** button to accept the changes made.

SNMP Traps Settings

Users can enable and disable the SNMP trap support function of the switch and SNMP authentication failure trap support, respectively.

To view the following window, click **Management > SNMP Settings > SNMP Traps Settings**, as show below:



Figure 4-31 SNMP Traps Settings window

The fields that can be configured are described below:

Parameter	Description
SNMP Traps	Enable this option to use the SNMP Traps feature.
SNMP Authentication Trap	Enable this option to use the SNMP Authentication Traps feature.
Linkchange Traps	Enable this option to use the SNMP Link Change Traps feature.
Coldstart Traps	Enable this option to use the SNMP Cold Start Traps feature.
Warmstart Traps	Enable this option to use the SNMP Warm Start Traps feature.

Click the **Apply** button to accept the changes made.

SNMP Linkchange Traps Settings

On this page the user can configure the SNMP link change trap settings.

To view the following window, click **Management > SNMP Settings > SNMP Linkchange Traps Settings**, as show below:

From Port	To Port	State
01	01	Disabled

Linkchange Traps: Enabled

Port	State
1	Enabled
2	Enabled
3	Enabled
4	Enabled
5	Enabled
6	Enabled
7	Enabled

Figure 4-32 SNMP Linkchange Traps Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select the starting and ending ports to use.
State	Use the drop-down menu to enable or disable the SNMP link change Trap.

Click the **Apply** button to accept the changes made.

SNMP View Table Settings

Users can assign views to community strings that define which MIB objects can be accessed by a remote SNMP manager. The SNMP Group created with this table maps SNMP users (identified in the SNMP User Table) to the views created in the previous window.

To view the following window, click **Management > SNMP Settings > SNMP View Table Settings**, as show below:

The image shows the 'SNMP View Table Settings' window. At the top, there are three input fields: 'View Name', 'Subtree OID', and 'View Type' (set to 'Included'). An 'Apply' button is on the right. Below is a table with 8 entries, each with a 'Delete' button.

View Name	Subtree	View Type	
restricted	1.3.6.1.2.1.1	Included	Delete
restricted	1.3.6.1.2.1.11	Included	Delete
restricted	1.3.6.1.6.3.10.2.1	Included	Delete
restricted	1.3.6.1.6.3.11.2.1	Included	Delete
restricted	1.3.6.1.6.3.15.1.1	Included	Delete
CommunityView	1	Included	Delete
CommunityView	1.3.6.1.6.3	Excluded	Delete
CommunityView	1.3.6.1.6.3.1	Included	Delete

Figure 4-33 SNMP View Table Settings window

The fields that can be configured are described below:

Parameter	Description
View Name	Type an alphanumeric string of up to 32 characters. This is used to identify the new SNMP view being created.
Subtree OID	Type the Object Identifier (OID) Subtree for the view. The OID identifies an object tree (MIB tree) that will be included or excluded from access by an SNMP manager.
View Type	Select Included to include this object in the list of objects that an SNMP manager can access. Select Excluded to exclude this object from the list of objects that an SNMP manager can access.

Click the **Apply** button to accept the changes made.

Click the **Delete** button to remove the specific entry.

SNMP Community Table Settings

Users can create an SNMP community string to define the relationship between the SNMP manager and an agent. The community string acts like a password to permit access to the agent on the Switch. One or more of the following characteristics can be associated with the community string:

1. An Access List of IP addresses of SNMP managers that are permitted to use the community string to gain access to the Switch's SNMP agent.
2. Any MIB view that defines the subset of all MIB objects will be accessible to the SNMP community.
3. Read/write or read-only level permission for the MIB objects accessible to the SNMP community.

To view the following window, click **Management > SNMP Settings > SNMP Community Table Settings**, as show below:



The image shows a web interface window titled "SNMP Community Table Settings" with a "Safeguard" icon in the top right. The window is divided into two main sections. The top section, "Add Community", contains three input fields: "Community Name" (a text box), "View Name" (a text box), and "Access Right" (a dropdown menu currently set to "Read Only"). An "Apply" button is located to the right of these fields. The bottom section, "Total Entries: 2", displays a table with two rows of existing community entries. Each row includes the community name, view name, access right, and a "Delete" button.

Community Name	View Name	Access Right	
private	CommunityView	read_write	Delete
public	CommunityView	read_only	Delete

Figure 4-34 SNMP community Table Settings window

The fields that can be configured are described below:

Parameter	Description
Community Name	Type an alphanumeric string of up to 32 characters that is used to identify members of an SNMP community. This string is used like a password to give remote SNMP managers access to MIB objects in the Switch's SNMP agent.
View Name	Type an alphanumeric string of up to 32 characters that is used to identify the group of MIB objects that a remote SNMP manager is allowed to access on the Switch. The view name must exist in the SNMP View Table.
Access Right	<p><i>Read Only</i> – Specify that SNMP community members using the community string created can only read the contents of the MIBs on the Switch.</p> <p><i>Read Write</i> – Specify that SNMP community members using the community string created can read from, and write to the contents of the MIBs on the Switch.</p>

Click the **Apply** button to accept the changes made.

Click the **Delete** button to remove the specific entry.

SNMP Group Table Settings

An SNMP Group created with this table maps SNMP users (identified in the SNMP User Table) to the views created in the previous window.

To view the following window, click **Management > SNMP Settings > SNMP Group Table Settings**, as show below:

SNMP Group Table Settings
Safeguard

Add Group

Group Name

Read View Name

Write View Name

Notify View Name

User-based Security Model SNMPv1 ▼

Security Level NoAuthNoPriv ▼ Apply

Total Entries: 9

Group Name	Read View Name	Write View Name	Notify View Name	User-based Security Model	Security Level	
public	CommunityV...		CommunityV...	SNMPv1	NoAuthNoPriv	Delete
public	CommunityV...		CommunityV...	SNMPv2	NoAuthNoPriv	Delete
initial	restricted		restricted	SNMPv3	NoAuthNoPriv	Delete
private	CommunityV...	CommunityV...	CommunityV...	SNMPv1	NoAuthNoPriv	Delete
private	CommunityV...	CommunityV...	CommunityV...	SNMPv2	NoAuthNoPriv	Delete
ReadGroup	CommunityV...		CommunityV...	SNMPv1	NoAuthNoPriv	Delete
ReadGroup	CommunityV...		CommunityV...	SNMPv2	NoAuthNoPriv	Delete
WriteGroup	CommunityV...	CommunityV...	CommunityV...	SNMPv1	NoAuthNoPriv	Delete
WriteGroup	CommunityV...	CommunityV...	CommunityV...	SNMPv2	NoAuthNoPriv	Delete

Figure 4-35 SNMP Group Table Settings window

The fields that can be configured are described below:

Parameter	Description
Group Name	Type an alphanumeric string of up to 32 characters. This is used to identify the new SNMP group of SNMP users.
Read View Name	This name is used to specify the SNMP group created can request SNMP messages.
Write View Name	Specify a SNMP group name for users that are allowed SNMP write privileges to the Switch's SNMP agent.
Notify View Name	Specify a SNMP group name for users that can receive SNMP trap messages generated by the Switch's SNMP agent.
User-based Security Model	<p><i>SNMPv1</i> – Specify that SNMP version 1 will be used.</p> <p><i>SNMPv2</i> – Specify that SNMP version 2c will be used. The SNMPv2 supports both centralized and distributed network management strategies. It includes improvements in the Structure of Management Information (SMI) and adds some security features.</p> <p><i>SNMPv3</i> – Specify that the SNMP version 3 will be used. SNMPv3 provides secure access to devices through a combination of authentication and encrypting packets over the network.</p>
Security Level	<p>The Security Level settings only apply to SNMPv3.</p> <p><i>NoAuthNoPriv</i> – Specify that there will be no authorization and no encryption of packets sent between the Switch and a remote SNMP manager.</p> <p><i>AuthNoPriv</i> – Specify that authorization will be required, but there will be no encryption of packets sent between the Switch and a remote SNMP manager.</p> <p><i>AuthPriv</i> – Specify that authorization will be required, and that packets sent between</p>

the Switch and a remote SNMP manager will be encrypted.

Click the **Apply** button to accept the changes made.

Click the **Delete** button to remove the specific entry.

SNMP Engine ID Settings

The Engine ID is a unique identifier used for SNMP V3 implementations on the Switch.

To view the following window, click **Management > SNMP Settings > SNMP Engine ID Settings**, as show below:



Figure 4-36 SNMP Engine ID Settings window

The fields that can be configured are described below:

Parameter	Description
Engine ID	To change the Engine ID, type the new Engine ID value in the space provided. The SNMP engine ID displays the identification of the SNMP engine on the Switch. The default value is suggested in RFC2271. The very first bit is 1, and the first four octets are set to the binary equivalent of the agent's SNMP management private enterprise number as assigned by IANA (D-Link is 171). The fifth octet is 03 to indicate the rest is the MAC address of this device. The sixth to eleventh octets is the MAC address.

Click the **Apply** button to accept the changes made.



NOTE: The Engine ID length is 10-64 and accepted characters can range from 0 to F.

SNMP User Table Settings

This window displays all of the SNMP User's currently configured on the Switch.

To view the following window, click **Management > SNMP Settings > SNMP User Table Settings**, as show below:

The image shows the 'SNMP User Table Settings' window. It has a title bar with 'Safeguard' on the right. Below the title bar is the 'Add User' section with the following fields:

- User Name:
- Group Name:
- SNMP Version:
- SNMP V3 Encryption:
- Auth-Protocol by Password:
- Password:
- Priv-Protocol by Password:
- Password:
- Auth-Protocol by Key:
- Key:
- Priv-Protocol by Key:
- Key:

An 'Apply' button is located at the bottom right of the 'Add User' section. Below this is a table showing the current state of the user table:

Total Entries: 1

User Name	Group Name	SNMP Version	Auth-Protocol	Priv-Protocol	
initial	initial	V3	None	None	<input type="button" value="Delete"/>

Figure 4-37 SNMP User Table Settings window

The fields that can be configured are described below:

Parameter	Description
User Name	An alphanumeric string of up to 32 characters. This is used to identify the SNMP users.
Group Name	This name is used to specify the SNMP group created can request SNMP messages.
SNMP Version	V3 – Indicates that SNMP version 3 is in use.
SNMP V3 Encryption	Use the drop-down menu to enable encryption for SNMP V3. This is only operable in SNMP V3 mode. The choices are <i>None</i> , <i>Password</i> , or <i>Key</i> .
Auth-Protocol	<p><i>MD5</i> – Specify that the HMAC-MD5-96 authentication level will be used. This field is only operable when V3 is selected in the SNMP Version field and the Encryption field has been checked. This field will require the user to enter a password.</p> <p><i>SHA</i> – Specify that the HMAC-SHA authentication protocol will be used. This field is only operable when V3 is selected in the SNMP Version field and the Encryption field has been checked. This field will require the user to enter a password.</p>
Priv-Protocol	<p><i>None</i> – Specify that no authorization protocol is in use.</p> <p><i>DES</i> – Specify that DES 56-bit encryption is in use, based on the CBC-DES (DES-56) standard. This field is only operable when V3 is selected in the SNMP Version field and the Encryption field has been checked. This field will require the user to enter a password.</p>

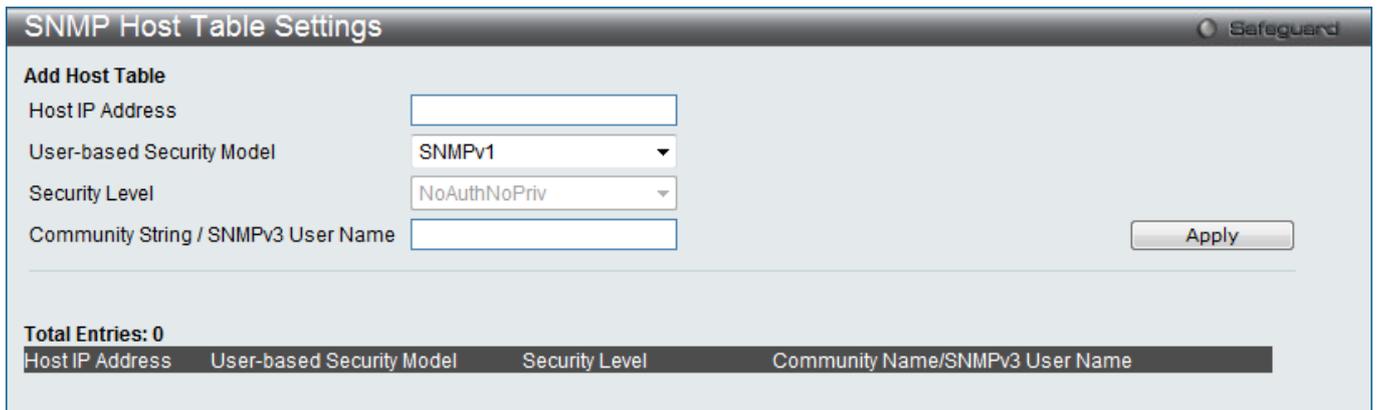
Click the **Apply** button to accept the changes made.

Click the **Delete** button to remove the specific entry.

SNMP Host Table Settings

Users can set up SNMP trap recipients for IPv4.

To view the following window, click **Management > SNMP Settings > SNMP Host Table Settings**, as show below:



The image shows a web interface window titled "SNMP Host Table Settings" with a "Safeguard" icon in the top right corner. The window contains a form for adding a host table. The form has four input fields: "Host IP Address" (a text box), "User-based Security Model" (a dropdown menu with "SNMPv1" selected), "Security Level" (a dropdown menu with "NoAuthNoPriv" selected), and "Community String / SNMPv3 User Name" (a text box). An "Apply" button is located to the right of the last field. Below the form, there is a section labeled "Total Entries: 0" and a table header with four columns: "Host IP Address", "User-based Security Model", "Security Level", and "Community Name/SNMPv3 User Name".

Figure 4-38 SNMP Host Table Settings window

The fields that can be configured are described below:

Parameter	Description
Host IP Address	Type the IP address of the remote management station that will serve as the SNMP host for the Switch.
User-based Security Model	<i>SNMPv1</i> – Specify that SNMP version 1 will be used. <i>SNMPv2</i> – Specify that SNMP version 2 will be used. <i>SNMPv3</i> – Specify that SNMP version 3 will be used.
Security Level	<i>NoAuthNoPriv</i> – To specify that the SNMP version 3 will be used, with a NoAuth-NoPriv security level. <i>AuthNoPriv</i> – To specify that the SNMP version 3 will be used, with an Auth-NoPriv security level. <i>AuthPriv</i> – To specify that the SNMP version 3 will be used, with an Auth-Priv security level.
Community String / SNMPv3 User Name	Type in the community string or SNMP V3 user name as appropriate.

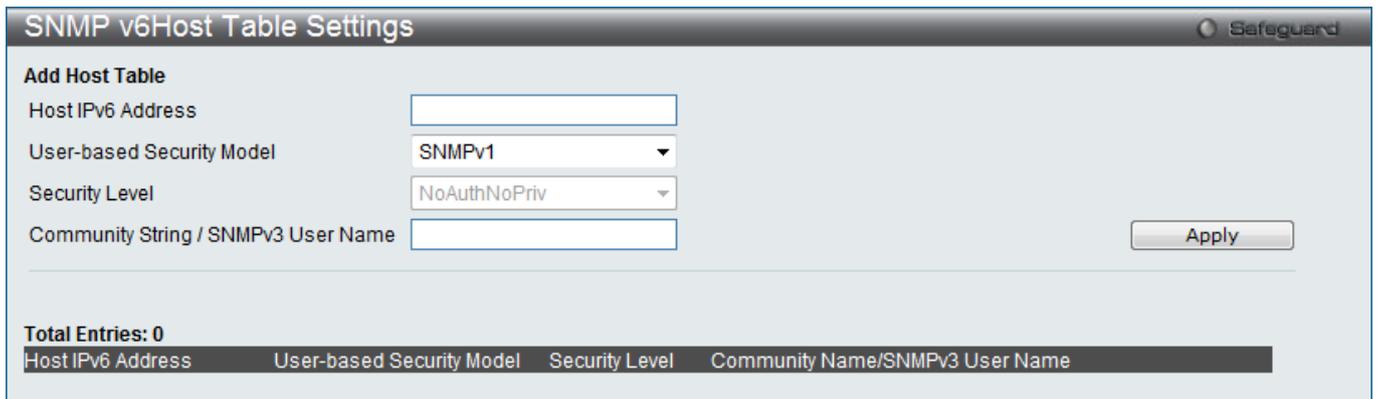
Click the **Apply** button to accept the changes made.

Click the **Delete** button to remove the specific entry.

SNMP v6Host Table Settings

Users can set up SNMP trap recipients for IPv6.

To view the following window, click **Management > SNMP Settings > SNMP v6Host Table Settings**, as show below:



The screenshot shows the 'SNMP v6Host Table Settings' window. It has a title bar with 'Safeguard' on the right. Below the title bar is a section titled 'Add Host Table'. This section contains four input fields: 'Host IPv6 Address' (a text box), 'User-based Security Model' (a dropdown menu with 'SNMPv1' selected), 'Security Level' (a dropdown menu with 'NoAuthNoPriv' selected), and 'Community String / SNMPv3 User Name' (a text box). An 'Apply' button is located to the right of the last field. Below this section, there is a summary bar that reads 'Total Entries: 0' and a table header with four columns: 'Host IPv6 Address', 'User-based Security Model', 'Security Level', and 'Community Name/SNMPv3 User Name'.

4-39 SNMP v6Host Table Settings

The fields that can be configured are described below:

Parameter	Description
Host IPv6 Address	Type the IPv6 address of the remote management station that will serve as the SNMP host for the Switch.
User-based Security Model	<i>SNMPv1</i> – Specifies that SNMP version 1 will be used. <i>SNMPv2</i> – Specifies that SNMP version 2 will be used. <i>SNMPv3</i> – Specifies that SNMP version 3 will be used.
Security Level	<i>NoAuthNoPriv</i> – To specify that the SNMP version 3 will be used, with a NoAuth-NoPriv security level. <i>AuthNoPriv</i> – To specify that the SNMP version 3 will be used, with an Auth-NoPriv security level. <i>AuthPriv</i> – To specify that the SNMP version 3 will be used, with an Auth-Priv security level.
Community String / SNMPv3 User Name	Type in the community string or SNMP V3 user name as appropriate.

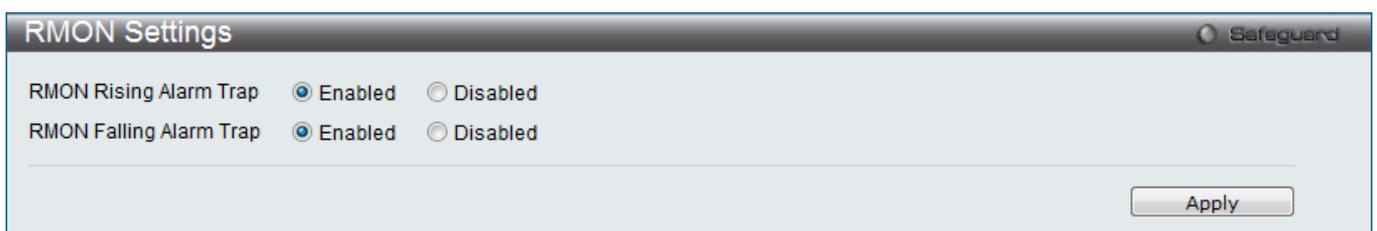
Click the **Apply** button to accept the changes made.

Click the **Delete** button to remove the specific entry.

RMON Settings

This window is used to enable or disable remote monitoring (RMON) for the rising and falling alarm trap feature for the SNMP function on the Switch.

To view the following window, click **Management > SNMP Settings > RMON Settings**, as show below:



The screenshot shows the 'RMON Settings' window. It has a title bar with 'Safeguard' on the right. Below the title bar, there are two rows of settings. The first row is 'RMON Rising Alarm Trap' with radio buttons for 'Enabled' (selected) and 'Disabled'. The second row is 'RMON Falling Alarm Trap' with radio buttons for 'Enabled' (selected) and 'Disabled'. An 'Apply' button is located at the bottom right of the window.

Figure 4-40 RMON Settings window

The fields that can be configured are described below:

Parameter	Description
RMON Rising Alarm Trap	Enable this option to use the RMON Rising Alarm Trap Feature.
RMON Falling Alarm Trap	Enable this option to use the RMON Falling Alarm Trap Feature.

Click the **Apply** button to accept the changes made.

Telnet Settings

Users can configure Telnet Settings on the Switch.

To view the following window, click **Management > Telnet Settings**, as show below:

Figure 4-41 Telnet Settings window

The fields that can be configured are described below:

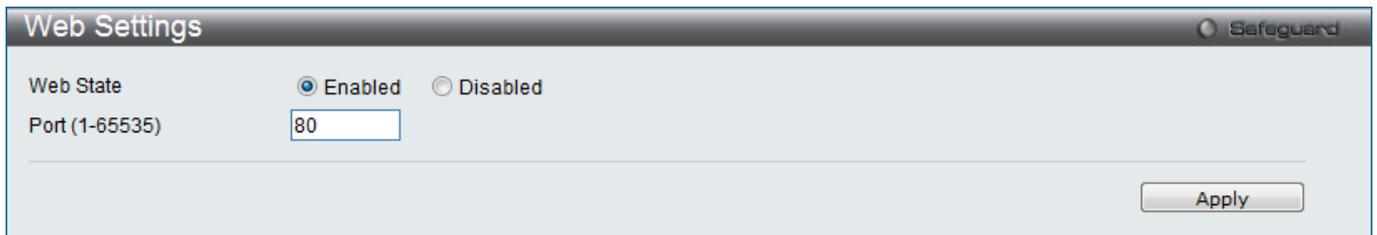
Parameter	Description
Telnet State	Telnet configuration is Enabled by default. If you do not want to allow configuration of the system through Telnet choose Disabled.
Port (1-65535)	The TCP port number used for Telnet management of the Switch. The “well-known” TCP port for the Telnet protocol is 23.

Click the **Apply** button to accept the changes made.

Web Settings

Users can configure the Web settings on the Switch.

To view the following window, click **Management > Web Settings**, as show below:



Web Settings Safeguard

Web State Enabled Disabled

Port (1-65535)

Figure 4-42 Web Settings window

The fields that can be configured are described below:

Parameter	Description
Web Status	Web-based management is Enabled by default. If you choose to disable this by clicking Disabled, you will lose the ability to configure the system through the web interface as soon as these settings are applied.
Port (1-65535)	The TCP port number used for web-based management of the Switch. The “well-known” TCP port for the Web protocol is 80.

Click the **Apply** button to accept the changes made.

Chapter 5 L2 Features

VLAN

QinQ

Layer 2 Protocol Tunneling Settings

Spanning Tree

Link Aggregation

FDB

L2 Multicast Control

Multicast Filtering

ERPS Settings

Local Loopback Port Settings

LLDP

VLAN

Understanding IEEE 802.1p Priority

Priority tagging is a function defined by the IEEE 802.1p standard designed to provide a means of managing traffic on a network where many different types of data may be transmitted simultaneously. It is intended to alleviate problems associated with the delivery of time critical data over congested networks. The quality of applications that are dependent on such time critical data, such as video conferencing, can be severely and adversely affected by even very small delays in transmission.

Network devices that are in compliance with the IEEE 802.1p standard have the ability to recognize the priority level of data packets. These devices can also assign a priority label or tag to packets. Compliant devices can also strip priority tags from packets. This priority tag determines the packet's degree of expeditiousness and determines the queue to which it will be assigned.

Priority tags are given values from 0 to 7 with 0 being assigned to the lowest priority data and 7 assigned to the highest. The highest priority tag 7 is generally only used for data associated with video or audio applications, which are sensitive to even slight delays, or for data from specified end users whose data transmissions warrant special consideration.

The Switch allows you to further tailor how priority tagged data packets are handled on your network. Using queues to manage priority tagged data allows you to specify its relative priority to suit the needs of your network. There may be circumstances where it would be advantageous to group two or more differently tagged packets into the same queue. Generally, however, it is recommended that the highest priority queue, Queue 7, be reserved for data packets with a priority value of 7. Packets that have not been given any priority value are placed in Queue 0 and thus given the lowest priority for delivery.

Strict mode and weighted round robin system are employed on the Switch to determine the rate at which the queues are emptied of packets. The ratio used for clearing the queues is 4:1. This means that the highest priority queue, Queue 7, will clear 4 packets for every 1 packet cleared from Queue 0.

Remember, the priority queue settings on the Switch are for all ports, and all devices connected to the Switch will be affected. This priority queuing system will be especially beneficial if your network employs switches with the capability of assigning priority tags.

VLAN Description

A Virtual Local Area Network (VLAN) is a network topology configured according to a logical scheme rather than the physical layout. VLANs can be used to combine any collection of LAN segments into an autonomous user group that appears as a single LAN. VLANs also logically segment the network into different broadcast domains so that packets are forwarded only between ports within the VLAN. Typically, a VLAN corresponds to a particular subnet, although not necessarily.

VLANs can enhance performance by conserving bandwidth, and improve security by limiting traffic to specific domains.

A VLAN is a collection of end nodes grouped by logic instead of physical location. End nodes that frequently communicate with each other are assigned to the same VLAN, regardless of where they are physically on the network. Logically, a VLAN can be equated to a broadcast domain, because broadcast packets are forwarded to only members of the VLAN on which the broadcast was initiated.

Notes about VLANs on the Switch

- No matter what basis is used to uniquely identify end nodes and assign these nodes VLAN membership, packets cannot cross VLANs without a network device performing a routing function between the VLANs.
- The Switch supports IEEE 802.1Q VLANs. The port untagging function can be used to remove the 802.1Q tag from packet headers to maintain compatibility with devices that are tag-unaware.
- The Switch's default is to assign all ports to a single 802.1Q VLAN named "default."
- The "default" VLAN has a VID = 1.
- The member ports of Port-based VLANs may overlap, if desired.

IEEE 802.1Q VLANs

Some relevant terms:

- **Tagging** – The act of putting 802.1Q VLAN information into the header of a packet.
- **Untagging** – The act of stripping 802.1Q VLAN information out of the packet header.
- **Ingress port** – A port on a switch where packets are flowing into the Switch and VLAN decisions must be made.
- **Egress port** – A port on a switch where packets are flowing out of the Switch, either to another switch or to an end station, and tagging decisions must be made.

IEEE 802.1Q (tagged) VLANs are implemented on the Switch. 802.1Q VLANs require tagging, which enables them to span the entire network (assuming all switches on the network are IEEE 802.1Q-compliant).

VLANs allow a network to be segmented in order to reduce the size of broadcast domains. All packets entering a VLAN will only be forwarded to the stations (over IEEE 802.1Q enabled switches) that are members of that VLAN, and this includes broadcast, multicast and unicast packets from unknown sources.

VLANs can also provide a level of security to your network. IEEE 802.1Q VLANs will only deliver packets between stations that are members of the VLAN.

Any port can be configured as either tagging or untagging. The untagging feature of IEEE 802.1Q VLANs allows VLANs to work with legacy switches that don't recognize VLAN tags in packet headers. The tagging feature allows VLANs to span multiple 802.1Q-compliant switches through a single physical connection and allows Spanning Tree to be enabled on all ports and work normally.

The IEEE 802.1Q standard restricts the forwarding of untagged packets to the VLAN the receiving port is a member of.

The main characteristics of IEEE 802.1Q are as follows:

1. Assigns packets to VLANs by filtering.
2. Assumes the presence of a single global spanning tree.
3. Uses an explicit tagging scheme with one-level tagging.
4. 802.1Q VLAN Packet Forwarding
5. Packet forwarding decisions are made based upon the following three types of rules:
 1. Ingress rules – rules relevant to the classification of received frames belonging to a VLAN.
 2. Forwarding rules between ports – decides whether to filter or forward the packet.
 3. Egress rules – determines if the packet must be sent tagged or untagged.

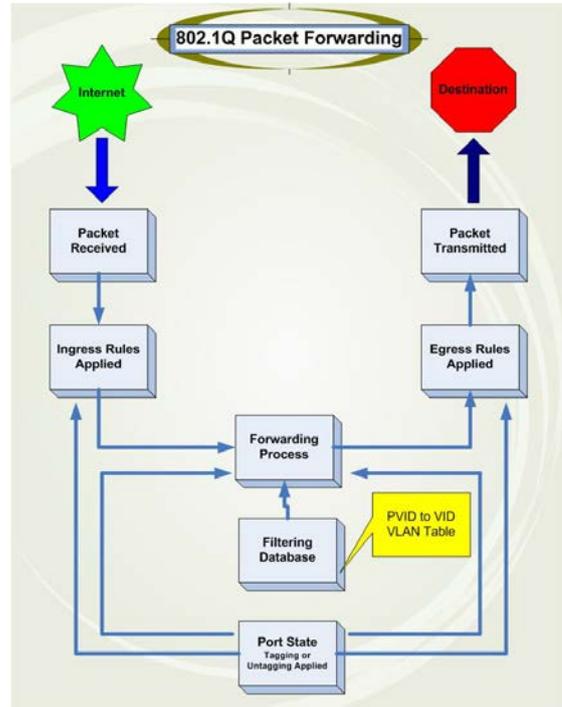


Figure 5-1 IEEE 802.1Q Packet Forwarding

802.1Q VLAN Tags

The figure below shows the 802.1Q VLAN tag. There are four additional octets inserted after the source MAC address. Their presence is indicated by a value of 0x8100 in the EtherType field. When a packet's EtherType field is equal to 0x8100, the packet carries the IEEE 802.1Q/802.1p tag. The tag is contained in the following two octets and consists of 3 bits of user priority, 1 bit of Canonical Format Identifier (CFI – used for encapsulating Token Ring packets so they can be carried across Ethernet backbones), and 12 bits of VLAN ID (VID). The 3 bits of user priority are used by 802.1p. The VID is the VLAN identifier and is used by the 802.1Q standard. Because the VID is 12 bits long, 4094 unique VLANs can be identified.

The tag is inserted into the packet header making the entire packet longer by 4 octets. All of the information originally contained in the packet is retained.

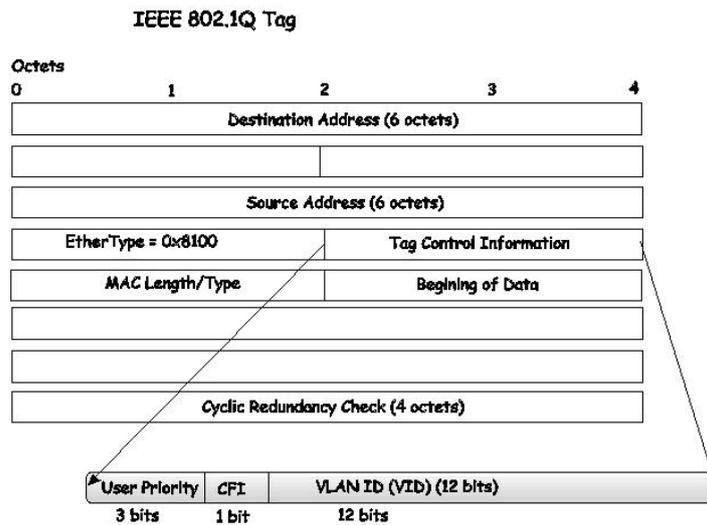


Figure 5-2 IEEE 802.1Q Tag

The EtherType and VLAN ID are inserted after the MAC source address, but before the original EtherType/Length or Logical Link Control. Because the packet is now a bit longer than it was originally, the Cyclic Redundancy Check (CRC) must be recalculated.

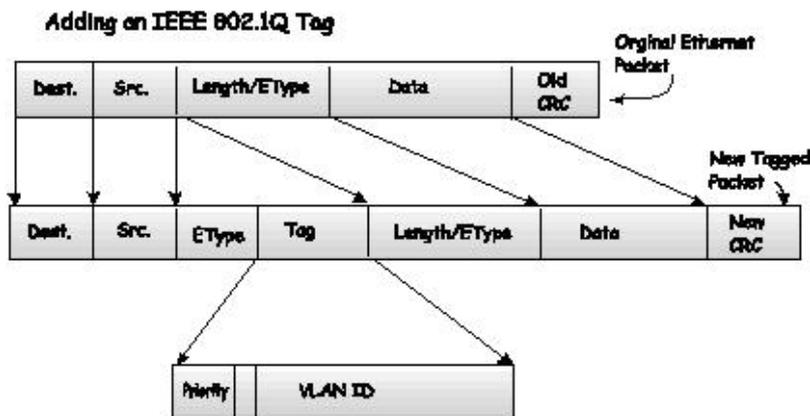


Figure 5-3 Adding an IEEE 802.1Q Tag

Port VLAN ID

Packets that are tagged (are carrying the 802.1Q VID information) can be transmitted from one 802.1Q compliant network device to another with the VLAN information intact. This allows 802.1Q VLANs to span network devices (and indeed, the entire network, if all network devices are 802.1Q compliant).

Unfortunately, not all network devices are 802.1Q compliant. These devices are referred to as tag-unaware. 802.1Q devices are referred to as tag-aware.

Prior to the adoption of 802.1Q VLANs, port-based and MAC-based VLANs were in common use. These VLANs relied upon a Port VLAN ID (PVID) to forward packets. An untagged packet received on a given port would be assigned that port's PVID and then be forwarded to the port that corresponded to the packet's destination address (found in the Switch's forwarding table).

Within the Switch, different PVIDs mean different VLANs (remember that two VLANs cannot communicate without an external router). So, VLAN identification based upon the PVIDs cannot create VLANs that extend outside a given switch (or switch stack).

Every physical port on a switch has a PVID. 802.1Q ports are also assigned a PVID, for use within the Switch. If no VLANs are defined on the Switch, all ports are then assigned to a default VLAN with a PVID equal to 1. Untagged packets are assigned the PVID of the port on which they were received. Forwarding decisions are based upon this PVID, in so far as VLANs are concerned. Tagged packets are forwarded according to the VID contained within the tag.

Tag-aware switches must keep a table to relate PVIDs within the Switch to VIDs on the network. The Switch will compare the VID of a packet to be transmitted to the VID of the port that is to transmit the packet. If the two VIDs are different, the Switch will drop the packet. Because of the existence of the PVID for untagged packets and the VID for tagged packets, tag-aware and tag-unaware network devices can coexist on the same network.

A switch port can have only one PVID, but can have as many VIDs as the Switch has memory in its VLAN table to store them.

Because some devices on a network may be tag-unaware, a decision must be made at each port on a tag-aware device before packets are transmitted – should the packet to be transmitted have a tag or not? If the transmitting port is connected to a tag-unaware device, the packet should be untagged. If the transmitting port is connected to a tag-aware device, the packet should be tagged.

Tagging and Untagging

Every port on an 802.1Q compliant switch can be configured as tagging or untagging.

Ports with tagging enabled will put the VID number, priority and other VLAN information into the header of all packets that flow into and out of it.

If a packet has previously been tagged, the port will not alter the packet, thus keeping the VLAN information intact. Other 802.1Q compliant devices on the network to make packet-forwarding decisions can then use the VLAN information in the tag.

Ports with untagging enabled will strip the 802.1Q tag from all packets that flow into and out of those ports. If the packet doesn't have an 802.1Q VLAN tag, the port will not alter the packet. Thus, all packets received by and forwarded by an untagging port will have no 802.1Q VLAN information. (Remember that the PVID is only used internally within the Switch). Untagging is used to send packets from an 802.1Q-compliant network device to a non-compliant network device.

Ingress Filtering

A port on a switch where packets are flowing into the Switch and VLAN decisions must be made is referred to as an ingress port. If ingress filtering is enabled for a port, the Switch will examine the VLAN information in the packet header (if present) and decide whether or not to forward the packet.

If the packet is tagged with VLAN information, the ingress port will first determine if the ingress port itself is a member of the VLAN. If it is not, the packet will be dropped. If the ingress port is a member of the 802.1Q VLAN, the Switch then determines if the destination port is a member of the 802.1Q VLAN. If it is not, the packet is dropped. If the destination port is a member of the 802.1Q VLAN, the packet is forwarded and the destination port transmits it to its attached network segment.

If the packet is not tagged with VLAN information, the ingress port will tag the packet with its own PVID as a VID. The switch then determines if the destination port is a member of the same VLAN (has the same VID) as the ingress port. If it does not, the packet is dropped. If it has the same VID, the packet is forwarded and the destination port transmits it on its attached network segment.

This process is referred to as ingress filtering and is used to conserve bandwidth within the Switch by dropping packets that are not on the same VLAN as the ingress port at the point of reception. This eliminates the subsequent processing of packets that will just be dropped by the destination port.

Default VLANs

The Switch initially configures one VLAN, VID = 1, called “default.” The factory default setting assigns all ports on the Switch to the “default.” As new VLANs are configured in Port-based mode, their respective member ports are removed from the “default.”

Packets cannot cross VLANs. If a member of one VLAN wants to connect to another VLAN, the link must be through an external router.



NOTE: If no VLANs are configured on the Switch, then all packets will be forwarded to any destination port. Packets with unknown source addresses will be flooded to all ports. Broadcast and multicast packets will also be flooded to all ports.

An example is presented below:

VLAN Name	VID	Switch Ports
System (default)	1	5, 6, 7
Engineering	2	9, 10
Sales	5	1, 2, 3, 4

Port-based VLANs

Port-based VLANs limit traffic that flows into and out of switch ports. Thus, all devices connected to a port are members of the VLAN(s) the port belongs to, whether there is a single computer directly connected to a switch, or an entire department.

On port-based VLANs, NICs do not need to be able to identify 802.1Q tags in packet headers. NICs send and receive normal Ethernet packets. If the packet’s destination lies on the same segment, communications take place using normal Ethernet protocols. Even though this is always the case, when the destination for a packet lies on another switch port, VLAN considerations come into play to decide if the packet gets dropped by the Switch or delivered.

VLAN Segmentation

Take for example a packet that is transmitted by a machine on Port 1 that is a member of VLAN 2. If the destination lies on another port (found through a normal forwarding table lookup), the Switch then looks to see if the other port (Port 10) is a member of VLAN 2 (and can therefore receive VLAN 2 packets). If Port 10 is not a member of VLAN 2, then the packet will be dropped by the Switch and will not reach its destination. If Port 10 is a member of VLAN 2, the packet will go through. This selective forwarding feature based on VLAN criteria is how VLANs segment networks. The key point being that Port 1 will only transmit on VLAN 2.

802.1Q VLAN Settings

The **VLAN List** tab lists all previously configured VLANs by VLAN ID and VLAN Name.

To view the following window, click **L2 Features > VLAN > 802.1Q VLAN Settings**, as show below:

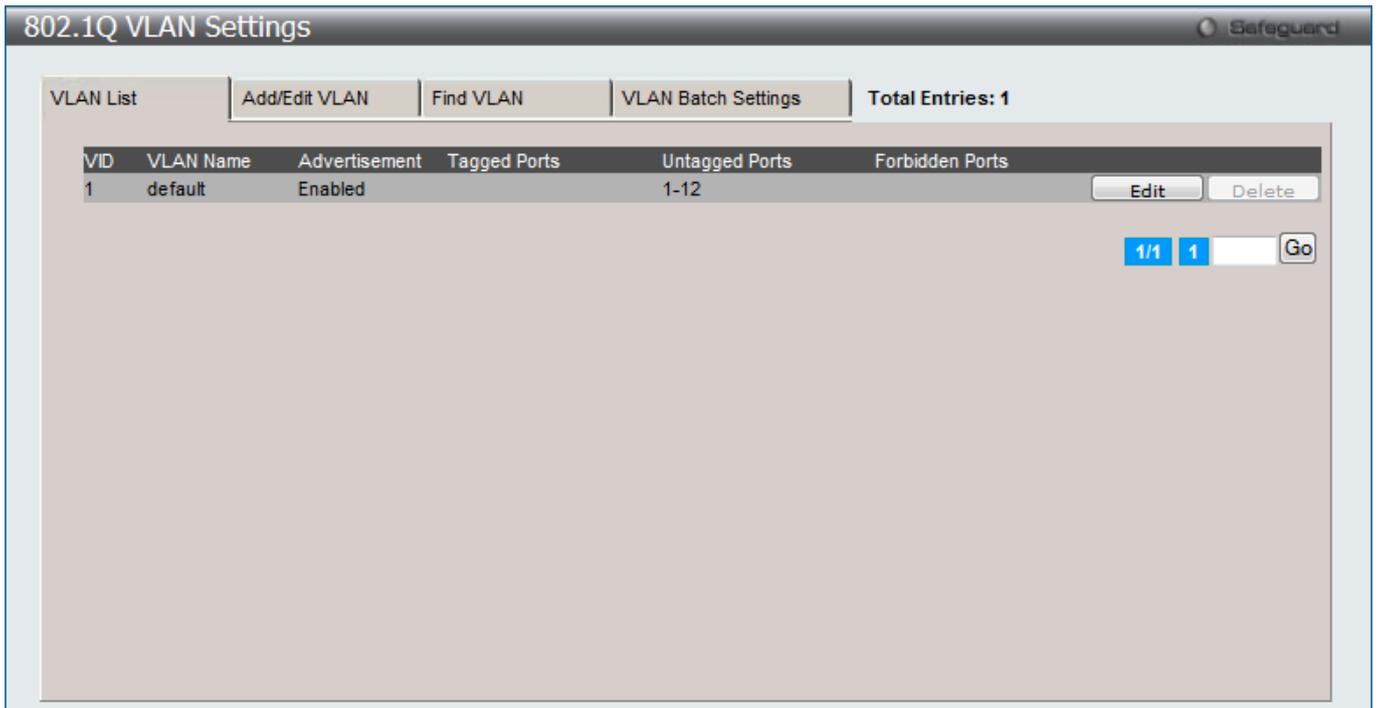


Figure 5-4 802.1Q VLAN Settings –VLAN List Tab window

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

To create a new 802.1Q VLAN or modify an existing 802.1Q VLAN, click the **Add/Edit VLAN** tab.

A new tab will appear, as shown below, to configure the port settings and to assign a unique name and number to the new VLAN.

The screenshot shows the 'Add/Edit VLAN' tab in the 802.1Q VLAN Settings window. At the top, there are navigation tabs: 'VLAN List', 'Add/Edit VLAN', 'Find VLAN', and 'VLAN Batch Settings'. The 'Total Entries: 1' is displayed on the right. The main configuration area includes a 'VID' input field, a 'VLAN Name' input field (with a '(Max: 32 characters)' note), and an 'Apply' button. Below this is an 'Advertisement' dropdown menu set to 'Disabled'. The core of the interface is a table for port configuration:

Port	Select All	01	02	03	04	05	06	07	08	09	10	11	12
Tagged	All	<input type="radio"/>											
Untagged	All	<input type="radio"/>											
Forbidden	All	<input type="radio"/>											
Not Member	All	<input checked="" type="radio"/>											

Below the table, there are three sections: 'Tagged Ports', 'Untagged Ports', and 'Forbidden Ports', each with a corresponding list of ports.

Figure 5-5 802.1Q VLAN Settings – Add/Edit VLAN Tab window

The fields that can be configured are described below:

Parameter	Description
VID	Allow the entry of a VLAN ID or displays the VLAN ID of an existing VLAN in the Add/Edit VLAN tab. VLANs can be identified by either the VID or the VLAN name.
VLAN Name	Allow the entry of a name for the new VLAN or for editing the VLAN name in the Add/Edit VLAN tab.
Advertisement	Enable this function to allow the Switch sending out GVRP packets to outside sources, notifying that they may join the existing VLAN.
Port	Display all ports of the Switch for the configuration option.
Tagged	Specify the port as 802.1Q tagging. Clicking the radio button will designate the port as tagged. Click the All button to select all ports.
Untagged	Specify the port as 802.1Q untagged. Clicking the radio button will designate the port as untagged. Click the All button to select all ports.
Forbidden	Click the radio button to specify the port as not being a member of the VLAN and that the port is forbidden from becoming a member of the VLAN dynamically. Click the All button to select all ports.
Not Member	Click the radio button to allow an individual port to be specified as a non-VLAN member. Click the All button to select all ports.

Click the **Apply** button to accept the changes made.

To search for a VLAN, click the **Find VLAN** tab. A new tab will appear, as shown below.

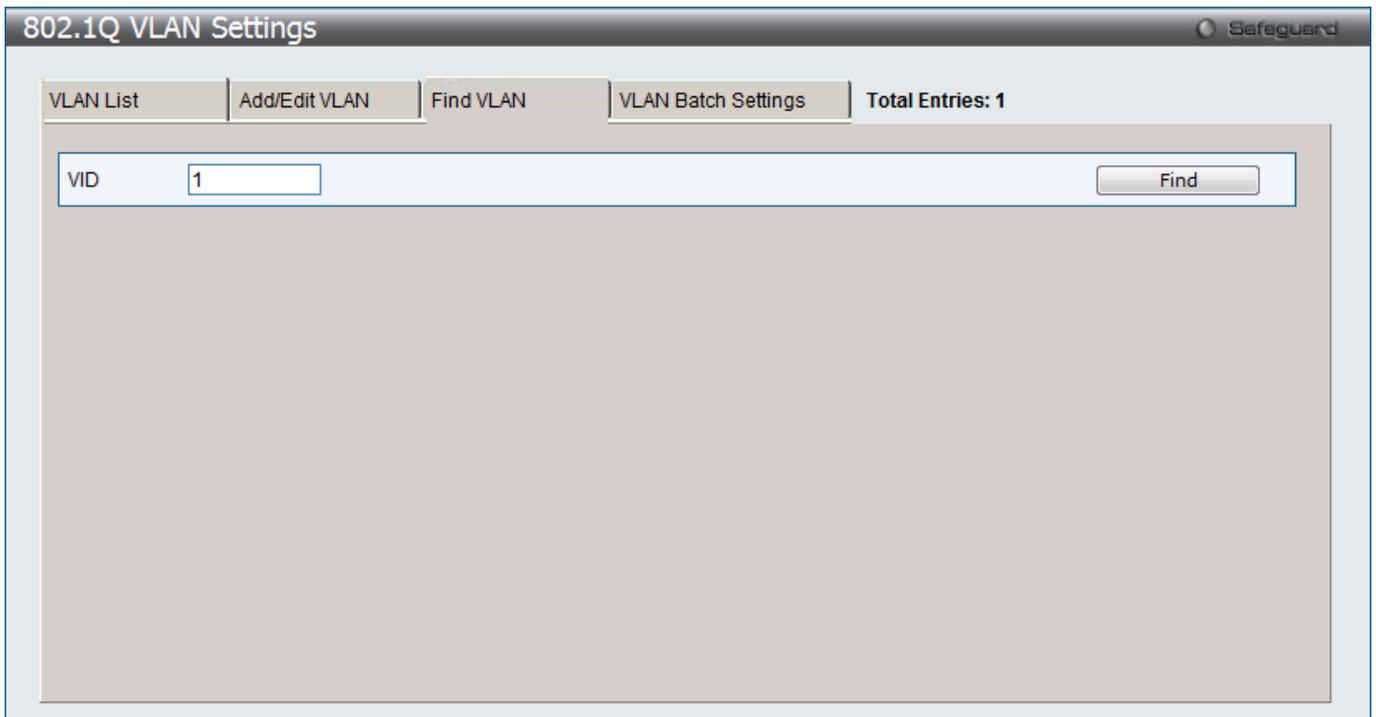


Figure 5-6 802.1Q VLAN Settings – Find VLAN Tab window

Enter the VLAN ID number in the field offered and then click the **Find** button. You will be redirected to the **VLAN List** tab.

To create, delete and configure a VLAN Batch entry click the **VLAN Batch Settings** tab, as shown below.

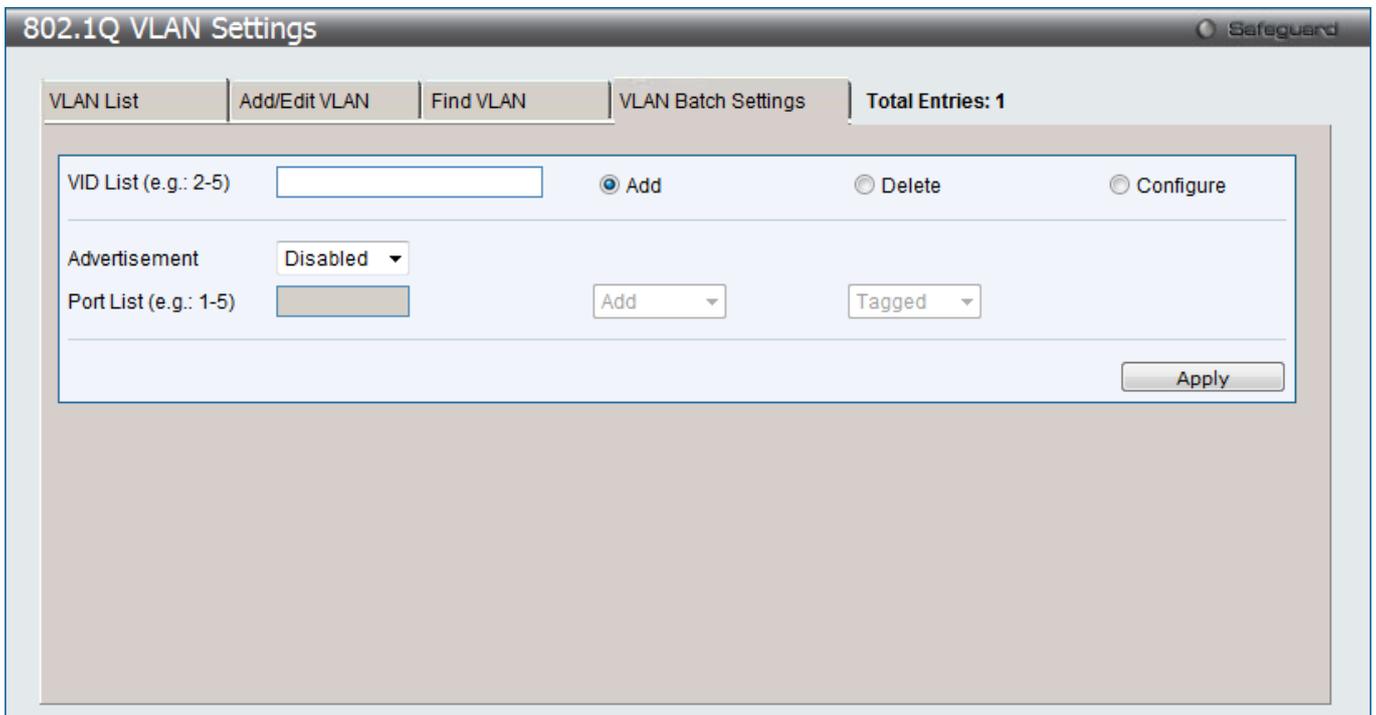


Figure 5-7 802.1Q VLAN Settings – VLAN Batch Settings Tab window

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

VID List	Enter a VLAN ID List that can be added, deleted or configured.
Advertisement	Enabling this function will allow the Switch to send out GVRP packets to outside sources, notifying that they may join the existing VLAN.
Port List	Allows an individual port list to be added or deleted as a member of the VLAN.
Tagged	Specify the port as 802.1Q tagged. Use the drop-down menu to designate the port as tagged.
Untagged	Specify the port as 802.1Q untagged. Use the drop-down menu to designate the port as untagged.
Forbidden	Specify the port as not being a member of the VLAN and that the port is forbidden from becoming a member of the VLAN dynamically. Use the drop-down menu to designate the port as forbidden.

Click the **Apply** button to accept the changes made.



NOTE: The Switch supports up to 4k static VLAN entries.

802.1v Protocol VLAN

802.1v Protocol Group Settings

The user can create Protocol VLAN groups and add protocols to that group. The 802.1v Protocol VLAN Group Settings support multiple VLANs for each protocol and allows the user to configure the untagged ports of different protocols on the same physical port. For example, it allows the user to configure an 802.1Q and 802.1v untagged port on the same physical port. The lower half of the table displays any previously created groups.

To view the following window, click **L2 Features > VLAN > 802.1v protocol VLAN > 802.1v Protocol Group Settings**, as show below:

Figure 5-8 802.1v Protocol Group Settings window

The fields that can be configured are described below:

Parameter	Description
Group ID	Select an ID number for the group, between 1 and 16.
Group Name	This is used to identify the new Protocol VLAN group. Type an alphanumeric string of up to 32 characters.
Protocol	This function maps packets to protocol-defined VLANs by examining the type octet within the packet header to discover the type of protocol associated with it. Use the drop-down menu to toggle between <i>Ethernet II</i> , <i>IEEE802.3 SNAP</i> , and <i>IEEE802.3 LLC</i> .
Protocol Value	Enter a value for the Group. The protocol value is used to identify a protocol of the frame type specified. The form of the input is 0x0 to 0xffff. Depending on the frame type, the octet string will have one of the following values: For Ethernet II, this is a 16-bit (2-octet) hex value. For example, IPv4 is 0800, IPv6 is 86dd, ARP is 0806, etc. For IEEE802.3 SNAP, this is a 16-bit (2-octet) hex value. For IEEE802.3 LLC, this is a 2-octet IEEE 802.2 Link Service Access Point (LSAP) pair. The first octet is for Destination Service Access Point (DSAP) and the second octet is for Source.

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete All** button to remove all the entries based on the information entered.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete Settings** button to remove the Protocol for the Protocol VLAN Group information for the specific entry.

Click the **Delete Group** button to remove the entry completely.



NOTE: The Group name value should be less than 33 characters.

802.1v Protocol VLAN Settings

The user can configure Protocol VLAN settings. The lower half of the table displays any previously created settings.

To view the following window, click **L2 Features > VLAN > 802.1v protocol VLAN > 802.1v Protocol VLAN Settings**, as show below:

Figure 5-9 802.1v Protocol VLAN Settings window

The fields that can be configured are described below:

Parameter	Description
Group ID	Select a previously configured Group ID from the drop-down menu.
Group Name	Select a previously configured Group Name from the drop-down menu.
VID (1-4094)	This is the VLAN ID that, along with the VLAN Name, identifies the VLAN the user wishes to create.
VLAN Name	This is the VLAN Name that, along with the VLAN ID, identifies the VLAN the user wishes to create.
802.1p Priority	<p>This parameter is specified if you want to re-write the 802.1p default priority previously set in the Switch, which is used to determine the CoS queue to which packets are forwarded to. Once this field is specified, packets accepted by the Switch that match this priority are forwarded to the CoS queue specified previously by the user.</p> <p>Click the corresponding box if you want to set the 802.1p default priority of a packet to the value entered in the Priority (0-7) field, which meets the criteria specified previously in this command, before forwarding it on to the specified CoS queue. Otherwise, a packet will have its incoming 802.1p user priority re-written to its original value before being forwarded by the Switch.</p> <p>For more information on priority queues, CoS queues and mapping for 802.1p, see the QoS section of this manual.</p>
Port List	Select the specified ports you wish to configure by entering the port number in this field, or tick the All Ports check box.
Search Port List	This function allows the user to search all previously configured port list settings and display them on the lower half of the table. To search for a port list enter the port number you wish to view and click Find . To display all previously configured port lists on the bottom half of the screen click the Show All button, to clear all previously configured lists click the Delete All button.

Click the **Add** button to add a new entry based on the information entered.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Show All** button to display all the Protocol VLANs configured.

Click the **Delete All** button to remove all the entries listed.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

GVRP

GVRP Global Settings

Users can determine whether the Switch will share its VLAN configuration information with other GARP VLAN Registration Protocol (GVRP) enabled switches. In addition, Ingress Checking can be used to limit traffic by filtering incoming packets whose VID does not match the PVID of the port. Results can be seen in the table under the configuration settings.

To view the following window, click **L2 Features > VLAN > GVRP > GVRP Global Settings**, as show below:

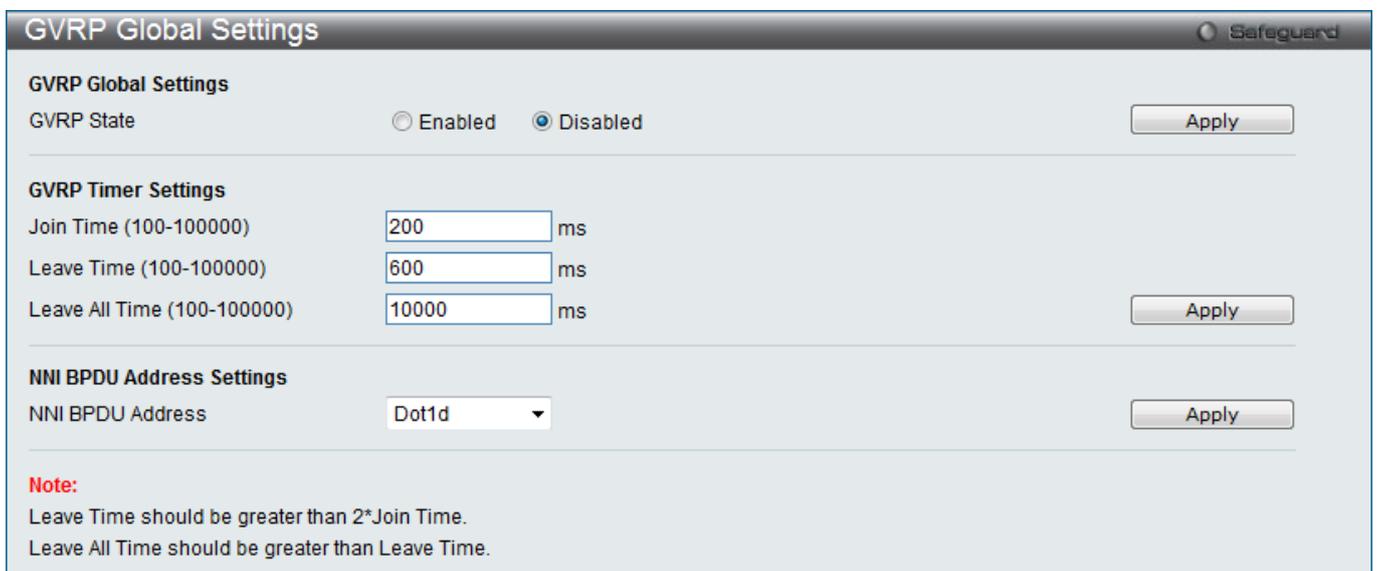


Figure 5-10 GVRP Global Settings window

The fields that can be configured are described below:

Parameter	Description
GVRP State	Click the radio buttons to enable or disable the GVRP State.
Join Time (100-100000)	Enter the Join Time value in milliseconds.
Leave Time (100-100000)	Enter the Leave Time value in milliseconds.
Leave All Time (100-100000)	Enter the Leave All Time value in milliseconds.
NNI BPDU Address	Used to determine the BPDU protocol address for GVRP in service provide site. It can use 802.1d GVRP address, 802.1ad service provider GVRP address or a user defined multicast address. The range of the user defined address is 0180C2000000 -

0180C2FFFFFF.

Click the **Apply** button to accept the changes made for each individual section.



NOTE: The **Leave Time** value should be greater than twice the **Join Time** value. The **Leave All Time** value should be greater than the **Leave Time** value.

GVRP Port Settings

On this page the user can configure the GVRP port parameters.

To view the following window, click **L2 Features > VLAN > GVRP > GVRP Port Settings**, as show below:

Port	PVID	GVRP	Ingress Checking	Acceptable Frame Type
1	1	Disabled	Enabled	All
2	1	Disabled	Enabled	All
3	1	Disabled	Enabled	All
4	1	Disabled	Enabled	All
5	1	Disabled	Enabled	All
6	1	Disabled	Enabled	All
7	1	Disabled	Enabled	All
8	1	Disabled	Enabled	All
9	1	Disabled	Enabled	All
10	1	Disabled	Enabled	All

Figure 5-11 GVRP Port Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select the starting and ending ports to use.
PVID (1-4094)	This field is used to manually assign a PVID to a VLAN. The Switch's default is to assign all ports to the default VLAN with a VID of 1. The PVID is used by the port to tag internally outgoing, untagged packets, and to make filtering decisions about incoming packets.
GVRP	The GARP VLAN Registration Protocol (GVRP) enables the port to dynamically become a member of a VLAN. GVRP is <i>Disabled</i> by default.
Ingress Checking	This drop-down menu allows the user to enable the port to compare the VID tag of an incoming packet with the port's VLAN setting, including PVID and tag LAN settings. If enable ingress checking and the reception port is not the member port of the frame's VLAN, the frame shall be discarded.
Acceptable Frame Type	This field denotes the type of frame that will be accepted by the port. The user may choose between <i>Tagged Only</i> , which means only VLAN tagged frames will be accepted, and <i>All</i> , which mean both tagged and untagged frames will be accepted.

All is enabled by default.

Click the **Apply** button to accept the changes made.

MAC-based VLAN Settings

Users can create new MAC-based VLAN entries, search and delete existing entries. When a static MAC-based VLAN entry is created for a user, the traffic from this user will be able to be serviced under the specified VLAN regardless of the authentication function operating on this port.

To view the following window, click **L2 Features > VLAN > MAC-based VLAN Settings**, as show below:

Figure 5-12 MAC-based VLAN Settings

The fields that can be configured are described below:

Parameter	Description
MAC Address	Enter the unicast MAC address.
VID (1-4094)	Select this option and enter the VLAN ID.
VLAN Name	Select this option and enter the VLAN name of a previously configured VLAN.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Add** button to add a new entry based on the information entered.

Click the **View All** button to display all the existing entries.

Click the **Delete All** button to remove all the entries listed.

Click the **Delete** button to remove the specific entry.

PVID Auto Assign Settings

This window is used to enable or disable PVID Auto Assign Status. The default setting is enabled.

To view the following window, click **L2 Features > VLAN > PVID Auto Assign Settings**, as show below:

Figure 5-13 PVID Auto Assign Settings window

Click the **Apply** button to accept the changes made.

Subnet VLAN

Subnet VLAN Settings

A subnet VLAN entry is an IP subnet-based VLAN classification rule. If an untagged or priority-tagged IP packet is received on a port, its source IP address will be used to match the subnet VLAN entries. If the source IP is in the subnet of an entry, the packet will be classified to the VLAN defined for this subnet.

The user can configure the subnet VLAN parameters here.

To view the following window, click **L2 Features > VLAN > Subnet VLAN > Subnet VLAN Settings**, as show below:

Figure 5-14 Subnet VLAN Settings Window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	Enter a VLAN Name.
VID	Enter a VLAN ID.
VID List	Enter a list of VLAN IDs.
IPv4 Network Address	The user can enter the IPv4 address used in here. Remember to include the subnet mask using the / notation.
IPv6 Network Address	The user can enter the IPv6 address used in here. Remember to include the subnet mask using the / notation.

Click the **Add** button to add a new entry based on the information entered.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Delete** button to remove the specific entry based on the information entered.

Click the **Show All** button to display all the existing entries.

Click the **Delete All** button to remove all the entries listed.

VLAN Precedence Settings

The VLAN precedence settings are used to configure VLAN classification precedence on each port. You can specify the order of MAC-based VLAN classifications and subnet VLAN classifications. If a port's VLAN classification is a MAC-based precedence, MAC-based VLAN classification will process first. If MAC-based VLAN classification fails, the subnet VLAN classification will be executed. If a port's VLAN classification is subnet VLAN precedence, the subnet VLAN classification will process first. If subnet VLAN classification fails, the MAC-based VLAN classification will be executed.

To view the following window, click **L2 Features > VLAN > Subnet VLAN > VLAN Precedence Settings**, as show below:

Port	VLAN Precedence
1	MAC-based VLAN
2	MAC-based VLAN
3	MAC-based VLAN
4	MAC-based VLAN
5	MAC-based VLAN
6	MAC-based VLAN
7	MAC-based VLAN
8	MAC-based VLAN
9	MAC-based VLAN
10	MAC-based VLAN
11	MAC-based VLAN
12	MAC-based VLAN

Figure 5-15 VLAN Precedence Settings Window

The fields that can be configured are described below:

Parameter	Description
From Port ~ To Port	Specifies the list of port that will be used for this configuration.
VLAN Precedence	Use the drop-down menu to select the VLAN precedence, choose either MAC Based VLAN or Subnet VLAN. <i>MAC-based VLAN</i> – Specifies that the MAC-based VLAN classification is given precedence over the subnet VLAN classification. <i>Subnet VLAN</i> – Specifies that the subnet VLAN classification is given precedence over the MAC-based VLAN classification.

Click the **Apply** button to accept the changes made.

VLAN Counter Settings

This window is used to configure the VLAN counter settings.

To view the following window, click **L2 Features > VLAN > VLAN Counter Settings**, as show below:

Figure 5-16 VLAN Counter Settings window

The fields that can be configured are described below:

Parameter	Description
VID List	Enter the VLAN ID used here.
VLAN Name	Enter the VLAN name used here.
Ports	Enter the list of ports used here. To include all the ports in this configuration, tick the All Ports option.
Packet Type	Select the packet type used here. Options to choose from are Broadcast, Multicast, Unicast, and All .
Counter Type	Select the counter type used here. Options to choose from are Packet and Byte .

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete** button to remove the specific entry based on the information entered.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **View All** button to display all the existing entries.

Click the **Delete All** button to remove all the entries listed.

Voice VLAN

Voice VLAN Global Settings

Voice VLAN is a VLAN used to carry voice traffic from IP phone. Because the sound quality of an IP phone call will be deteriorated if the data is unevenly sent, the quality of service (QoS) for voice traffic shall be configured to ensure the transmission priority of voice packet is higher than normal traffic.

The switches determine whether a received packet is a voice packet by checking its source MAC address. If the source MAC addresses of packets comply with the organizationally unique identifier (OUI) addresses configured by the system, the packets are determined as voice packets and transmitted in voice VLAN.

To view the following window, click **L2 Features > VLAN > Voice VLAN > Voice VLAN Global Settings**, as show below:

Figure 5-17 Voice VLAN Global Settings window

The fields that can be configured are described below:

Parameter	Description
Voice VLAN State	The state of the voice VLAN.
Voice VLAN Name	The name of the voice VLAN.
Voice VID (1-4094)	The VLAN ID of the voice VLAN.
Priority	The priority of the voice VLAN, the range is 0 – 7. The default priority is 5.
Aging Time (1-65535)	The aging time to set, the range is 1 – 65535 minutes. The default value is 720 minutes. The aging time is used to remove a port from voice VLAN if the port is an automatic VLAN member. When the last voice device stops sending traffic and the MAC address of this voice device is aged out, the voice VLAN aging timer will be started. The port will be removed from the voice VLAN after expiration of voice VLAN aging timer. If the voice traffic resumes during the aging time, the aging timer will be reset and stop.
Log State	Used to enable/disable sending of issue of voice VLAN log.

Click the **Apply** button to accept the changes made for each individual section.

Voice VLAN Port Settings

This window is used to show the ports voice VLAN information.

To view the following window, click **L2 Features > VLAN > Voice VLAN > Voice VLAN Port Settings**, as show below:

From Port	To Port	State	Mode
01	01	Disabled	Auto

Port	State	Mode
1	Disabled	Auto
2	Disabled	Auto
3	Disabled	Auto
4	Disabled	Auto
5	Disabled	Auto
6	Disabled	Auto
7	Disabled	Auto
8	Disabled	Auto

Figure 5-18 Voice VLAN Port Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Here the user can select a range of port to display.
State	Here the user can configure the state of the port.
Mode	Here the user can configure the mode of the port.

Click the **Apply** button to accept the changes made.

Voice VLAN OUI Settings

This window is used to configure the user-defined voice traffic's OUI. The OUI is used to identify the voice traffic. There are a number of pre-defined OUIs. The user can further define the user-defined OUIs if needed. The user-defined OUI cannot be the same as the pre-defined OUI.

To view the following window, click **L2 Features > VLAN > Voice VLAN > Voice VLAN OUI Settings**, as show below:

OUI Address	Mask	Description	Edit	Delete
00-01-E3-00-00-00	FF-FF-FF-00-00-00	Siemens	Edit	Delete
00-03-6B-00-00-00	FF-FF-FF-00-00-00	Cisco	Edit	Delete
00-09-6E-00-00-00	FF-FF-FF-00-00-00	Avaya	Edit	Delete
00-0F-E2-00-00-00	FF-FF-FF-00-00-00	Huawei&3COM	Edit	Delete
00-60-B9-00-00-00	FF-FF-FF-00-00-00	NEC&Philips	Edit	Delete
00-D0-1E-00-00-00	FF-FF-FF-00-00-00	Pingtel	Edit	Delete
00-E0-75-00-00-00	FF-FF-FF-00-00-00	Veritel	Edit	Delete
00-E0-BB-00-00-00	FF-FF-FF-00-00-00	3COM	Edit	Delete

Figure 5-19 Voice VLAN OUI Settings window

The fields that can be configured are described below:

Parameter	Description
OUI Address	User defined OUI MAC address.
Mask	User defined OUI MAC address mask.
Description	The description for the user defined OUI.

Click the **Apply** button to accept the changes made.

Click the **Delete All** button to remove all the user-defined entries listed.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

Voice VLAN Device

This window is used to show voice devices that are connected to the ports. The start time is the time when the device is detected on this port, the activate time is the latest time saw the device sending the traffic.

To view the following window, click **L2 Features > VLAN > Voice VLAN > Voice VLAN Device**, as show below:

Port	Voice Device	Start Time	Last Active Time
------	--------------	------------	------------------

Figure 5-20 Voice VLAN Device window

Browse VLAN

Users can display the VLAN status for each of the Switch's ports viewed by VLAN. Enter a VID (VLAN ID) in the field at the top of the window and click the **Find** button.

To view the following window, click **L2 Features > VLAN > Browse VLAN**, as show below:

Browse VLAN Safeguard

VID Find

VID: 1
 VLAN Name: default
 VLAN Type: Static
 Advertisement: Enabled

Total Entries: 1

Port											
01	02	03	04	05	06	07	08	09	10	11	12
U	U	U	U	U	U	U	U	U	U	U	U

1/1 1 Go

Note: T: Tagged Port, U: Untagged Port, F: Forbidden Port

Figure 5-21 Browse VLAN window

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.



NOTE: The abbreviations used on this page are **Tagged Port (T)**, **Untagged Port (U)** and **Forbidden Port (F)**.

Show VLAN Ports

Users can display the VLAN ports of the Switch's viewed by VID. Enter a Port or a **Port List** in the field at the top of the window and click the **Find** button.

To view the following window, click **L2 Features > VLAN > Show VLAN Ports**, as show below:

Show VLAN Ports Safeguard

Port List (e.g.: 1, 5-10) Find View All

Total Entries: 12

Ports	VID	Untagged	Tagged	Dynamic	Forbidden
1	1	X	-	-	-
2	1	X	-	-	-
3	1	X	-	-	-
4	1	X	-	-	-
5	1	X	-	-	-
6	1	X	-	-	-
7	1	X	-	-	-
8	1	X	-	-	-
9	1	X	-	-	-
10	1	X	-	-	-

1/2 1 2 > >> Go

Figure 5-22 Show VLAN Ports window

Click the **View All** button to display all the existing entries.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

QinQ

Q-in-Q VLANs allow network providers to expand their VLAN configurations to place customer VLANs within a larger inclusive VLAN, which adds a new layer to the VLAN configuration. This basically lets large ISP's create L2 Virtual Private Networks and also create transparent LANs for their customers, which will connect two or more customer LAN points without over-complicating configurations on the client's side. Not only will over-complication be avoided, but also now the administrator has over 4000 VLANs in which over 4000 VLANs can be placed, therefore greatly expanding the VLAN network and enabling greater support of customers utilizing multiple VLANs on the network.

Q-in-Q VLANs are basically VLAN tags placed within existing IEEE 802.1Q VLANs which we will call SPVIDs (Service Provider VLAN IDs). These VLANs are marked by a TPID (Tagged Protocol ID), configured in hex form to be encapsulated within the VLAN tag of the packet. This identifies the packet as double-tagged and segregates it from other VLANs on the network, therefore creating a hierarchy of VLANs within a single packet.

Here is an example Q-in-Q VLAN tagged packet.

Destination Address	Source Address	SPVLAN (TPID + Service Provider VLAN Tag)	802.1Q CEVLAN Tag (TPID + Customer VLAN Tag)	Ether Type	Payload
---------------------	----------------	-------------------------------------------	----------------------------------------------	------------	---------

Consider the example below:

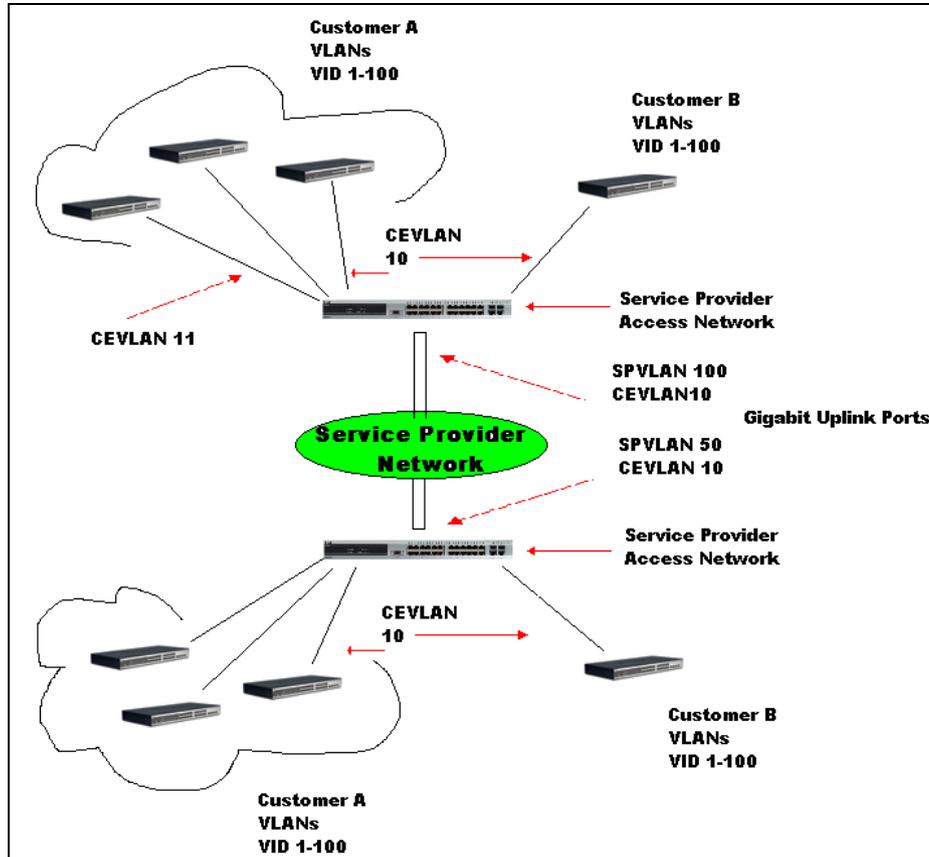


Figure 5-23 QinQ example window

In this example, the Service Provider Access Network switch (Provider edge switch) is the device creating and configuring Q-in-Q VLANs. Both CEVLANs (Customer VLANs), 10 and 11, are tagged with the SPVID 100 on the Service Provider Access Network and therefore belong to one VLAN on the Service Provider's network, thus being a member of two VLANs. In this way, the Customer can retain its normal VLAN and the Service Provider can congregate multiple Customer VLANs within one SPVLAN, thus greatly regulating traffic and routing on the Service Provider switch. This information is then routed to the Service Provider's main network and regarded there as one VLAN, with one set of protocols and one routing behavior.

Regulations for Q-in-Q VLANs

- Some rules and regulations apply with the implementation of the Q-in-Q VLAN procedure.
- Ports can be configured as UNI ports or NNI ports.
- Provider Edge switches must allow frames of at least 1522 bytes or more, due to the addition of the SPVID tag.
- UNI ports must be an un-tagged port of the service provider VLANs. NNI ports must be a tagged port of the service provider VLANs.
- The switch cannot have both double and normal VLANs co-existing. Once the change of VLAN is made, all Access Control lists are cleared and must be reconfigured.
- When Q-in-Q VLANs are enabled, GVRP can work with Q-in-Q VLANs.
- The tags of all packets sent from the CPU to the UNI ports must be striped or replaced.
- The following functions will not operate when the switch is in Q-in-Q VLAN mode:
 - Guest VLANs.
 - Web-based Access Control.
 - IP Multicast Routing.
 - All Regular 802.1Q VLAN functions.

QinQ Settings

The user can configure the Q-in-Q parameters in this page.

To view the following window, click **L2 Features > QinQ > QinQ Settings**, as show below:

QinQ Settings
Safeguard

QinQ Global Settings

QinQ State Enabled Disabled Apply

Inner TPID 0x (hex : 0x1-0xffff) Apply

From Port To Port Role Missdrop Outer TPID Use Inner Priority Add Inner Tag (hex : 0x1-0xffff)

01 01 NNI Disabled 0x 88A8 Disabled 0x Disabled Apply

Port	Role	Missdrop	Outer TPID	Use Inner Priority	Add Inner Tag
1	NNI	Disabled	0x8100	Disabled	Disabled
2	NNI	Disabled	0x8100	Disabled	Disabled
3	NNI	Disabled	0x8100	Disabled	Disabled
4	NNI	Disabled	0x8100	Disabled	Disabled
5	NNI	Disabled	0x8100	Disabled	Disabled
6	NNI	Disabled	0x8100	Disabled	Disabled
7	NNI	Disabled	0x8100	Disabled	Disabled
8	NNI	Disabled	0x8100	Disabled	Disabled
9	NNI	Disabled	0x8100	Disabled	Disabled
10	NNI	Disabled	0x8100	Disabled	Disabled
11	NNI	Disabled	0x8100	Disabled	Disabled
12	NNI	Disabled	0x8100	Disabled	Disabled

Figure 5-24 QinQ Settings Window

The fields that can be configured are described below:

Parameter	Description
QinQ State	Selecting this option enable the Q-in-Q feature.
Inner TPID	Specifies to configure the inner TPID of the system. The inner TPID is used to decide if the ingress packet is c-tagged. Inner tag TPID is per system configurable.
From Port / To Port	Here the user can select a range of ports to use in the configuration.
Role	Port role in Q-in-Q mode, it can be UNI port or NNI port.
Missdrop	This option enables or disables C-VLAN based SP-VLAN assignment miss drop. If Missdrop is enabled, the packet that does not match any assignment rule in the Q-in-Q profile will be dropped. If disabled, then the packet will be forwarded and will be assigned to the PVID of the received port.
Outer TPID	Enter an Outer TPID in SP-VLAN tag here.
Inner TPID	Enter an Inner TPID in customer VLAN tag here.
Add Inner Tag	Specify whether to add inner tag for ingress untagged packets. If set, the inner tag will be added for the ingress untagged packets and, therefore, the packets that egress to the NNI port will be double tagged.

Click the **Apply** button to accept the changes made for each individual section.

VLAN Translation Settings

This page can be used to add translation relationship between C-VLAN and SP-VLAN. On ingress at UNI port, the C-VLAN tagged packets will be translated to SP-VLAN tagged packets by adding or replacing according the configured rule. On egress at this port, the SP-VLAN tag will be recovered to C-VLAN tag or be striped. The priority will be the priority in the SP-VLAN tag if the inner priority flag is disabled for the receipt port.

To view the following window, click **L2 Features > QinQ > VLAN Translation Settings**, as show below:

Figure 5-25 VLAN Translation Settings Window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select a range of ports to use in the configuration.
CVID (1, 5-7)	Enter the C-VLAN ID to match.
Action	The action indicates to add an S-tag before a C-tag or to replace the original C-tag by an S-tag.
SVID (1-4094)	Enter the SP-VLAN ID.
Priority	Select the priority of the s-tag.

Click the **Apply** button to accept the changes made for each individual section.

Click the **Delete All** button to remove all the entries listed.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove a specific entry.

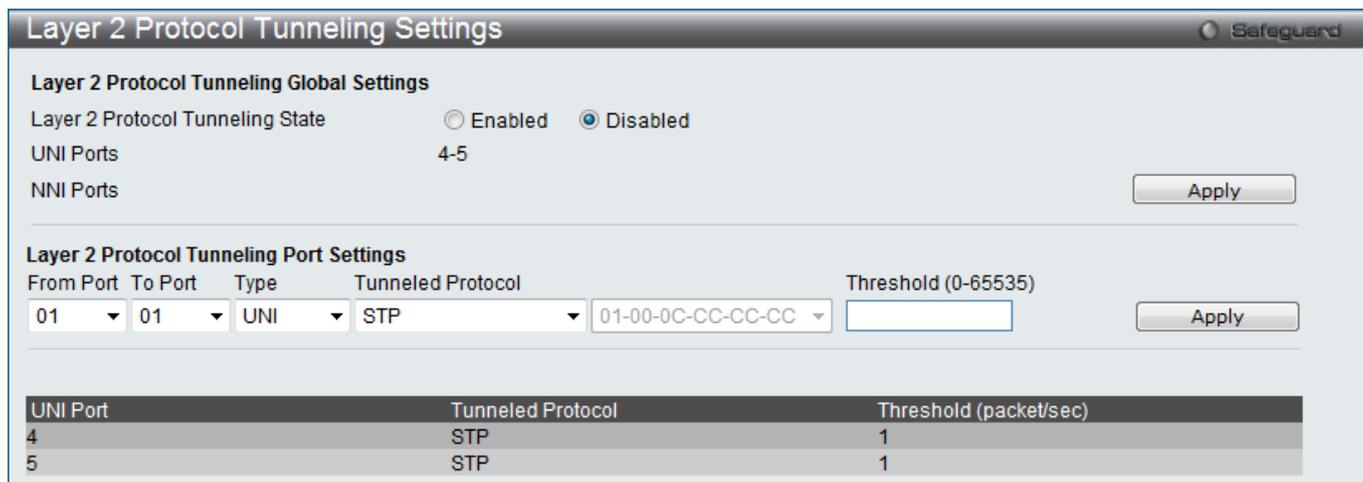
Click the **View by Hardware** button to display entries by hardware.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

Layer 2 Protocol Tunneling Settings

This window is used to configure the Layer 2 Protocol tunneling port settings.

To view the following window, click **L2 Features > Layer 2 Protocol Tunneling Settings**, as show below:



Layer 2 Protocol Tunneling Global Settings

Layer 2 Protocol Tunneling State Enabled Disabled

UNI Ports 4-5

NNI Ports

Layer 2 Protocol Tunneling Port Settings

From Port To Port Type Tunneled Protocol Threshold (0-65535)

01 01 UNI STP 01-00-0C-CC-CC-CC

UNI Port	Tunneled Protocol	Threshold (packet/sec)
4	STP	1
5	STP	1

Figure 5-26 Layer 2 Protocol Tunneling Settings window

The fields that can be configured are described below:

Parameter	Description
Layer 2 protocol tunneling State	Use the radio buttons to enable or disable the Layer 2 protocol tunneling function globally on the Switch.
From Port ~ To Port	Specify the ports on which the Layer 2 protocol tunneling will be configured.
Type	Specify the type of the ports. Options to choose from are UNI , NNI , and None .
Tunneled Protocol	Specify tunneled protocols on this UNI port. If specified all, all tunnel-able Layer 2 protocols will be tunneled on this port. Options to choose from are STP , GVRP , Protocol MAC , and All .
MAC Address	Specify which protocol MAC address to use when the Protocol MAC option is selected as the Tunneling Protocol. Options to choose from are 01-00-0C-CC-CC-CC and 01-00-0C-CC-CC-CD .
Threshold	Specify the drop threshold for packets-per-second accepted on this UNI port. The port drops the PDU if the protocol's threshold is exceeded. The range of the threshold value is 0 to 65535 (packet/second). The value 0 means on limit. By default, the value is 0.

Click the **Apply** button to accept the changes made for each individual section.

Spanning Tree

This Switch supports three versions of the Spanning Tree Protocol: 802.1D-1998 STP, 802.1W Rapid STP, and 802.1S MSTP. 802.1D-1998 STP will be familiar to most networking professionals. However, since 802.1W Rapid STP and 802.1S MSTP have been recently introduced to D-Link managed Ethernet switches, a brief introduction to the technology is provided below followed by a description of how to set up 802.1D-1998 STP, 802.1W Rapid STP, and 802.1S MSTP.

802.1S MSTP

Multiple Spanning Tree Protocol, or MSTP, is a standard defined by the IEEE community that allows multiple VLANs to be mapped to a single spanning tree instance, which will provide multiple pathways across the network. Therefore, these MSTP configurations will balance the traffic load, preventing wide scale disruptions when a single

spanning tree instance fails. This will allow for faster convergences of new topologies for the failed instance. Frames designated for these VLANs will be processed quickly and completely throughout interconnected bridges utilizing any of the three spanning tree protocols (STP, RSTP or MSTP).

This protocol will also tag BPDU packets so receiving devices can distinguish spanning tree instances, spanning tree regions and the VLANs associated with them. An MSTI ID will classify these instances. MSTP will connect multiple spanning trees with a Common and Internal Spanning Tree (CIST). The CIST will automatically determine each MSTP region, its maximum possible extent and will appear as one virtual bridge that runs a single spanning tree. Consequentially, frames assigned to different VLANs will follow different data routes within administratively established regions on the network, continuing to allow simple and full processing of frames, regardless of administrative errors in defining VLANs and their respective spanning trees.

Each switch utilizing the MSTP on a network will have a single MSTP configuration that will have the following three attributes:

- A configuration name defined by an alphanumeric string of up to 32 characters (defined in the **MST Configuration Identification** window in the Configuration Name field).
- A configuration revision number (named here as a Revision Level and found in the **MST Configuration Identification** window) and;
- A 4094-element table (defined here as a VID List in the **MST Configuration Identification** window), which will associate each of the possible 4094 VLANs supported by the Switch for a given instance.

To utilize the MSTP function on the Switch, three steps need to be taken:

- 1 The Switch must be set to the MSTP setting (found in the **STP Bridge Global Settings** window in the STP Version field)
- 2 The correct spanning tree priority for the MSTP instance must be entered (defined here as a Priority in the **MSTI Config Information** window when configuring MSTI ID settings).
- 3 VLANs that will be shared must be added to the MSTP Instance ID (defined here as a VID List in the **MST Configuration Identification** window when configuring an MSTI ID settings).

802.1W Rapid Spanning Tree

The Switch implements three versions of the Spanning Tree Protocol, the Multiple Spanning Tree Protocol (MSTP) as defined by the IEEE 802.1S, the Rapid Spanning Tree Protocol (RSTP) as defined by the IEEE 802.1W specification and a version compatible with the IEEE 802.1D-1998 STP. RSTP can operate with legacy equipment implementing IEEE 802.1D-1998; however the advantages of using RSTP will be lost.

The IEEE 802.1W Rapid Spanning Tree Protocol (RSTP) evolved from the 802.1D-1998 STP standard. RSTP was developed in order to overcome some limitations of STP that impede the function of some recent switching innovations, in particular, certain Layer 3 functions that are increasingly handled by Ethernet switches. The basic function and much of the terminology is the same as STP. Most of the settings configured for STP are also used for RSTP. This section introduces some new Spanning Tree concepts and illustrates the main differences between the two protocols.

Port Transition States

An essential difference between the three protocols is in the way ports transition to a forwarding state and in the way this transition relates to the role of the port (forwarding or not forwarding) in the topology. MSTP and RSTP combine the transition states disabled, blocking and listening used in 802.1D-1998 and creates a single state Discarding. In either case, ports do not forward packets. In the STP port transition states disabled, blocking or listening or in the RSTP/MSTP port state discarding, there is no functional difference, the port is not active in the network topology. Table 7-3 below compares how the three protocols differ regarding the port state transition.

All three protocols calculate a stable topology in the same way. Every segment will have a single path to the root bridge. All bridges listen for BPDU packets. However, BPDU packets are sent more frequently - with every Hello packet. BPDU packets are sent even if a BPDU packet was not received. Therefore, each link between bridges is sensitive to the status of the link. Ultimately this difference results in faster detection of failed links, and thus faster topology adjustment. A drawback of 802.1D-1998 is this absence of immediate feedback from adjacent bridges.

802.1S MSTP	802.1W RSTP	802.1D-1998 STP	Forwarding	Learning
Disabled	Disabled	Disabled	No	No
<i>Discarding</i>	<i>Discarding</i>	<i>Blocking</i>	No	No
<i>Discarding</i>	<i>Discarding</i>	<i>Listening</i>	No	No
<i>Learning</i>	<i>Learning</i>	<i>Learning</i>	No	Yes
Forwarding	Forwarding	Forwarding	Yes	Yes

RSTP is capable of a more rapid transition to a forwarding state - it no longer relies on timer configurations - RSTP compliant bridges are sensitive to feedback from other RSTP compliant bridge links. Ports do not need to wait for the topology to stabilize before transitioning to a forwarding state. In order to allow this rapid transition, the protocol introduces two new variables: the edge port and the point-to-point (P2P) port.

Edge Port

The edge port is a configurable designation used for a port that is directly connected to a segment where a loop cannot be created. An example would be a port connected directly to a single workstation. Ports that are designated as edge ports transition to a forwarding state immediately without going through the listening and learning states. An edge port loses its status if it receives a BPDU packet, immediately becoming a normal spanning tree port.

P2P Port

A P2P port is also capable of rapid transition. P2P ports may be used to connect to other bridges. Under RSTP/MSTP, all ports operating in full-duplex mode are considered to be P2P ports, unless manually overridden through configuration.

802.1D-1998/802.1W/802.1S Compatibility

MSTP or RSTP can interoperate with legacy equipment and is capable of automatically adjusting BPDU packets to 802.1D-1998 format when necessary. However, any segment using 802.1D-1998 STP will not benefit from the rapid transition and rapid topology change detection of MSTP or RSTP. The protocol also provides for a variable used for migration in the event that legacy equipment on a segment is updated to use RSTP or MSTP.

The Spanning Tree Protocol (STP) operates on two levels:

- 1 On the switch level, the settings are globally implemented.
- 2 On the port level, the settings are implemented on a per-user-defined group of ports basis.

STP Bridge Global Settings

On this page the user can configure the STP bridge global parameters.

To view the following window, click **L2 Features > Spanning Tree > STP Bridge Global Settings**, as show below:

Figure 5-27 STP Bridge Global Settings window

The fields that can be configured are described below:

Parameter	Description
STP Status	Use the radio button to globally enable or disable STP.
STP Version	Use the drop-down menu to choose the desired version of STP: <i>STP</i> - Select this parameter to set the Spanning Tree Protocol (STP) globally on the switch. <i>RSTP</i> - Select this parameter to set the Rapid Spanning Tree Protocol (RSTP) globally on the Switch. <i>MSTP</i> - Select this parameter to set the Multiple Spanning Tree Protocol (MSTP) globally on the Switch.
Forwarding BPDU	This field can be <i>Enabled</i> or <i>Disabled</i> . When <i>Enabled</i> , it allows the forwarding of STP BPDU packets from other network devices. The default is <i>Disabled</i> .
Bridge Max Age (6-40)	The Max Age may be set to ensure that old information does not endlessly circulate through redundant paths in the network, preventing the effective propagation of the new information. Set by the Root Bridge, this value will aid in determining that the Switch has spanning tree configuration values consistent with other devices on the bridged LAN. The user may choose a time between 6 and 40 seconds. The default value is 20 seconds.
Bridge Hello Time (1-2)	The Hello Time can be set from 1 to 2 seconds. This is the interval between two transmissions of BPDU packets sent by the Root Bridge to tell all other switches that it is indeed the Root Bridge. This field will only appear here when STP or RSTP is selected for the STP Version. For MSTP, the Hello Time must be set on a port per port basis. The default is 2 seconds.

Bridge Forward Delay (4-30)	The Forward Delay can be from 4 to 30 seconds. Any port on the Switch spends this time in the listening state while moving from the blocking state to the forwarding state. The default is 15 seconds
TX Hold Count (1-10)	Used to set the maximum number of Hello packets transmitted per interval. The count can be specified from 1 to 10. The default is 6.
Max Hops (6-40)	Used to set the number of hops between devices in a spanning tree region before the BPDU (bridge protocol data unit) packet sent by the Switch will be discarded. Each switch on the hop count will reduce the hop count by one until the value reaches zero. The Switch will then discard the BPDU packet and the information held for the port will age out. The user may set a hop count from 6 to 40. The default is 20.
NNI BPDU Address	Used to determine the BPDU protocol address for GVRP in service provide site. It can use 802.1d GVRP address, 802.1ad service provider GVRP address or a user defined multicast address. The range of the user defined address is 0180C2000000 - 0180C2FFFFFF.

Click the **Apply** button to accept the changes made for each individual section.



NOTE: The Bridge Hello Time cannot be longer than the Bridge Max Age. Otherwise, a configuration error will occur. Observe the following formulas when setting the above parameters:

Bridge Max Age $\leq 2 \times$ (Bridge Forward Delay - 1 second)

Bridge Max Age $\geq 2 \times$ (Bridge Hello Time + 1 second)

STP Port Settings

STP can be set up on a port per port basis.

To view the following window, click **L2 Features > Spanning Tree > STP Port Settings**, as show below:

STP Port Settings
Safeguard

From Port To Port

External Cost (0 = Auto) Migrate Edge

P2P Port STP Restricted Role

Restricted TCN Forward BPDU

Port	External Cost	Edge	P2P	Port STP	Restricted Role	Restricted TCN	Forward BPDU	Hello Time
1	Auto/200000	False/No	Auto/Yes	Enabled	False	False	Disabled	2/2
2	Auto/200000	False/No	Auto/Yes	Enabled	False	False	Disabled	2/2
3	Auto/200000	False/No	Auto/Yes	Enabled	False	False	Disabled	2/2
4	Auto/200000	False/No	Auto/Yes	Enabled	False	False	Disabled	2/2
5	Auto/200000	False/No	Auto/Yes	Enabled	False	False	Disabled	2/2
6	Auto/200000	False/No	Auto/Yes	Enabled	False	False	Disabled	2/2
7	Auto/200000	False/No	Auto/Yes	Enabled	False	False	Disabled	2/2
8	Auto/200000	False/No	Auto/Yes	Enabled	False	False	Disabled	2/2
9	Auto/200000	False/No	Auto/Yes	Enabled	False	False	Disabled	2/2
10	Auto/200000	False/No	Auto/Yes	Enabled	False	False	Disabled	2/2
11	Auto/200000	False/No	Auto/Yes	Enabled	False	False	Disabled	2/2
12	Auto/200000	False/No	Auto/Yes	Enabled	False	False	Disabled	2/2

Port field:
M = Trunk Master T = Trunk Member
External Cost, Edge, P2P and Hello Time fields:
Value1/Value2 (Value1 = Configured value Value2 = Actual value)

Figure 5-28 STP Port Settings window

It is advisable to define an STP Group to correspond to a VLAN group of ports.

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select the starting and ending ports to be configured.
External Cost (0 = Auto)	This defines a metric that indicates the relative cost of forwarding packets to the specified port list. Port cost can be set automatically or as a metric value. The default value is 0 (auto). Setting 0 for the external cost will automatically set the speed for forwarding packets to the specified port(s) in the list for optimal efficiency. The default port cost for a 100Mbps port is 200000 and the default port cost for a Gigabit port is 20000. Enter a value between 1 and 200000000 to determine the External Cost. The lower the number, the greater the probability the port will be chosen to forward packets.
P2P	Choosing the <i>True</i> parameter indicates a point-to-point (P2P) shared link. P2P ports are similar to edge ports; however they are restricted in that a P2P port must operate in full duplex. Like edge ports, P2P ports transition to a forwarding state rapidly thus benefiting from RSTP. A P2P value of <i>False</i> indicates that the port cannot have P2P status. <i>Auto</i> allows the port to have P2P status whenever possible and operate as if the P2P status were <i>True</i> . If the port cannot maintain this status, (for example if the port is forced to half-duplex operation) the P2P status changes to operate as if the P2P value were <i>False</i> . The default setting for this parameter is <i>Auto</i> .
Restricted TCN	Topology Change Notification is a simple BPDU that a bridge sends out to its root port to signal a topology change. Restricted TCN can be toggled between <i>True</i> and <i>False</i> . If set to <i>True</i> , this stops the port from propagating received topology change

	notifications and topology changes to other ports. The default is <i>False</i> .
Migrate	When operating in RSTP mode, selecting <i>Yes</i> forces the port that has been selected to transmit RSTP BPDUs.
Port STP	This drop-down menu allows you to enable or disable STP for the selected group of ports. The default is <i>Enabled</i> .
Forward BPDU	Use the drop-down menu to enable or disable the flooding of BPDU packets when STP is disabled.
Edge	Choosing the <i>True</i> parameter designates the port as an edge port. Edge ports cannot create loops, however an edge port can lose edge port status if a topology change creates a potential for a loop. An edge port normally should not receive BPDU packets. If a BPDU packet is received, it automatically loses edge port status. Choosing the <i>False</i> parameter indicates that the port does not have edge port status. Alternatively, the <i>Auto</i> option is available.
Restricted Role	Use the drop-down menu to toggle Restricted Role between <i>True</i> and <i>False</i> . If set to <i>True</i> , the port will never be selected to be the Root port. The default is <i>False</i> .

Click the **Apply** button to accept the changes made.

MST Configuration Identification

This window allows the user to configure a MSTI instance on the Switch. These settings will uniquely identify a multiple spanning tree instance set on the Switch. The Switch initially possesses one CIST, or Common Internal Spanning Tree, of which the user may modify the parameters for but cannot change the MSTI ID for, and cannot be deleted.

To view the following window, click **L2 Features > Spanning Tree > MST Configuration Identification**, as show below:

MST Configuration Identification Settings

Configuration Name:

Revision Level (0-65535): Apply

Instance ID Settings

MSTI ID (1-15):

Type:

VID List (1-4094):

Apply

Total Entries: 1

MSTI ID	VID List
CIST	1-4094

Edit Delete

Figure 5-29 MST Configuration Identification window

The fields that can be configured are described below:

Parameter	Description
Configuration Name	This name uniquely identifies the MSTI (Multiple Spanning Tree Instance). If a Configuration Name is not set, this field will show the MAC address of the device

	running MSTP.
Revision Level (0-65535)	This value, along with the Configuration Name, identifies the MSTP region configured on the Switch.
MSTI ID (1-15)	Enter a number between 1 and 15 to set a new MSTI on the Switch.
Type	This field allows the user to choose a desired method for altering the MSTI settings. The user has two choices: <i>Add VID</i> - Select this parameter to add VIDs to the MSTI ID, in conjunction with the VID List parameter. <i>Remove VID</i> - Select this parameter to remove VIDs from the MSTI ID, in conjunction with the VID List parameter.
VID List (e.g.: 2-5, 10)	This field is used to specify the VID range from configured VLANs set on the Switch. Supported VIDs on the Switch range from ID number 1 to 4094.

Click the **Apply** button to accept the changes made for each individual section.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

STP Instance Settings

This window displays MSTIs currently set on the Switch and allows users to change the Priority of the MSTIs.

To view the following window, click **L2 Features > Spanning Tree > STP Instance Settings**, as show below:

Figure 5-30 STP Instance Settings window

The fields that can be configured are described below:

Parameter	Description
MSTI ID	Enter the MSTI ID in this field. An entry of 0 denotes the CIST (default MSTI).
Priority	Enter the priority in this field. The available range of values is from 0 to 61440.

Click the **Apply** button to accept the changes made.

Click the **Edit** button to re-configure the specific entry.

Click the **View** button to display the information of the specific entry.

MSTP Port Information

This window displays the current MSTI configuration information and can be used to update the port configuration for an MSTI ID. If a loop occurs, the MSTP function will use the port priority to select an interface to put into the forwarding state. Set a higher priority value for interfaces to be selected for forwarding first. In instances where the priority value is identical, the MSTP function will implement the lowest MAC address into the forwarding state and other interfaces will be blocked. Remember that lower priority values mean higher priorities for forwarding packets.

To view the following window, click **L2 Features > Spanning Tree > MSTP Port Information**, as show below:

Port 1 Settings					
MSTI	Designated Bridge	Internal Path Cost	Priority	Status	Role
0	N/A	200000	128	Forwarding	NonStp

Figure 5-31 MSTP Port Information window

To view the MSTI settings for a particular port, use the drop-down menu to select the Port number. To modify the settings for a particular MSTI instance, enter a value in the Instance ID field, an Internal Path Cost, and use the drop-down menu to select a Priority.

The fields that can be configured are described below:

Parameter	Description
Port	Select the port you want to configure.
Instance ID	The MSTI ID of the instance to be configured. Enter a value between 0 and 64. An entry of 0 in this field denotes the CIST (default MSTI).
Internal Path Cost (1-200000000)	This parameter is set to represent the relative cost of forwarding packets to specified ports when an interface is selected within an STP instance. Selecting this parameter with a value in the range of 1 to 200000000 will set the quickest route when a loop occurs. A lower Internal cost represents a quicker transmission. Selecting 0 (zero) for this parameter will set the quickest route automatically and optimally for an interface.
Priority	Enter a value between 0 and 240 to set the priority for the port interface. A higher priority will designate the interface to forward packets first. A lower number denotes a higher priority.

Click the **Find** button to locate a specific entry based on the information entered.

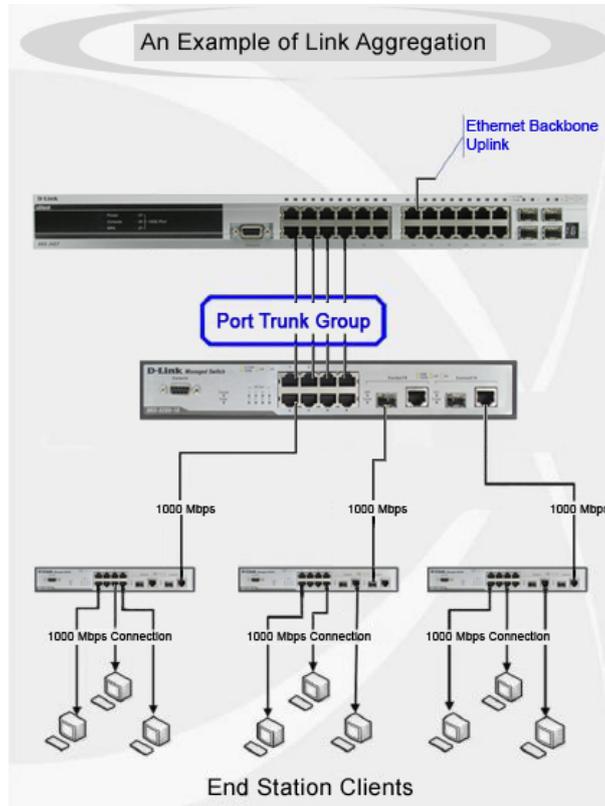
Click the **Apply** button to accept the changes made.

Click the **Edit** button to re-configure the specific entry.

Link Aggregation

Understanding Port Trunk Groups

Port trunk groups are used to combine a number of ports together to make a single high-bandwidth data pipeline. The Switch supports up to 6 port trunk groups with two to eight ports in each group.



5-32 Example of Port Trunk Group

The Switch treats all ports in a trunk group as a single port. Data transmitted to a specific host (destination address) will always be transmitted over the same port in a trunk group. This allows packets in a data stream to arrive in the same order they were sent.

Link aggregation allows several ports to be grouped together and to act as a single link. This gives a bandwidth that is a multiple of a single link's bandwidth.

Link aggregation is most commonly used to link a bandwidth intensive network device or devices, such as a server, to the backbone of a network.

The Switch allows the creation of up to 6 link aggregation groups, each group consisting of 2 to 8 links (ports). Each port can only belong to a single link aggregation group.

All of the ports in the group must be members of the same VLAN, and their STP status, static multicast, traffic control; traffic segmentation and 802.1p default priority configurations must be identical. Port locking and 802.1X must not be enabled on the trunk group. Further, the LACP aggregated links must all be of the same speed and should be configured as full duplex.

The Master Port of the group is to be configured by the user, and all configuration options, including the VLAN configuration that can be applied to the Master Port, are applied to the entire link aggregation group.

Load balancing is automatically applied to the ports in the aggregated group, and a link failure within the group causes the network traffic to be directed to the remaining links in the group.

The Spanning Tree Protocol will treat a link aggregation group as a single link, on the switch level. On the port level, the STP will use the port parameters of the Master Port in the calculation of port cost and in determining the state of the link aggregation group. If two redundant link aggregation groups are configured on the Switch, STP will block one entire group; in the same way STP will block a single port that has a redundant link.



NOTE: If any ports within the trunk group become disconnected, packets intended for the disconnected port will be load shared among the other linked ports of the link aggregation group.

Port Trunking Settings

On this page the user can configure the port trunk settings for the switch.

To view the following window, click **L2 Features > Link Aggregation > Port Trunking Settings**, as show below:

Figure 5-33 Port Trunking Settings window

The fields that can be configured or displayed are described below:

Parameter	Description
Algorithm	This is the traffic hash algorithm among the ports of the link aggregation group. Options to choose from are MAC Source , MAC Destination , MAC Source Destination , IP Source , IP Destination , and IP Source Destination .
Group ID (1-6)	Select an ID number for the group, between 1 and 6.
Type	This drop-down menu allows users to select between <i>Static</i> and <i>LACP</i> (Link Aggregation Control Protocol). <i>LACP</i> allows for the automatic detection of links in a Port Trunking Group.

Master Port	Choose the Master Port for the trunk group using the drop-down menu.
State	Use the drop-down menu to toggle between <i>Enabled</i> and <i>Disabled</i> . This is used to turn a port trunking group on or off. This is useful for diagnostics, to quickly isolate a bandwidth intensive network device or to have an absolute backup aggregation group that is not under automatic control.
Member Ports	Choose the members of a trunked group. Up to eight ports can be assigned to a group.
Active Ports	Shows the ports that are currently forwarding packets.

Click the **Apply** button to accept the changes made.

Click the **Clear All** button to clear out all the information entered.

Click the **Edit** button to re-configure the specified entry.

Click the **Delete** button to delete the specified entry.

Click the **Add** button to add a new entry based on the information entered.



NOTE: The maximum number of ports that can be configured in one Static Trunk or LACP Group are **8 ports**.

LACP Port Settings

In conjunction with the Trunking window, users can create port trunking groups on the Switch. Using the following window, the user may set which ports will be active and passive in processing and sending LACP control frames.

To view the following window, click **L2 Features > Link Aggregation > LACP Port Settings**, as show below:

From Port	To Port	Activity	LACP Timeout
01	01	Passive	Short

Port	Activity	LACP Timeout
1	Passive	Short
2	Passive	Short
3	Passive	Short
4	Passive	Short
5	Passive	Short
6	Passive	Short
7	Passive	Short
8	Passive	Short
9	Passive	Short
10	Passive	Short
11	Passive	Short

Figure 5-34 LACP Port Settings window

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

From Port / To Port	A consecutive group of ports may be configured starting with the selected port.
Activity	<p><i>Active</i> - Active LACP ports are capable of processing and sending LACP control frames. This allows LACP compliant devices to negotiate the aggregated link so the group may be changed dynamically as needs require. In order to utilize the ability to change an aggregated port group, that is, to add or subtract ports from the group, at least one of the participating devices must designate LACP ports as active. Both devices must support LACP.</p> <p><i>Passive</i> - LACP ports that are designated as passive cannot initially send LACP control frames. In order to allow the linked port group to negotiate adjustments and make changes dynamically, one end of the connection must have "active" LACP ports (see above).</p>
LACP Timeout	<p>Select the LACP timeout mode to use here. Options to choose from are Short and Long.</p> <p><i>Short</i> - Specifies that there will be 3 seconds before the LACP invalidating received LACPDU information and there will be 1 second between LACP PDU periodic transmissions when using Short Timeouts.</p> <p><i>Long</i> - Specifies that there will be 90 seconds before the LACP invalidating received LACPDU information and there will be 30 seconds between LACP PDU periodic transmissions when using Long Timeouts</p>

Click the **Apply** button to accept the changes made.

FDB

Static FDB Settings

Unicast Static FDB Settings

This window is used to configure the static unicast forwarding on the Switch.

To view the following window, click **L2 Features > FDB > Static FDB Settings > Unicast Static FDB Settings**, as show below:

The screenshot shows the 'Unicast Static FDB Settings' window. At the top, there's a title bar with 'Unicast Static FDB Settings' and a 'Safeguard' icon. Below that, the 'Unicast Forwarding Settings' section contains three input fields: 'VLAN Name' (empty), 'MAC Address' (pre-filled with '00-00-00-00-00-00'), and 'Port' (a dropdown menu). To the right of these fields is an 'Apply' button. Below the settings, it displays 'Total Entries: 0' and a table header with columns: 'VID', 'VLAN Name', 'MAC Address', and 'Port'.

Figure 5-35 Unicast Static FDB Settings window

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

VLAN Name	Click the radio button and enter the VLAN name of the VLAN on which the associated unicast MAC address resides.
MAC Address	The MAC address to which packets will be statically forwarded. This must be a unicast MAC address.
Port/Drop	Allows the selection of the port number on which the MAC address entered above resides. This option could also drop the MAC address from the unicast static FDB. When selecting <i>Port</i> , enter the port number in the field.

Click the **Apply** button to accept the changes made.

Click the **Delete** button to remove the specific entry.

Multicast Static FDB Settings

Users can set up static multicast forwarding on the Switch.

To view the following window, click **L2 Features > FDB > Static FDB Settings > Multicast Static FDB Settings**, as show below:

Figure 5-36 Multicast Static FDB Settings window

The fields that can be configured are described below:

Parameter	Description
VID	The VLAN ID of the VLAN the corresponding MAC address belongs to.
Multicast MAC Address	The static destination MAC address of the multicast packets. This must be a multicast MAC address. The format of the destination MAC address is 01-xx-xx-xx-xx-xx, but 01-00-5E-xx-xx-xx should be excluded. The function does not support the destination MAC address with 01-00-5E-xx-xx-xx.
Port	Allows the selection of ports that will be members of the static multicast group and ports that are either forbidden from joining dynamically, or that can join the multicast group dynamically, using GMRP. The options are: <i>None</i> - No restrictions on the port dynamically joining the multicast group. When <i>None</i> is chosen, the port will not be a member of the Static Multicast Group. Click the All button to select all the ports. <i>Egress</i> - The port is a static member of the multicast group. Click the All button to

select all the ports.

Click the **Clear All** button to clear out all the information entered.

Click the **Apply** button to accept the changes made.

MAC Notification Settings

MAC Notification is used to monitor MAC addresses learned and entered into the forwarding database. This window allows you to globally set MAC notification on the Switch. Users can set MAC notification for individual ports on the Switch.

To view the following window, click **L2 Features > FDB > MAC Notification Settings**, as show below:

Port	MAC Address Notification State
01	Disabled
02	Disabled
03	Disabled
04	Disabled
05	Disabled
06	Disabled
07	Disabled
08	Disabled
09	Disabled

Figure 5-37 MAC Notification Settings window

The fields that can be configured are described below:

Parameter	Description
State	Enable or disable MAC notification globally on the Switch
Interval (1-2147483647)	The time in seconds between notifications. Value range to use is 1 to 2147483647.
History Size (1-500)	The maximum number of entries listed in the history log used for notification. Up to 500 entries can be specified.
From Port / To Port	Select the starting and ending ports for MAC notification.
State	Enable MAC Notification for the ports selected using the drop-down menu.

Click the **Apply** button to accept the changes made for each individual section.

MAC Address Aging Time Settings

Users can configure the MAC Address aging time on the Switch.

To view the following window, click **L2 Features > FDB > MAC Address Aging Time Settings**, as show below:

Figure 5-38 MAC Address Aging Time Settings window

The fields that can be configured are described below:

Parameter	Description
MAC Address Aging Time	This field specify the length of time a learned MAC Address will remain in the forwarding table without being accessed (that is, how long a learned MAC Address is allowed to remain idle). To change this option, type in a different value representing the MAC address' age-out time in seconds. The MAC Address Aging Time can be set to any value between 10 and 1000000 seconds. The default setting is 300 seconds.

Click the **Apply** button to accept the changes made.

MAC Address Table

This allows the Switch's MAC address forwarding table to be viewed. When the Switch learns an association between a MAC address, VLAN and a port number, it makes an entry into its forwarding table. These entries are then used to forward packets through the Switch.

To view the following window, click **L2 Features > FDB > MAC Address Table**, as show below:

Figure 5-39 MAC Address Table window

The fields that can be configured are described below:

Parameter	Description
Port	The port to which the MAC address below corresponds.
VLAN Name	Enter a VLAN Name for the forwarding table to be browsed by.
MAC Address	Enter a MAC address for the forwarding table to be browsed by.
Security	Specifies to display the security settings.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Clear Dynamic Entries** button to delete all dynamic entries of the address table.

Click the **View All Entries** button to display all the existing entries.

Click the **Clear All Entries** button to remove all the entries listed in the table.

Click the **Add to Static MAC table** button to add the specific entry to the Static MAC table.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

ARP & FDB Table

On this page the user can find the ARP and FDB table parameters.

To view the following window, click **L2 Features > FDB > ARP & FDB Table**, as show below:

Interface	IP Address	MAC Address	VLAN Name	Port
System	192.168.69.66	00-23-7D-BC-2E-18	default	1

Figure 5-40 ARP & FDB Table window

The fields that can be configured are described below:

Parameter	Description
Port	Select the port number to use for this configuration.
MAC Address	Enter the MAC address to use for this configuration.
IP Address	Enter the IP address the use for this configuration.

Click the **Find by Port** button to locate a specific entry based on the port number selected.

Click the **Find by MAC** button to locate a specific entry based on the MAC address entered.

Click the **Find by IP Address** button to locate a specific entry based on the IP address entered.

Click the **View All Entries** button to display all the existing entries.

Click the **Add to IP MAC Port Binding Table** to add the specific entry to the IMPB Entry Settings window.

L2 Multicast Control

IGMP Snooping

Internet Group Management Protocol (IGMP) snooping allows the Switch to recognize IGMP queries and reports sent between network stations or devices and an IGMP host. When enabled for IGMP snooping, the Switch can open or close a port to a specific device based on IGMP messages passing through the Switch.

IGMP Snooping Settings

In order to use IGMP Snooping it must first be enabled for the entire Switch under IGMP Global Settings at the top of the window. You may then fine-tune the settings for each VLAN by clicking the corresponding **Edit** button. When enabled for IGMP snooping, the Switch can open or close a port to a specific multicast group member based on IGMP messages sent from the device to the IGMP host or vice versa. The Switch monitors IGMP messages and discontinues forwarding multicast packets when there are no longer hosts requesting that they continue.

To view the following window, click **L2 Features > L2 Multicast Control > IGMP Snooping > IGMP Snooping Settings**, as show below:

Figure 5-41 IGMP Snooping Settings window

The fields that can be configured are described below:

Parameter	Description
IGMP Snooping State	Use the radio buttons to enable or disable the IGMP Snooping state.
Max Learning Entry Value (1-1024)	Enter the IGMP data driven maximum learning entry value used here. The default value is 128.

Click the **Apply** button to accept the changes made for each individual section.

Click the **Edit** button to configure the IGMP Snooping Parameters Settings.

Click the [Modify Router Port](#) link to configure the IGMP Snooping Router Port Settings.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

After clicking the **Edit** button, the following page will appear:

IGMP Snooping Parameters Settings		Safeguard	
VID	1	VLAN Name	default
Rate Limit	No Limitation	Querier IP	0.0.0.0
Querier Expiry Time	0 secs	Query Interval (1-65535)	125 sec
Max Response Time (1-25)	10 sec	Robustness Value (1-7)	2
Last Member Query Interval (1-25)	1 sec	Data Driven Group Expiry Time (1-65535)	260 sec
Proxy Reporting Source IP	0.0.0.0 (e.g.: 10.90.90.90)	Proxy Reporting State	Enabled
Querier State	Disabled	Fast Leave	Disabled
State	Disabled	Report Suppression	Disabled
Data Driven Learning State	Enabled	Data Driven Learning Aged Out	Disabled
Version	2	Querier Role	Non-Querier

Figure 5-42 IGMP Snooping Parameters Settings window

The fields that can be configured are described below:

Parameter	Description
Query Interval (1-65535)	Specify the amount of time in seconds between general query transmissions. The default setting is 125 seconds..
Max Response Time (1-25)	Specify the maximum time in seconds to wait for reports from members. The default setting is 10 seconds.
Robustness Value (1-7)	Provides fine-tuning to allow for expected packet loss on a subnet. The value of the robustness value is used in calculating the following IGMP message intervals: By default, the robustness variable is set to 2.
Last Member Query Interval (1-25)	Specify the maximum amount of time between group-specific query messages, including those sent in response to leave-group messages. You might lower this interval to reduce the amount of time it takes a router to detect the loss of the last member of a group.
Data Driven Group Expiry Time (1-65535)	Enter the data driven group expiry time value used here.
Proxy Reporting Source IP	Enter the proxy reporting source IP address.
Proxy Reporting State	Use the drop-down menu to enable and disable the proxy report state. When enabled, multiple IGMP reports or leaves for a specific (S, G) will be integrated into one report only before sending them to the router port.
Querier State	Specify to enable or disable the querier state.
Fast Leave	Enable or disable the IGMP snooping fast leave function. If enabled, the

	membership is immediately removed when the system receive the IGMP leave message.
State	If the state is enable, it allows the switch to be selected as a IGMP Querier (sends IGMP query packets). If the state is disabled, then the switch can not play the role as a querier. NOTE: that if the Layer 3 router connected to the switch provides only the IGMP proxy function but does not provide the multicast routing function, then this state must be configured as disabled. Otherwise, if the Layer 3 router is not selected as the querier, it will not send the IGMP query packet. Since it will not also send the multicast-routing protocol packet, the port will be timed out as a router port.
Data Driven Learning State	Specify to enable or disable the data driven learning state.
Data Driven Learning Aged Out	Specify to enable or disable the data driven learning aged out state.
Version	Specify the version of IGMP packet that will be sent by this port. If an IGMP packet received by the interface has a version higher than the specified version, this packet will be dropped. By default, this option is version 2.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

After clicking the [Modify Router Port](#) link, the following page will appear:

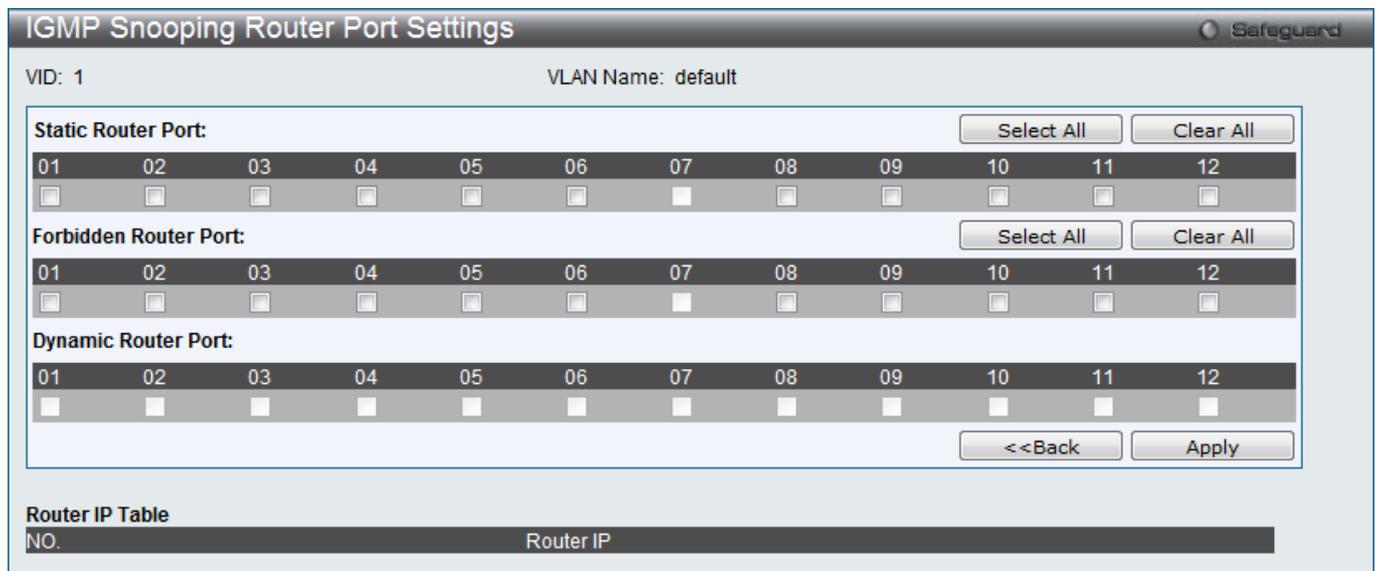


Figure 5-43 IGMP Snooping Router Port Settings window

The fields that can be configured are described below:

Parameter	Description
Static Router Port	This section is used to designate a range of ports as being connected to multicast-enabled routers. This will ensure that all packets with such a router as its destination will reach the multicast-enabled router regardless of the protocol.

Forbidden Router Port	This section is used to designate a range of ports as being not connected to multicast-enabled routers. This ensures that the forbidden router port will not propagate routing packets out.
Dynamic Router Port	Displays router ports that have been dynamically configured.

Click the **Select All** button to select all the ports for configuration.

Click the **Clear All** button to unselect all the ports for configuration.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

IGMP Snooping Message Limit Settings

On this page, the user can configure the IGMP Snooping message limit settings.

To view the following window, click **L2 Features > L2 Multicast Control > IGMP Snooping > IGMP Snooping Message Limit Settings**, as show below:

Figure 5-44 IGMP Snooping Message Limit Settings window

The fields that can be configured are described below:

Parameter	Description
Port List	Enter a list of ports, used for this configuration, here.
VID List	Enter the VLAN ID list, used for this configuration, here.
Message Limit	Enter the IGMP snooping message limit value here. This value must be between 1 and 1000. No Limit specifies that the IGMP snooping message limit will be set to no limit.

Click the **Apply** button to accept the changes made.

Click the **Find** button to find the entry based on the information entered.

Click the **Edit** button to re-configure the specified entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

IGMP Snooping Static Group Settings

Users can view the Switch's IGMP Snooping Group Table. IGMP Snooping allows the Switch to read the Multicast Group IP address and the corresponding MAC address from IGMP packets that pass through the Switch.

To view the following window, click **L2 Features > L2 Multicast Control > IGMP Snooping > IGMP Snooping Static Group Settings**, as show below:

Figure 5-45 IGMP Snooping Static Group Settings window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	Enter the VLAN Name of the multicast group here.
VID List	Enter the VID List or of the multicast group here.
IPv4 Address	Enter the IPv4 address.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Create** button to add a new entry based on the information entered.

Click the **Delete** button to remove the specific entry based on the information entered.

Click the **View All** button to display all the existing entries.

Click the **Edit** button to re-configure the specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

After clicking the **Edit** button, the following page will appear:

Figure 5-46 IGMP Snooping Static Group Settings – Edit window

The fields that can be configured are described below:

Parameter	Description
Ports	Select the appropriate ports individually to include them in the IGMP snooping static group settings.

Click the **Select All** button to select all the ports for configuration.

Click the **Clear All** button to unselect all the ports for configuration.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

IGMP Router Port

Users can display which of the Switch's ports are currently configured as router ports. A router port configured by a user (using the console or Web-based management interfaces) is displayed as a static router port, designated by S. A router port that is dynamically configured by the Switch is designated by D, while a Forbidden port is designated by F.

To view the following window, click **L2 Features > L2 Multicast Control > IGMP Snooping > IGMP Router Port**, as show below:

Figure 5-47 IGMP Router Port window

Enter a VID (VLAN ID) in the field at the top of the window.

Click the **Find** button to locate a specific entry based on the information entered.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.



NOTE: The abbreviations used on this page are **Static Router Port (S)**, **Dynamic Router Port (D)** and **Forbidden Router Port (F)**.

IGMP Snooping Group

Users can view the Switch's IGMP Snooping Group Table. IGMP Snooping allows the Switch to read the Multicast Group IP address and the corresponding MAC address from IGMP packets that pass through the Switch.

To view the following window, click **L2 Features > L2 Multicast Control > IGMP Snooping > IGMP Snooping Group**, as show below:

Figure 5-48 IGMP Snooping Group window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	The VLAN Name of the multicast group.
VID List	The VLAN ID list of the multicast group.
Port List	Specify the port number(s) used to find a multicast group.
Group IPv4 Address	Enter the IPv4 address.
Data Driven	Select this option to display only data driven groups.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Clear Data Driven** button to delete the specific IGMP snooping group which was learned by the Data Driven feature of the specified VLAN.

Click the **View All** button to display all the existing entries.

Click the **Clear All Data Driven** button to delete all IGMP snooping groups which were learned by the Data Driven feature.

IGMP Snooping Forwarding Table

This page displays the switch's current IGMP snooping forwarding table. It provides an easy way for user to check the list of ports that the multicast group comes from and specific sources that it will be forwarded to. The packet comes from the source VLAN. They will be forwarded to the forwarding VLAN. The IGMP snooping further restricts the forwarding ports.

To view the following window, click **L2 Features > L2 Multicast Control > IGMP Snooping > IGMP Snooping Forwarding Table**, as show below:

Figure 5-49 IGMP Snooping Forwarding Table window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	The VLAN Name of the multicast group.
VID List	The VLAN ID list of the multicast group.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **View All** button to display all the existing entries.

IGMP Snooping Counter

Users can view the switch's IGMP Snooping counter table.

To view the following window, click **L2 Features > L2 Multicast Control > IGMP Snooping > IGMP Snooping Counter**, as show below:

Figure 5-50 IGMP Snooping Counter window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	Enter the VLAN Name of the multicast group here.
VID List	Enter the VLAN ID list of the multicast group here.
Port List	Enter the Port List of the multicast group here.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **View All** button to display all the existing entries.

Click the [Packet Statistics](#) link to view the IGMP Snooping Counter Table.

After clicking the [Packet Statistics](#) link, the following page will appear:

The screenshot shows a web interface window titled "Browse IGMP Snooping Counter" with a "Safeguard" logo in the top right. Below the title bar, there is a section for "IGMP Snooping Counter Table" with three buttons: "Clear Counter", "Refresh", and "<<Back". Below these buttons, the configuration is set to "Port : 1" and "Group Number : 0".

There are two main sections: "Receive Statistics" and "Transmit Statistics". Each section contains a table with two columns: "Query" and "Report & Leave".

Receive Statistics		Report & Leave	
Query			
IGMP v1 Query	0	IGMP v1 Report	0
IGMP v2 Query	0	IGMP v2 Report	0
IGMP v3 Query	0	IGMP v3 Report	0
Total	0	IGMP v2 Leave	0
Dropped By Rate Limitation	0	Total	0
Dropped By Multicast VLAN	0	Dropped By Rate Limitation	0
		Dropped By Max Group Limitation	0
		Dropped By Group Filter	0
		Dropped By Multicast VLAN	0

Transmit Statistics		Report & Leave	
Query			
IGMP v1 Query	0	IGMP v1 Report	0
IGMP v2 Query	0	IGMP v2 Report	0
IGMP v3 Query	0	IGMP v3 Report	0
Total	0	IGMP v2 Leave	0
		Total	0

Figure 5-51 Browse IGMP Snooping Counter window

Click the **Clear Counter** button to clear all the information displayed in the fields.

Click the **Refresh** button to refresh the display table so that new information will appear.

Click the **<<Back** button to return to the previous page.

IGMP Host Table

On this page, the user can view the IGMP Host Table, per VLAN, port number, or Group Address. Simply select the desired input method and enter the appropriate data required.

To view the following window, click **L2 Features > L2 Multicast Control > IGMP Snooping > IGMP Host Table**, as show below:

Figure 5-52 IGMP Host Table window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	Specifies the VLAN name to display the host information
VID List	Specifies the VLAN ID to display the host information.
Port List	Specifies the list of ports to display the host information.
Group Address	Specifies the group to display the host information.

Click the **Find** button to find the entry based on the information entered.

Click the **View All** button to display all the existing entries.

IGMP Snooping Group Port Number

On this page, the user can view the IGMP Snooping group port numbers.

To view the following window, click **L2 Features > L2 Multicast Control > IGMP Snooping > IGMP Snooping Group Port Number**, as show below:

Figure 5-53 IGMP Snooping Group Port Number window

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

VLAN Name	The VLAN Name of the multicast group.
VID List	The VLAN ID list of the multicast group.
Group IPv4 Address	Enter the IPv4 address used.

Click the **Find** button to find the entry based on the information entered.

Click the **View All** button to display all the existing entries.

MLD Snooping

Multicast Listener Discovery (MLD) Snooping is an IPv6 function used similarly to IGMP snooping in IPv4. It is used to discover ports on a VLAN that are requesting multicast data. Instead of flooding all ports on a selected VLAN with multicast traffic, MLD snooping will only forward multicast data to ports that wish to receive this data through the use of queries and reports produced by the requesting ports and the source of the multicast traffic.

MLD snooping is accomplished through the examination of the layer 3 part of an MLD control packet transferred between end nodes and a MLD router. When the Switch discovers that this route is requesting multicast traffic, it adds the port directly attached to it into the correct IPv6 multicast table, and begins the process of forwarding multicast traffic to that port. This entry in the multicast routing table records the port, the VLAN ID, and the associated multicast IPv6 multicast group address, and then considers this port to be an active listening port. The active listening ports are the only ones to receive multicast group data.

MLD Control Messages

Three types of messages are transferred between devices using MLD snooping. These three messages are all defined by four ICMPv6 packet headers, labeled 130, 131, 132, and 143.

- 1 **Multicast Listener Query** – Similar to the IGMPv2 Host Membership Query for IPv4, and labeled as 130 in the ICMPv6 packet header, this message is sent by the router to ask if any link is requesting multicast data. There are two types of MLD query messages emitted by the router. The General Query is used to advertise all multicast addresses that are ready to send multicast data to all listening ports, and the Multicast Specific query, which advertises a specific multicast address that is also ready. These two types of messages are distinguished by a multicast destination address located in the IPv6 header and a multicast address in the Multicast Listener Query Message.
- 2 **Multicast Listener Report, Version 1** – Comparable to the Host Membership Report in IGMPv2, and labeled as 131 in the ICMP packet header, this message is sent by the listening port to the Switch stating that it is interested in receiving multicast data from a multicast address in response to the Multicast Listener Query message.
- 3 **Multicast Listener Done** – Akin to the Leave Group Message in IGMPv2, and labeled as 132 in the ICMPv6 packet header, this message is sent by the multicast listening port stating that it is no longer interested in receiving multicast data from a specific multicast group address, therefore stating that it is “done” with the multicast data from this address. Once this message is received by the Switch, it will no longer forward multicast traffic from a specific multicast group address to this listening port.
- 4 **Multicast Listener Report, Version 2** - Comparable to the Host Membership Report in IGMPv3, and labeled as 143 in the ICMP packet header, this message is sent by the listening port to the Switch stating that it is interested in receiving multicast data from a multicast address in response to the Multicast Listener Query message.

MLD Snooping Settings

Users can configure the settings for MLD snooping.

To view the following window, click **L2 Features > L2 Multicast Control > MLD Snooping > MLD Snooping Settings**, as show below:

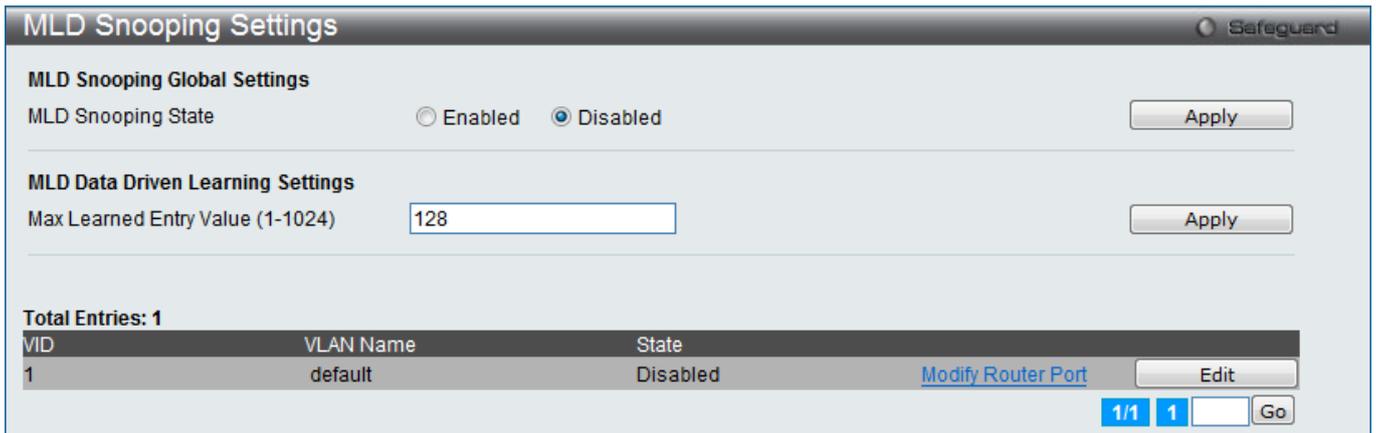


Figure 5-54 MLD Snooping Settings window

The fields that can be configured are described below:

Parameter	Description
MLD Snooping State	Click the radio buttons to enable or disable the MLD snooping state.
Max Learned Entry Value	Enter the maximum learned entry value used here. This value must be between 1 and 1024. The default value is 128.

Click the **Apply** button to accept the changes made for each individual section.

Click the **Edit** button to configure the MLD Snooping Parameters Settings for a specific entry.

Click the [Modify Router Port](#) link to configure the MLD Snooping Router Port Settings for a specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

After clicking the **Edit** button, the following page will appear:

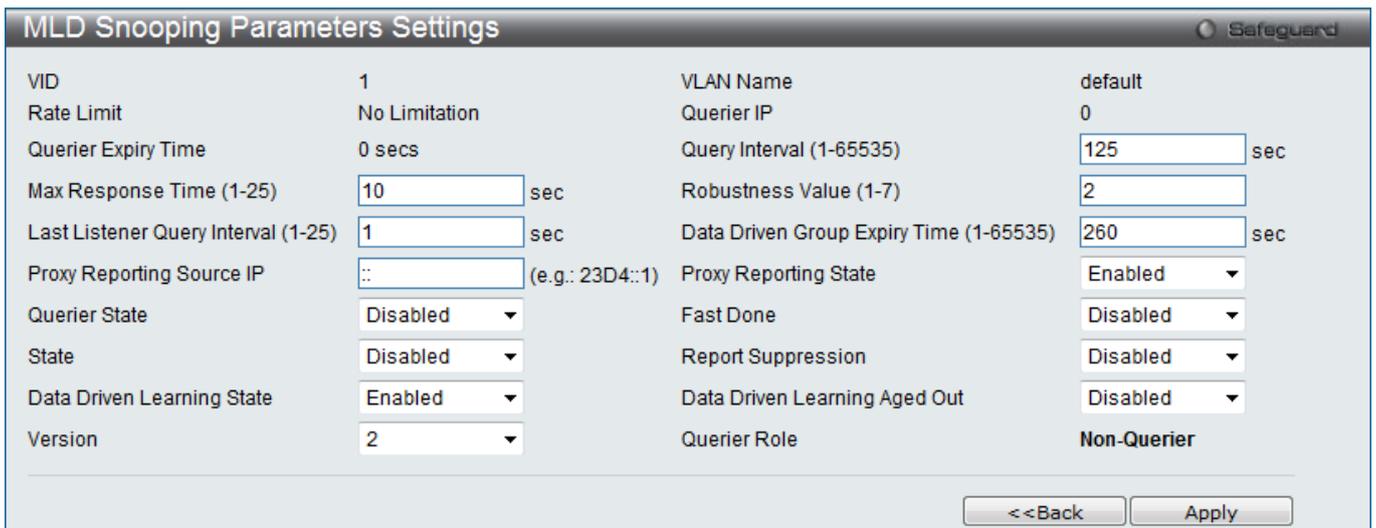


Figure 5-55 MLD Snooping Parameters Settings window

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

Query Interval (1-65535)	Specify the amount of time in seconds between general query transmissions. The default setting is 125 seconds.
Max Response Time (1-25)	The maximum time in seconds to wait for reports from listeners. The default setting is 10 seconds.
Robustness Value (1-7)	<p>Provides fine-tuning to allow for expected packet loss on a subnet. The value of the robustness variable is used in calculating the following MLD message intervals:</p> <p><i>Group listener interval</i> - Amount of time that must pass before a multicast router decides there are no more listeners of a group on a network.</p> <p><i>Other Querier present interval</i> - Amount of time that must pass before a multicast router decides that there is no longer another multicast router that is the Querier.</p> <p><i>Last listener query count</i> - Number of group-specific queries sent before the router assumes there are no local listeners of a group. The default number is the value of the robustness variable.</p> <p>By default, the robustness variable is set to 2. You might want to increase this value if you expect a subnet to be loosely.</p>
Last Listener Query Interval (1-25)	The maximum amount of time between group-specific query messages, including those sent in response to done-group messages. You might lower this interval to reduce the amount of time it takes a router to detect the loss of the last listener of a group.
Data Driven Group Expiry Time (1-65535)	Specifies the data driven group lifetime in seconds. This parameter is valid only when ' Data Driven Learning Aged Out ' is enabled.
Proxy Reporting Source IP	Specifies the proxy reporting source IPv6 address used.
Proxy Reporting State	Specifies the state of the proxy reporting function.
Querier State	This allows the switch to be specified as an MLD Querier (sends MLD query packets) or a Non-Querier (does not send MLD query packets). Set to enable or disable.
Fast Done	Use the drop-down menu to enable or disable the fast done feature.
State	Used to enable or disable MLD snooping for the specified VLAN. This field is <i>Disabled</i> by default.
Report Suppression	Specifies whether the report suppression state is enabled or disabled.
Data Driven Learning State	<p>Specifies to enable or disable the data driven learning state of an MLD snooping group. When the data-driven learning is enabled for the VLAN, when the switch receives the IP multicast traffic, on this VLAN, an MLD snooping group will be created. That is, the learning of an entry is not activated by MLD membership registration, but activated by the traffic. For an ordinary MLD snooping entry, the MLD protocol will take care the aging out of the entry. For a data-driven entry, the entry can be specified not to be age out or to be aged out by the aged timer. When the data driven learning is enabled, and data driven table is not full, the multicast filtering mode for all ports are ignored. That is, the multicast packets will be forwarded to router ports. If data driven learning table is full, the multicast packets will be forwarded according to multicast filtering mode.</p> <p>Note that if a data-driven group is created and MLD member ports are learned later, the entry will become an ordinary MLD snooping entry. That is, the aging out</p>

	mechanism will follow the ordinary MLD snooping entry.
Data Driven Learning Aged Out	Specifies whether the data driven learning aged out state will be enabled or disabled.
Version	Specify the version of MLD packet that will be sent by this port. If a MLD packet received by the interface has a version higher than the specified version, this packet will be forwarded from the router ports or VLAN flooding.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

After clicking the [Modify Router Port](#) link, the following page will appear:

Figure 5-56 MLD Snooping Router Port Settings window

The fields that can be configured are described below:

Parameter	Description
Static Router Port	This section is used to designate a range of ports as being connected to multicast-enabled routers. This will ensure that all packets with such a router as its destination will reach the multicast-enabled router regardless of the protocol.
Forbidden Router Port	This section is used to designate a range of ports as being not connected to multicast-enabled routers. This ensures that the forbidden router port will not propagate routing packets out.
Dynamic Router Port	Displays router ports that have been dynamically configured.

Click the **Select All** button to select all the ports for configuration.

Click the **Clear All** button to unselect all the ports for configuration.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

MLD Snooping Rate Limit Settings

Users can configure the rate limit of the MLD control packet that the switch can process on a specific port or VLAN in this page.

To view the following window, click **L2 Features > L2 Multicast Control > MLD Snooping > MLD Snooping Rate Limit Settings**, as show below:

Figure 5-57 MLD Snooping Rate Limit Settings window

The fields that can be configured are described below:

Parameter	Description
Port List	Enter the Port List here.
VID List	Enter the VID List value here.
Rate Limit	Configure the rate limit of MLD control packet that the switch can process on a specific port/VLAN. The rate is specified in packet per second. The packet that exceeds the limited rate will be dropped. Selecting the No Limit option lifts the rate limit requirement.

Click the **Apply** button to accept the changes made for each individual section.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Edit** button to re-configure the specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

MLD Snooping Static Group Settings

This page used to configure the MLD snooping multicast group static members.

To view the following window, click **L2 Features > L2 Multicast Control > MLD Snooping > MLD Snooping Static Group Settings**, as show below:



Figure 5-58 MLD Snooping Static Group Settings window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	The name of the VLAN on which the static group resides.
VID List	The ID of the VLAN on which the static group resides.
IPv6 Address	Specify the multicast group IPv6 address.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Create** button to add a static group.

Click the **Delete** button to delete a static group.

Click the **View All** button to display all the existing entries.

Click the **Edit** button to re-configure the specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

After clicking the **Edit** button, the following page will appear:

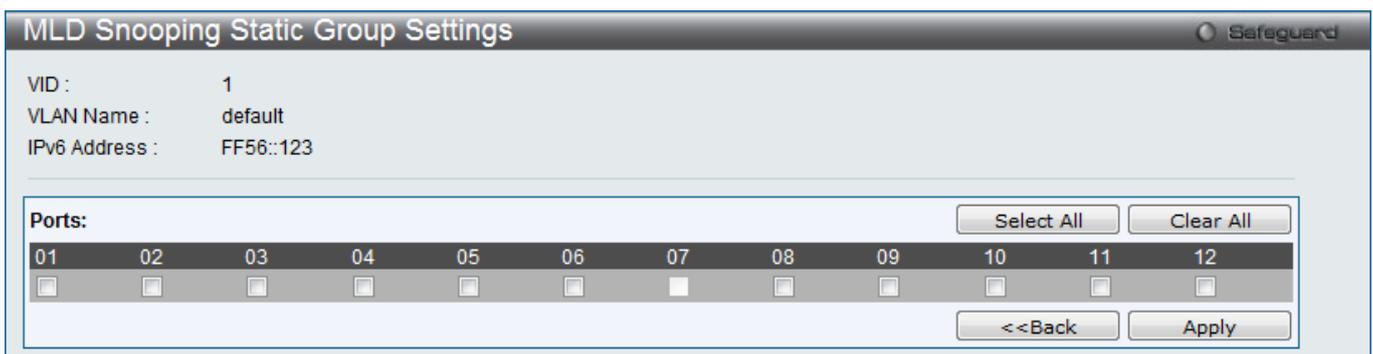


Figure 5-59 MLD Snooping Static Group Settings – Edit window

Click the **Select All** button to select all the ports for configuration.

Click the **Clear All** button to unselect all the ports for configuration.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

MLD Router Port

Users can display which of the Switch's ports are currently configured as router ports in IPv6. A router port configured by a user (using the console or Web-based management interfaces) is displayed as a static router port, designated by S. A router port that is dynamically configured by the Switch is designated by D, while a Forbidden port is designated by F.

To view the following window, click **L2 Features > L2 Multicast Control > MLD Snooping > MLD Router Port**, as show below:

MLD Router Port

VID Find

VID 1
VLAN Name default

Total Entries: 1

01	02	03	04	05	06	07	08	09	10	11	12
----	----	----	----	----	----	----	----	----	----	----	----

1/1 1 Go

Note: S:Static Router Port, D:Dynamic Router Port, F:Forbidden Router Port

Figure 5-60 MLD Router Port window

Enter a VID (VLAN ID) in the field at the top of the window.

Click the **Find** button to locate a specific entry based on the information entered.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.



NOTE: The abbreviations used on this page are **Static Router Port (S)**, **Dynamic Router Port (D)** and **Forbidden Router Port (F)**.

MLD Snooping Group

Users can view MLD Snooping Groups present on the Switch. MLD Snooping is an IPv6 function comparable to IGMP Snooping for IPv4.

To view the following window, click **L2 Features > L2 Multicast Control > MLD Snooping > MLD Snooping Group**, as show below:

Figure 5-61 MLD Snooping Group window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	Click the radio button and enter the VLAN name of the multicast group.
VID List	Click the radio button and enter a VLAN list of the multicast group.
Port List	Specify the port number(s) used to find a multicast group.
Group IPv6 Address	Enter the group IPv6 address used here.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Clear Data Driven** button to delete the specific MLD snooping group which was learned by the Data Driven feature of the specified VLAN.

Click the **View All** button to display all the existing entries.

Click the **Clear All Data Driven** button to delete all MLD snooping groups which were learned by the Data Driven feature of specified VLANs.

MLD Snooping Forwarding Table

This page displays the switch's current MLD snooping forwarding table. It provides an easy way for user to check the list of ports that the multicast group comes from and specific sources that it will be forwarded to. The packet comes from the source VLAN. They will be forwarded to the forwarding VLAN. The MLD snooping further restricts the forwarding ports.

To view the following window, click **L2 Features > L2 Multicast Control > MLD Snooping > MLD Snooping Forwarding Table**, as show below:

Figure 5-62 MLD Snooping Forwarding Table window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	The name of the VLAN for which you want to view MLD snooping forwarding table information.
VID List	The ID of the VLAN for which you want to view MLD snooping forwarding table information.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **View All** button to display all the existing entries.

MLD Snooping Counter

This page displays the statistics counter for MLD protocol packets that are received by the switch since MLD Snooping is enabled.

To view the following window, click **L2 Features > L2 Multicast Control > MLD Snooping > MLD Snooping Counter**, as show below:

Figure 5-63 MLD Snooping Counter window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	Specify a VLAN name to be displayed.
VID List	Specify a list of VLANs to be displayed.
Port List	Specify a list of ports to be displayed.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **View All** button to display all the existing entries.

Click the [Packet Statistics](#) link to view the MLD Snooping Counter Settings for the specific entry.

After clicking the [Packet Statistics](#) link, the following page will appear:

MLD Snooping Counter Table

Port : 1
Group Number : 0

Receive Statistics

Query	Report & Done
MLD v1 Query	MLD v1 Report
MLD v2 Query	MLD v2 Report
Total	MLD v1 Done
Dropped By Rate Limitation	Total
Dropped By Multicast VLAN	Dropped By Rate Limitation
	Dropped By Max Group Limitation
	Dropped By Group Filter
	Dropped By Multicast VLAN

Transmit Statistics

Query	Report & Done
MLD v1 Query	MLD v1 Report
MLD v2 Query	MLD v2 Report
Total	MLD v1 Done
	Total

Figure 5-64 Browse MLD Snooping Counter window

Click the **Clear Counter** button to clear all the information displayed in the fields.

Click the **Refresh** button to refresh the display table so that new information will appear.

Click the **<<Back** button to return to the previous page.

MLD Host Table

On this page, the user can view and configure the MLD host table settings.

To view the following window, click **L2 Features > L2 Multicast Control > MLD Snooping > MLD Host Table**, as show below:

MLD Host Table

VLAN Name

VID List (e.g.: 1, 4-6)

Port List (e.g.: 1, 3-5)

Group Address (e.g.: FF1E::1)

Find

View All

Total Entries: 0

VID	Group	Port	Host
-----	-------	------	------

Figure 5-65 MLD Host Table window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	Specify a VLAN name to be displayed.

VID List	Specify a list of VLANs to be displayed.
Port List	Specify a list of ports to be displayed.
Group Address	Specify a MLD group IPv6 address to be displayed.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **View All** button to display all the existing entries.

MLD Snooping Group Port Number

On this page, the user can view the MLD Snooping group port number settings.

To view the following window, click **L2 Features > L2 Multicast Control > MLD Snooping > MLD Snooping Group Port Number**, as show below:

Figure 5-66 MLD Snooping Group Port Number window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	Click the radio button and enter the VLAN name of the multicast group.
VID List	Click the radio button and enter a VLAN list of the multicast group.
Group IPv6 Address	Enter the group IPv6 address used here.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **View All** button to display all the existing entries.

Multicast VLAN

In a switching environment, multiple VLANs may exist. Every time a multicast query passes through the Switch, the switch must forward separate different copies of the data to each VLAN on the system, which, in turn, increases data traffic and may clog up the traffic path. To lighten the traffic load, multicast VLANs may be incorporated. These multicast VLANs will allow the Switch to forward this multicast traffic as one copy to recipients of the multicast VLAN, instead of multiple copies.

Regardless of other normal VLANs that are incorporated on the Switch, users may add any ports to the multicast VLAN where they wish multicast traffic to be sent. Users are to set up a source port, where the multicast traffic is

entering the switch, and then set the ports where the incoming multicast traffic is to be sent. The source port cannot be a recipient port and if configured to do so, will cause error messages to be produced by the switch. Once properly configured, the stream of multicast data will be relayed to the receiver ports in a much more timely and reliable fashion.

Restrictions and Provisos:

The Multicast VLAN feature of this Switch does have some restrictions and limitations, such as:

- 1 Multicast VLANs can be implemented on edge and non-edge switches.
- 2 Member ports and source ports can be used in multiple ISM VLANs. But member ports and source ports cannot be the same port in a specific ISM VLAN.
- 3 The Multicast VLAN is exclusive with normal 802.1q VLANs, which means that VLAN IDs (VIDs) and VLAN Names of 802.1q VLANs and ISM VLANs cannot be the same. Once a VID or VLAN Name is chosen for any VLAN, it cannot be used for any other VLAN.
- 4 The normal display of configured VLANs will not display configured Multicast VLANs.
- 5 Once an ISM VLAN is enabled, the corresponding IGMP snooping state of this VLAN will also be enabled. Users cannot disable the IGMP feature for an enabled ISM VLAN.
- 6 One IP multicast address cannot be added to multiple ISM VLANs, yet multiple Ranges can be added to one ISM VLAN.

IGMP Multicast Group Profile Settings

Users can add a profile to which multicast address reports are to be received on specified ports on the Switch. This function will therefore limit the number of reports received and the number of multicast groups configured on the Switch. The user may set an IP Multicast address or range of IP Multicast addresses to accept reports (Permit) or deny reports (Deny) coming into the specified switch ports.

To view the following window, click **L2 Features > L2 Multicast Control > Multicast VLAN > IGMP Multicast Group Profile Settings**, as show below:

The screenshot shows the 'IGMP Multicast Group Profile Settings' window. At the top, there is a title bar with 'IGMP Multicast Group Profile Settings' and a 'Safeguard' icon. Below the title bar, there is a 'Profile Name' input field with a '(Max: 32 characters)' label. To the right of the input field are 'Add' and 'Find' buttons. Below the input field, there are 'Delete All' and 'View All' buttons. In the lower section, there is a table with one entry. The table has two columns: 'Profile Name' and 'Delete'. The entry has 'group' in the 'Profile Name' column and a 'Delete' button in the 'Delete' column. A 'Group List' link is located to the left of the 'Delete' button. The total number of entries is shown as 'Total Entries: 1'.

Figure 5-67 IGMP Multicast Group Profile Settings window

The fields that can be configured are described below:

Parameter	Description
Profile Name	Enter a name for the IP Multicast Profile.

Click the **Add** button to add a new entry based on the information entered.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Delete All** button to remove all the entries listed.

Click the **View All** button to display all the existing entries.

Click the **Delete** button to remove the corresponding entry.

Click the [Group List](#) link to configure the Multicast Group Profile Address Settings for the specific entry.

After clicking the [Group List](#) link, the following page will appear:

Figure 5-68 Multicast Group Profile Multicast Address Settings window

The fields that can be configured are described below:

Parameter	Description
Multicast Address List	Enter the multicast address list value.

Click the **Add** button to add a new entry based on the information entered.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **Delete** button to remove the corresponding entry.

IGMP Snooping Multicast VLAN Settings

On this page the user can configure the IGMP snooping multicast VLAN parameters.

To view the following window, click **L2 Features > L2 Multicast Control > Multicast VLAN > IGMP Snooping Multicast VLAN Settings**, as show below:

Figure 5-69 IGMP Snooping Multicast VLAN Settings window

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

IGMP Multicast VLAN State	Click the radio button to enable or disable the IGMP Multicast VLAN state.
IGMP Multicast VLAN Forward Unmatched	Click the radio button to enable or disable the IGMP Multicast VLAN Forwarding state.
IGMP Multicast VLAN Auto Assign	Click the radio button to enable or disable the IGMP Multicast VLAN Auto Assign feature.
VLAN Name	Enter the VLAN Name used.
VID (2-4094)	Enter the VID used.
Remap Priority	<p>0-7 – The remap priority value (0 to 7) to be associated with the data traffic to be forwarded on the multicast VLAN.</p> <p><i>None</i> – If None is specified, the packet's original priority is used. The default setting is <i>None</i>.</p>
Replace Priority	Tick the check box to specify that the packet's priority will be changed by the Switch, based on the remap priority. This flag will only take effect when the remap priority is set.

Click the **Apply** button to accept the changes made for each individual section.

Click the **Add** button to add a new entry based on the information entered.

Click the **Edit** button to configure the IGMP Snooping Multicast VLAN Settings for the specific entry.

Click the **Delete** button to remove the specific entry.

Click the [Profile List](#) link to configure the IGMP Snooping Multicast VLAN Settings for the specific entry.

After clicking the **Edit** button, the following page will appear:

IGMP Snooping Multicast VLAN Settings
Safeguard

VLAN Name: v2

State: Disabled

Replace Source IP: 192.168.69.123 (System IP) (e.g.: 10.90.90.6) Not Replaced

Remap Priority: None Replace Priority

Untagged Member Select All

Ports: Clear All

01	02	03	04	05	06	07	08	09	10	11	12
<input type="checkbox"/>											

Tagged Member Select All

Ports: Clear All

01	02	03	04	05	06	07	08	09	10	11	12
<input type="checkbox"/>											

Untagged Source Select All

Ports: Clear All

01	02	03	04	05	06	07	08	09	10	11	12
<input type="checkbox"/>											

Tagged Source Select All

Ports: Clear All

01	02	03	04	05	06	07	08	09	10	11	12
<input type="checkbox"/>											

<<Back
Apply

Figure 5-70 IGMP Snooping Multicast VLAN Settings – Edit window

The fields that can be configured are described below:

Parameter	Description
State	Use the drop-down menu to enable or disable the state.
Replace Source IP	With the IGMP snooping function, the IGMP report packet sent by the host will be forwarded to the source port. Before forwarding of the packet, the source IP address in the join packet needs to be replaced by this IP address. If none is specified, the source IP address will use the System IP address.
Not Replaced	Specify that the packet's priority will not be changed by the Switch, based on the remap priority.
Remap Priority	0-7 – The remap priority value (0 to 7) to be associated with the data traffic to be forwarded on the multicast VLAN. <i>None</i> – If None is specified, the packet's original priority is used. The default setting is None.
Replace Priority	Specify that the packet's priority will be changed by the switch, based on the remap priority. This flag will only take effect when the remap priority is set.
Untagged Member Ports	Specify the untagged member port of the multicast VLAN.
Tagged Member Ports	Specify the tagged member port of the multicast VLAN.
Untagged Source Ports	Specify the untagged source port where the multicast traffic is entering the Switch. The PVID of the untagged source port is automatically changed to the

	multicast VLAN. Source ports must be either tagged or untagged for any single multicast VLAN, i.e. both types cannot be members of the same multicast VLAN.
Tagged Source Ports	Specify the source port or range of source ports as tagged members of the multicast VLAN.

Click the **Select All** button to select all the ports for configuration.

Click the **Clear All** button to unselect all the ports for configuration.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

After clicking the [Profile List](#) link, the following page will appear:

Figure 5-71 IGMP Snooping Multicast VLAN Group List Settings window

The fields that can be configured or displayed are described below:

Parameter	Description
VID	Display the VLAN ID.
VLAN Name	Display the VLAN name.
Profile Name	Use the drop-down menu to select the IGMP Snooping Multicast VLAN Group Profile name.

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete** button to remove the specific entry.

Click the [Show IGMP Snooping Multicast VLAN Entries](#) link to view the IGMP Snooping Multicast VLAN Settings.

MLD Multicast Group Profile Settings

Users can add, delete, or configure the MLD multicast group profile on this page.

To view the following window, click **L2 Features > L2 Multicast Control > Multicast VLAN > MLD Multicast Group Profile Settings**, as show below:

MLD Multicast Group Profile Settings Safeguard

Profile Name (Max: 32 characters) Add Find

Delete All View All

Total Entries: 1

Profile Name	
group2	Group List Delete

Figure 5-72 MLD Multicast Group Profile Settings window

The fields that can be configured are described below:

Parameter	Description
Profile Name	Enter the MLD Multicast Group Profile name.

Click the **Add** button to add a new entry based on the information entered.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Delete All** button to remove all the entries listed.

Click the **View All** button to display all the existing entries.

Click the [Group List](#) link to configure the Multicast Group Profile Multicast Address Settings for the specific entry.

Click the **Delete** button to remove the specific entry.

After clicking the [Group List](#) link, the following page will appear:

Multicast Group Profile Multicast Address Settings Safeguard

Profile Name group2

Multicast Address List (e.g.: FF1E::1-FF1E::3) Add

<<Back

Multicast Address Group List: 1

NO.	Multicast Address List	
1	FF1E::1	Delete

Figure 5-73 Multicast Group Profile Multicast Address Settings window

The fields that can be configured are described below:

Parameter	Description
Multicast Address List	Enter the multicast address list.

Click the **Add** button to add a new entry based on the information entered.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **Delete** button to remove the specific entry.

MLD Snooping Multicast VLAN Settings

Users can add, delete, or configure the MLD snooping multicast VLAN on this page.

To view the following window, click **L2 Features > L2 Multicast Control > Multicast VLAN > MLD Snooping Multicast VLAN Settings**, as show below:

MLD Snooping Multicast VLAN Settings Safeguard

MLD Multicast VLAN State Enabled Disabled

MLD Multicast VLAN Forward Unmatched Enabled Disabled

MLD Multicast VLAN Auto Assign Enabled Disabled

VLAN Name VID (2-4094) Remap Priority Replace Priority

Total Entries: 1

VID	VLAN Name	Remap Priority		
3	v3	None	Profile List	<input type="button" value="Edit"/> <input type="button" value="Delete"/>

Figure 5-74 MLD Snooping Multicast VLAN Settings window

The fields that can be configured are described below:

Parameter	Description
MLD Multicast VLAN State	Click the radio button to enable or disable the MLD Multicast VLAN state.
MLD Multicast VLAN Forward Unmatched	Click the radio button to enable or disable the MLD Multicast VLAN Forward Unmatched state.
MLD Multicast VLAN Auto Assign	Click the radio button to enable or disable the MLD Multicast Auto Assign feature.
VLAN Name	Enter the VLAN name used.
VID	Enter the VID value used.
Remap Priority	The user can select this option to enable the Remap Priority feature. Specify the remap priority (0 to 7) to be associated with the data traffic to be forwarded on the multicast VLAN. If None is specified, the packet's original priority will be used. The default setting is None.
Replace Priority	Tick the check box to specify that the packet's priority will be changed by the switch, based on the remap priority. This flag will only take effect when the remap priority is set.

Click the **Apply** button to accept the changes made for each individual section.

Click the **Add** button to add a new entry based on the information entered.

Click the **Edit** button to configure the MLD Snooping Multicast VLAN Settings for the specific entry.

Click the **Delete** button to remove the specific entry.

Click the [Profile List](#) link to configure the MLD Snooping Multicast VLAN Settings for the specific entry.

After clicking the **Edit** button, the following page will appear:

MLD Snooping Multicast VLAN Settings
Safeguard

VLAN Name: v3

State: Disabled

Replace Source IP: :: (e.g.: FE80::201)

Remap Priority: None Replace Priority

Select All Clear All

01	02	03	04	05	06	07	08	09	10	11	12
<input type="checkbox"/>											

Select All Clear All

Select All Clear All

01	02	03	04	05	06	07	08	09	10	11	12
<input type="checkbox"/>											

Select All Clear All

Select All Clear All

01	02	03	04	05	06	07	08	09	10	11	12
<input type="checkbox"/>											

Select All Clear All

Select All Clear All

<<Back Apply

Figure 5-75 MLD Snooping Multicast VLAN Settings – Edit window

The fields that can be configured are described below:

Parameter	Description
State	Use the drop-down menu to enable or disable the state.
Replace Source IP	With the MLD snooping function, the MLD report packet sent by the host will be forwarded to the source port. Before forwarding of the packet, the source IP address in the join packet needs to be replaced by this IP address. If none is specified, the source IP address will use zero IP address.
Remap Priority	<p>0-7 – The remap priority value (0 to 7) to be associated with the data traffic to be forwarded on the multicast VLAN.</p> <p><i>None</i> – If None is specified, the packet's original priority is used. The default setting is None.</p>
Replace Priority	Tick the check box to specify that the packet's priority will be changed by the switch, based on the remap priority. This flag will only take effect when the remap priority is set.
Untagged Member Ports	Specify the untagged member port of the multicast VLAN.
Tagged Member Ports	Specify the tagged member port of the multicast VLAN.
Untagged Source Ports	Specify the untagged source port where the multicast traffic is entering the Switch. The PVID of the untagged source port is automatically changed to the multicast VLAN. Source ports must be either tagged or untagged for any single multicast VLAN, i.e. both types cannot be members of the same multicast VLAN.
Tagged Source Ports	Specify the source port or range of source ports as tagged members of the multicast VLAN.

Click the **Select All** button to select all the ports for configuration.

Click the **Clear All** button to unselect all the ports for configuration.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

After clicking the [Profile List](#) link, the following page will appear:

Figure 5-76 MLD Snooping Multicast VLAN Group List Settings window

The fields that can be configured are described below:

Parameter	Description
Profile Name	Use the drop-down menu to select the IGMP Snooping Multicast VLAN Group Profile name.

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete** button to remove the specific entry.

Click the [Show MLD Snooping Multicast VLAN Entries](#) link to view the MLD Snooping Multicast VLAN Settings.

Multicast Filtering

IPv4 Multicast Filtering

IPv4 Multicast Profile Settings

Users can add a profile to which multicast address(s) reports are to be received on specified ports on the Switch. This function will therefore limit the number of reports received and the number of multicast groups configured on the Switch. The user may set an IPv4 Multicast address or range of IPv4 Multicast addresses to accept reports (Permit) or deny reports (Deny) coming into the specified switch ports.

To view the following window, click **L2 Features > Multicast Filtering > IPv4 Multicast Filtering > IPv4 Multicast Profile Settings**, as show below:

IPv4 Multicast Profile Settings Safeguard

Profile ID (1-60) Profile Name (Max: 32 characters) Add Find

Delete All

Total Entries: 1

Profile ID	Profile Name	
1	1	Group List Edit Delete

Figure 5-77 IPv4 Multicast Profile Settings window

The fields that can be configured are described below:

Parameter	Description
Profile ID (1-60)	Enter a Profile ID between 1 and 60.
Profile Name	Enter a name for the IP Multicast Profile.

Click the **Add** button to add a new entry based on the information entered.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Delete All** button to remove all the entries listed.

Click the [Group List](#) link to configure the multicast address group list settings for the specific entry.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

After clicking the [Group List](#) link, the following page will appear:

Multicast Address Group List Settings Safeguard

Profile ID 1
Profile Name 1
Multicast Address List (e.g.: 235.2.2.1-235.2.2.2) Add

<<Back

Multicast Address Group List: 1

NO.	Multicast Address List	
1	235.2.2.1	Edit Delete

Figure 5-78 Multicast Address Group List Settings window

The fields that can be configured are described below:

Parameter	Description
Multicast Address List	Enter the multicast address list here.

Click the **Add** button to add a new entry based on the information entered.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

IPv4 Limited Multicast Range Settings

Users can configure the ports and VLANs on the Switch that will be involved in the Limited IPv4 Multicast Range. The user can configure the range of multicast ports that will be accepted by the source ports to be forwarded to the receiver ports.

To view the following window, click **L2 Features > Multicast Filtering > IPv4 Multicast Filtering > IPv4 Limited Multicast Range Settings**, as show below:

Figure 5-79 IPv4 Limited Multicast Range Settings window

The fields that can be configured are described below:

Parameter	Description
Ports / VID List	Select the appropriate port(s) or VLAN IDs used for the configuration.
Access	Assign access permissions to the ports selected. Options listed are <i>Permit</i> and <i>Deny</i> .
Profile ID / Profile Name	Use the drop-down menu to select the profile ID or profile name used and then assign <i>Permit</i> or <i>Deny</i> access to them.

Click the **Apply** button to accept the changes made.

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete** button to remove the specific entry.

Click the **Find** button to locate a specific entry based on the information entered.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

IPv4 Max Multicast Group Settings

Users can configure the ports and VLANs on the switch that will be a part of the maximum filter group, up to a maximum of 1024.

To view the following window, click **L2 Features > Multicast Filtering > IPv4 Multicast Filtering > IPv4 Max Multicast Group Settings**, as show below:

Figure 5-80 IPv4 Max Multicast Group Settings window

The fields that can be configured are described below:

Parameter	Description
Ports / VID List	Select the appropriate port(s) or VLAN IDs used for the configuration here.
Max Group (1-1024)	If the checkbox Infinite is not selected, the user can enter a Max Group value.
Infinite	Tick the check box to enable or disable the use of the Infinite value.
Action	Use the drop-down menu to select the appropriate action for this rule. The user can select <i>Drop</i> to initiate the drop action or the user can select <i>Replace</i> to initiate the replace action.

Click the **Apply** button to accept the changes made.

Click the **Find** button to locate a specific entry based on the information entered.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

IPv6 Multicast Filtering

Users can add a profile to which multicast address(s) reports are to be received on specified ports on the Switch. This function will therefore limit the number of reports received and the number of multicast groups configured on the Switch. The user may set an IPv6 Multicast address or range of IPv6 Multicast addresses to accept reports (Permit) or deny reports (Deny) coming into the specified switch ports.

IPv6 Multicast Profile Settings

Users can add, delete, and configure the IPv6 multicast profile on this page.

To view the following window, click **L2 Features > Multicast Filtering > IPv6 Multicast Filtering > IPv6 Multicast Profile Settings**, as show below:

Figure 5-81 IPv6 Multicast Profile Settings window

The fields that can be configured are described below:

Parameter	Description
Profile ID (1-60)	Enter a Profile ID between 1 and 60.
Profile Name	Enter a name for the IP Multicast Profile.

Click the **Add** button to add a new entry based on the information entered.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Delete All** button to remove all the entries listed.

Click the [Group List](#) link to configure the multicast address group list settings for the specific entry.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

After clicking the [Group List](#) link, the following page will appear:

Figure 5-82 Multicast Address Group List Settings window

The fields that can be configured are described below:

Parameter	Description
Multicast Address List	Enter the multicast address list here.

Click the **Add** button to add a new entry based on the information entered.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

IPv6 Limited Multicast Range Settings

Users can configure the ports and VLANs on the Switch that will be involved in the Limited IPv6 Multicast Range.

To view the following window, click **L2 Features > Multicast Filtering > IPv6 Multicast Filtering > IPv6 Limited Multicast Range Settings**, as show below:

Figure 5-83 IPv6 Limited Multicast Range Settings window

The fields that can be configured are described below:

Parameter	Description
Ports/VID List	Select the appropriate port(s) or VLAN IDs used for the configuration here.
Access	Assign access permissions to the ports selected. Options listed are <i>Permit</i> and <i>Deny</i> .
Profile ID/Profile Name	Use the drop-down menu to select the profile ID or profile name used and then assign <i>Permit</i> or <i>Deny</i> access to them.

Click the **Apply** button to accept the changes made.

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete** button to remove the specific entry.

Click the **Find** button to locate a specific entry based on the information entered.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

IPv6 Max Multicast Group Settings

Users can configure the ports and VLANs on the switch that will be a part of the maximum filter group, up to a maximum of 1024.

Figure 5-84 IPv6 Max Multicast Group Settings window

The fields that can be configured are described below:

Parameter	Description
Ports/VID List	Select the appropriate port(s) or VLAN IDs used for the configuration here.
Max Group	If the checkbox Infinite is not selected, the user can enter a Max Group value.
Infinite	Tick the check box to enable or disable the use of the Infinite value.
Action	Use the drop-down menu to select the appropriate action for this rule. The user can select <i>Drop</i> to initiate the drop action or the user can select <i>Replace</i> to initiate the replace action.

Click the **Apply** button to accept the changes made.

Click the **Find** button to locate a specific entry based on the information entered.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

Multicast Filtering Mode

Users can configure the multicast filtering mode.

To view the following window, click **L2 Features > Multicast Filtering > Multicast Filtering Mode**, as show below:

Figure 5-85 Multicast Filtering Mode window

The fields that can be configured are described below:

Parameter	Description
VLAN Name/VID List	The VLAN to which the specified filtering action applies. Tick the All check box to apply this feature to all the VLANs.
Multicast Filtering Mode	This drop-down menu allows you to select the action the Switch will take when it receives a multicast packet that requires forwarding to a port in the specified VLAN. <i>Forward Unregistered Groups</i> – The multicast packets whose destination is an unregistered multicast group will be forwarded within the range of ports specified above. <i>Filter Unregistered Groups</i> – The multicast packets whose destination is a registered multicast group will be forwarded within the range of ports specified above. This is the default option.

Click the **Apply** button to accept the changes made.

Click the **Find** button to locate a specific entry based on the information entered.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

ERPS Settings

Ethernet Ring Protection Switching (ERPS) is the first industry standard (ITU-T G.8032) for ERPS. It is achieved by integrating mature Ethernet operations, administration, and maintenance (OAM) * functions and a simple automatic protection switching (APS) protocol for Ethernet ring networks. ERPS provides sub-50ms protection for Ethernet traffic in a ring topology. It ensures that there are no loops formed at the Ethernet layer.

One link within a ring will be blocked to avoid Loop (RPL, Ring Protection Link). When the failure happens, protection switching blocks the failed link and unblocks the RPL. When the failure clears, protection switching blocks the RPL again and unblocks the link on which the failure is cleared.

G.8032 Terms and Concepts

RPL (Ring Protection Link) – Link designated by mechanism that is blocked during Idle state to prevent loop on Bridged ring

RPL Owner – Node connected to RPL that blocks traffic on RPL during Idle state and unblocks during Protected state

R-APS (Ring – Automatic Protection Switching) - Protocol messages defined in Y.1731 and G.8032 used to coordinate the protection actions over the ring through RAPS VLAN (R-APS Channel).

RAPS VLAN (R-APS Channel) – A separate ring-wide VLAN for transmission of R-APS messages

Protected VLAN – The service traffic VLANs for transmission of normal network traffic

This page is used to enable the ERPS function on the switch.



NOTE: STP and LBD should be disabled on the ring ports before enabling ERPS. The ERPS cannot be enabled before the R-APS VLAN is created, and ring ports, RPL port, RPL owner, are configured.

To view the following window, click **L2 Features > ERPS Settings**, as show below:

Figure 5-86 ERPS Settings Window

The fields that can be configured are described below:

Parameter	Description
ERPS State	Here the user can enable or disable the ERPS State.
ERPS Log	Here the user can enable or disable the ERPS Log.
ERPS Trap	Here the user can enable or disable the ERPS Trap.
R-APS VLAN (1-4094)	Specifies the VLAN which will be the R-APS VLAN.

Click the **Apply** button to accept the changes made.

Click the **Find** button to find a specific entry based on the information entered.

Click the **View All** button to view all the entries configured.

Click the **Delete** button to remove the specific entry.

Click the [Detail Information](#) link to view detailed information of the R-APS entry.

Click the [Sub-Ring Information](#) link to view the Sub-Ring information of the R-APS entry.

After clicking the [Detail Information](#) link, the following window will appear:

ERPS Settings			Safeguard
ERPS Information			
R-APS VLAN	1		
Ring Status	Disabled		
Admin West Port	1		
Operational West Port	1	(Forwarding)	
Admin East Port	2		
Operational East Port	2	(Forwarding)	
Admin RPL Port	None		
Operational RPL Port	None		
Admin RPL Owner	Disabled		
Operational RPL Owner	Disabled		
Protected VLAN(s)			
Ring MEL (0-7)	1		
Holdoff Time (0-10000)	0	ms	
Guard Time (10-2000)	500	ms	
WTR Time (5-12)	5	min	
Revertive	Enabled		
Current Ring State	-		
			<input type="button" value="Edit"/> <input type="button" value=" <<Back"/>

Figure 5-87 ERPS Settings Window (Detail Information)

Click the **Edit** button to re-configure the specific entry.

Click the **<<Back** button to return to the ERPS settings page.

After click the **Edit** button, the following window will appear:

ERPS Settings			Safeguard
ERPS Information			
R-APS VLAN	1		
Ring Status	Disabled <input type="checkbox"/>		
Admin West Port	01 <input type="checkbox"/>		
Operational West Port	1	(Forwarding)	
Admin East Port	02 <input type="checkbox"/>		
Operational East Port	2	(Forwarding)	
Admin RPL Port	None <input type="checkbox"/>		
Operational RPL Port	None		
Admin RPL Owner	Disabled <input type="checkbox"/>		
Operational RPL Owner	Disabled		
Protected VLAN(s) (e.g.: 4-6)	<input type="text"/>	<input checked="" type="radio"/> Add <input type="radio"/> Delete	
Ring MEL (0-7)	1 <input type="checkbox"/>		
Holdoff Time (0-10000)	0 <input type="checkbox"/>	ms	
Guard Time (10-2000)	500 <input type="checkbox"/>	ms	
WTR Time (5-12)	5 <input type="checkbox"/>	min	
Revertive	Enabled <input type="checkbox"/>		
Current Ring State	-		
			<input type="button" value="Apply"/> <input type="button" value=" <<Back"/>

Figure 5-88 ERPS Settings Window (Detail Information) Edit

The fields that can be configured or displayed are described below:

Parameter	Description
R-APS VLAN	Display the R-APS VLAN ID.
Ring Status	Tick the check box and use the drop-down menu to enable or disable the specified ring.
Admin West Port	Tick the check box and use the drop-down menu to specify the port as the west ring port and also the virtual port channel used.
Operational West Port	The operational west port value is displayed.
Admin East Port	Tick the check box and use the drop-down menu to specify the port as the east ring port and also the virtual port channel used.
Operational East Port	Display the operational east port value.
Admin RPL Port	Tick the check box and use the drop-down menu to specify the RPL port used. Options to choose from are <i>West Port</i> , <i>East Port</i> , and <i>None</i> .
Operational RPL Port	Display the operational RPL port value.
Admin RPL Owner	Tick the check box and use the drop-down menu to enable or disable the RPL owner node.
Operational RPL Owner	Display the operational RPL owner value.
Protected VLAN(s)	Tick the check box, click the Add or Delete radio button, and enter the protected VLAN group.
Ring MEL (0-7)	Tick the check box and enter the ring MEL of the R-APS function. The default ring MEL is 1.
Holdoff Time (0-10000)	Tick the check box and enter the hold-off time of the R-APS function. The default hold-off time is 0 milliseconds.
Guard Time (10-2000)	Tick the check box and enter the guard time of the R-APS function. The default guard time is 500 milliseconds.
WTR Time (5-12)	Tick the check box and enter the WTR time of the R-APS function.
Revertive	Tick the check box and use the drop-down menu to enable or disable the state of the R-APS revertive option.
Current Ring State	Display the current Ring state.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to return to the previous window.

After clicking the [Sub-Ring Information](#) link, the following window will appear:

ERPS Sub-Ring Settings Safeguard

R-APS VLAN: 1

Sub-Ring R-APS VLAN (1-4094):

State: Add

TC Propagation State: Disabled

Apply <<Back

Total Entries: 0

Sub-Ring R-APS VLAN	TC Propagation State

Figure 5-89 ERPS Settings Window (Sub-Ring Information)

The fields that can be configured are described below:

Parameter	Description
Sub-Ring R-APS VLAN (1-4094)	Enter the Sub-Ring R-APS VLAN ID used here.
State	Tick the check box and use the drop-down menu to add or delete the ERPS Sub-Ring state.
TC Propagation State	Tick the check box and use the drop-down menu to enable or disable the TC Propagation state.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to return to the previous window.

Local Loopback Port Settings

On this page the user can configure the local loopback port parameters.

To view the following window, click **L2 Features > Local Loopback Port Settings**, as show below:

Local Loopback Port Settings
Safeguard

From Port
01

To Port
01

Loopback Mode
MAC Internal

State
Disabled

Apply

Local Loopback Ports Settings Table

Port	Loopback Mode
1	None
2	None
3	None
4	None
5	None
6	None
7	None
8	None
9	None
10	None
11	None
12	None

Figure 5-90 Local Loopback Port Settings Window

The fields that can be configured are described below:

Parameter	Description
From Port – To Port	Here the user can select the port range to use for this configuration.
Loopback Mode	Here the user can select the Loopback mode used. Modes to choose from are MAC Internal , MAC External , PHY Internal and PHY External . When the user chooses to use the physical (PHY) mode then the user will be able to set the Medium Type .
State	Here the user can choose to enable or disable the state.

Click the **Apply** button to accept the changes made.

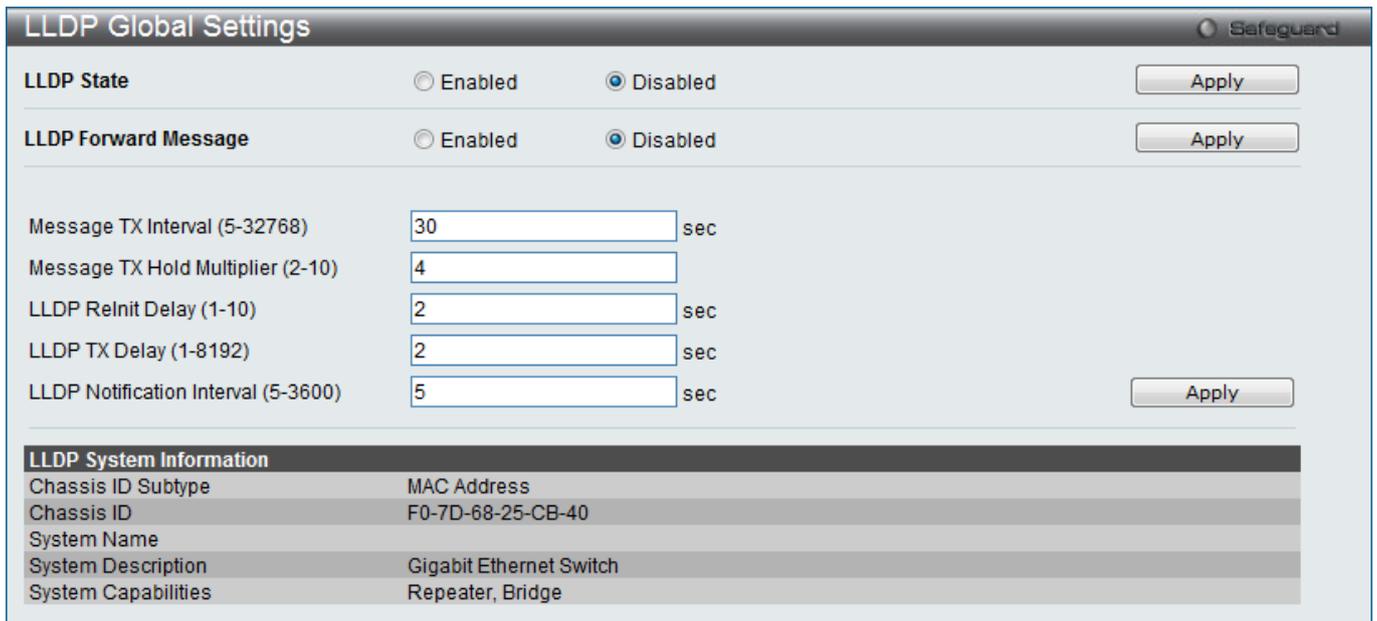
LLDP

LLDP

LLDP Global Settings

On this page the user can configure the LLDP global parameters.

To view the following window, click **L2 Features > LLDP > LLDP > LLDP Global Settings**, as show below:



LLDP Global Settings Safeguard

LLDP State Enabled Disabled Apply

LLDP Forward Message Enabled Disabled Apply

Message TX Interval (5-32768) sec

Message TX Hold Multiplier (2-10)

LLDP Reinit Delay (1-10) sec

LLDP TX Delay (1-8192) sec

LLDP Notification Interval (5-3600) sec Apply

LLDP System Information	
Chassis ID Subtype	MAC Address
Chassis ID	F0-7D-68-25-CB-40
System Name	
System Description	Gigabit Ethernet Switch
System Capabilities	Repeater, Bridge

Figure 5-91 LLDP Global Settings window

The fields that can be configured are described below:

Parameter	Description
LLDP State	Click the radio buttons to enable or disable the LLDP feature.
LLDP Forward Message	When LLDP is disabled this function controls the LLDP packet forwarding message based on individual ports. If the LLDP forward message is enabled on a port it will flood the LLDP packet to all ports that have the same port VLAN and will advertise to other stations attached to the same IEEE 802 LAN.
Message TX Interval (5-32768)	This interval controls how often active ports retransmit advertisements to their neighbors. To change the packet transmission interval, enter a value between 5 and 32768 seconds.
Message TX Hold Multiplier (2-10)	This function calculates the Time-to-Live for creating and transmitting the LLDP advertisements to LLDP neighbors by changing the multiplier used by an LLDP Switch. When the Time-to-Live for an advertisement expires the advertised data is then deleted from the neighbor Switch's MIB.
LLDP Reinit Delay (1-10)	The LLDP re-initialization delay interval is the minimum time that an LLDP port will wait before reinitializing after receiving an LLDP disable command. To change the LLDP re-init delay, enter a value between 1 and 10 seconds.
LLDP TX Delay (1-8192)	LLDP TX Delay allows the user to change the minimum time delay interval for any LLDP port which will delay advertising any successive LLDP advertisements due to change in the LLDP MIB content. To change the LLDP TX Delay, enter a value between 1 and 8192 seconds.
LLDP Notification Interval (5-3600)	LLDP Notification Interval is used to send notifications to configured SNMP trap receiver(s) when an LLDP change is detected in an advertisement received on the port from an LLDP neighbor. To set the LLDP Notification Interval, enter a value between 5 and 3600 seconds.

Click the **Apply** button to accept the changes made for each individual section.

LLDP Port Settings

On this page the user can configure the LLDP port parameters.

To view the following window, click **L2 Features > LLDP > LLDP > LLDP Port Settings**, as show below:

Port ID	Notification	Admin Status	IPv4(IPv6) Address
1	Disabled	TX and RX	
2	Disabled	TX and RX	
3	Disabled	TX and RX	
4	Disabled	TX and RX	
5	Disabled	TX and RX	
6	Disabled	TX and RX	
7	Disabled	TX and RX	
8	Disabled	TX and RX	
9	Disabled	TX and RX	

Figure 5-92 LLDP Port Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Use the drop-down menu to select the starting and ending ports to use.
Notification	Use the drop-down menu to enable or disable the status of the LLDP notification. This function controls the SNMP trap however it cannot implement traps on SNMP when the notification is disabled.
Admin Status	This function controls the local LLDP agent and allows it to send and receive LLDP frames on the ports. This option contains <i>TX</i> , <i>RX</i> , <i>TX And RX</i> or <i>Disabled</i> . <i>TX</i> - the local LLDP agent can only transmit LLDP frames. <i>RX</i> - the local LLDP agent can only receive LLDP frames. <i>TX And RX</i> - the local LLDP agent can both transmit and receive LLDP frames. <i>Disabled</i> - the local LLDP agent can neither transmit nor receive LLDP frames. The default value is TX And RX.
Subtype	Use the drop-down menu to select the type of the IP address information will be sent.
Action	Use the drop-down menu to enable or disable the action field.
Address	Enter the IP address that will be sent.

Click the **Apply** button to accept the changes made.



NOTE: The IPv4 or IPv6 address entered here should be an existing LLDP management IP address.

LLDP Management Address List

On this page the user can view the LLDP management address list.

To view the following window, click **L2 Features > LLDP > LLDP > LLDP management Address List**, as show below:

Subtype	Address	IF Type	OID	Advertising Ports
IPv4	192.168.69.123	Ifindex	1.3.6.1.4.1.171.10.1...	

Figure 5-93 LLDP Management Address List window

The fields that can be configured are described below:

Parameter	Description
IPv4/IPv6	Use the drop-down menu to select either IPv4 or IPv6.
Address	Enter the management IP address or the IP address of the entity you wish to advertise to. The IPv4 address is a management IP address, so the IP information will be sent with the frame.

Click the **Find** button to locate a specific entry based on the information entered.

LLDP Basic TLVs Settings

TLV stands for Type-length-value, which allows the specific sending information as a TLV element within LLDP packets. This window is used to enable the settings for the Basic TLVs Settings. An active LLDP port on the Switch always included mandatory data in its outbound advertisements. There are four optional data types that can be configured for an individual port or group of ports to exclude one or more of these data types from outbound LLDP advertisements. The mandatory data type includes four basic types of information (end of LLDPDU TLV, chassis ID TLV, port ID TLV, and Time to Live TLV). The mandatory data types cannot be disabled. There are also four data types which can be optionally selected. These include Port Description, System Name, System Description and System Capability.

To view the following window, click **L2 Features > LLDP > LLDP > LLDP Basic TLVs Settings**, as show below:

Port	Port Description	System Name	System Description	System Capabilities
1	Disabled	Disabled	Disabled	Disabled
2	Disabled	Disabled	Disabled	Disabled
3	Disabled	Disabled	Disabled	Disabled
4	Disabled	Disabled	Disabled	Disabled
5	Disabled	Disabled	Disabled	Disabled
6	Disabled	Disabled	Disabled	Disabled
7	Disabled	Disabled	Disabled	Disabled
8	Disabled	Disabled	Disabled	Disabled
9	Disabled	Disabled	Disabled	Disabled
10	Disabled	Disabled	Disabled	Disabled

Figure 5-94 LLDP Basic TLVs Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select the port range to use for this configuration.
Port Description	Use the drop-down menu to enable or disable the Port Description option.
System Name	Use the drop-down menu to enable or disable the System Name option.
System Description	Use the drop-down menu to enable or disable the System Description option.
System Capabilities	Use the drop-down menu to enable or disable the System Capabilities option.

Click the **Apply** button to accept the changes made.

LLDP Dot1 TLVs Settings

LLDP Dot1 TLVs are organizationally specific TLVs which are defined in IEEE 802.1 and used to configure an individual port or group of ports to exclude one or more of the IEEE 802.1 organizational port VLAN ID TLV data types from outbound LLDP advertisements.

To view the following window, click **L2 Features > LLDP > LLDP > LLDP Dot1 TLVs Settings**, as show below:

Port	PVID State	Port and Protocol VID State	VID	VLAN Name State	VID	Protocol Identity State	Protocol Identity
1	Disabled	Disabled		Disabled		Disabled	
2	Disabled	Disabled		Disabled		Disabled	
3	Disabled	Disabled		Disabled		Disabled	
4	Disabled	Disabled		Disabled		Disabled	
5	Disabled	Disabled		Disabled		Disabled	
6	Disabled	Disabled		Disabled		Disabled	
7	Disabled	Disabled		Disabled		Disabled	
8	Disabled	Disabled		Disabled		Disabled	
9	Disabled	Disabled		Disabled		Disabled	
10	Disabled	Disabled		Disabled		Disabled	
11	Disabled	Disabled		Disabled		Disabled	

Figure 5-95 LLDP Dot1 TLVs Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select the port range to use for this configuration.
Dot1 TLV PVID	Use the drop-down menu to enable or disable and configure the Dot1 TLV PVID option.
Dot1 TLV Protocol VLAN	Use the drop-down menu to enable or disable, and configure the Dot1 TLV Protocol VLAN option. After enabling this option, the user can select to use either <i>VLAN Name</i> , <i>VLAN ID</i> or <i>All</i> in the next drop-down menu. After selecting this, the user can enter either the VLAN name or VLAN ID in the space provided.
Dot1 TLV VLAN	Use the drop-down menu to enable or disable, and configure the Dot1 TLV VLAN option. After enabling this option, the user can select to use either <i>VLAN Name</i> , <i>VLAN ID</i> or <i>All</i> in the next drop-down menu. After selecting this, the user can enter either the VLAN name or VLAN ID in the space provided.
Dot1 TLV Protocol Identity	Use the drop-down menu to enable or disable, and configure the Dot1 TLV Protocol Identity option. After enabling this option the user can select to either use <i>EAPOL</i> , <i>LACP</i> , <i>GVRP</i> , <i>STP</i> , or <i>All</i> .

Click the **Apply** button to accept the changes made.

LLDP Dot3 TLVs Settings

This window is used to configure an individual port or group of ports to exclude one or more IEEE 802.3 organizational specific TLV data type from outbound LLDP advertisements.

To view the following window, click **L2 Features > LLDP > LLDP > LLDP Dot3 TLVs Settings**, as show below:

LLDP Dot3 TLVs Settings
Safeguard

From Port

To Port

MAC / PHY Configuration Status

Link Aggregation

Maximum Frame Size

Port	MAC / PHY Configuration Status	Link Aggregation	Maximum Frame Size
1	Disabled	Disabled	Disabled
2	Disabled	Disabled	Disabled
3	Disabled	Disabled	Disabled
4	Disabled	Disabled	Disabled
5	Disabled	Disabled	Disabled
6	Disabled	Disabled	Disabled
7	Disabled	Disabled	Disabled
8	Disabled	Disabled	Disabled
9	Disabled	Disabled	Disabled
10	Disabled	Disabled	Disabled
11	Disabled	Disabled	Disabled
12	Disabled	Disabled	Disabled

Figure 5-96 LLDP Dot3 TLVs Settings window

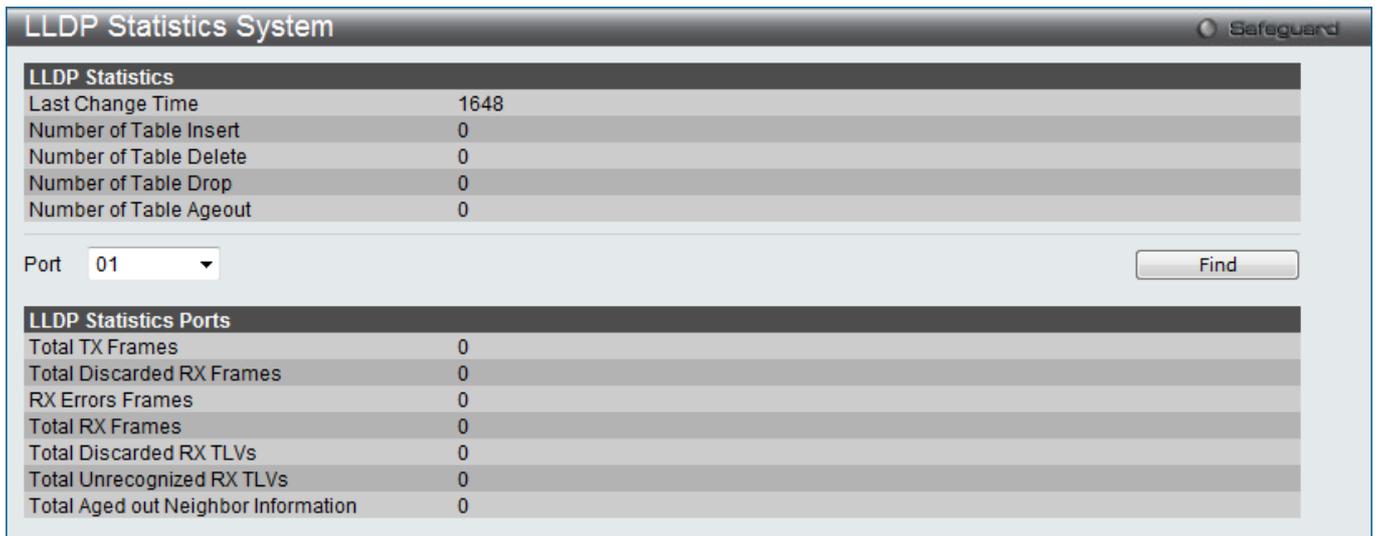
The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select the port range to use for this configuration.
MAC / PHY Configuration Status	This TLV optional data type indicates that the LLDP agent should transmit the MAC/PHY configuration/status TLV. This indicates it is possible for two ends of an IEEE 802.3 link to be configured with different duplex and/or speed settings and still establish some limited network connectivity. More precisely, the information includes whether the port supports the auto-negotiation function, whether the function is enabled, whether it has auto-negotiated advertised capability, and what is the operational MAU type. The default state is Disabled.
Link Aggregation	The Link Aggregation option indicates that LLDP agents should transmit 'Link Aggregation TLV'. This indicates the current link aggregation status of IEEE 802.3 MACs. More precisely, the information should include whether the port is capable of doing link aggregation, whether the port is aggregated in an aggregated link, and what is the aggregated port ID. The default state is Disabled.
Maximum Frame Size	The Maximum Frame Size indicates that LLDP agent should transmit 'Maximum-frame-size TLV'. The default state is Disabled.

Click the **Apply** button to accept the changes made.

LLDP Statistic System

The LLDP Statistics System page allows you an overview of the neighbor detection activity, LLDP Statistics and the settings for individual ports on the Switch. To view the following window, click **L2 Features > LLDP > LLDP > LLDP Statistic System**, as show below:



LLDP Statistics System

LLDP Statistics

Last Change Time	1648
Number of Table Insert	0
Number of Table Delete	0
Number of Table Drop	0
Number of Table Ageout	0

Port: 01

LLDP Statistics Ports

Total TX Frames	0
Total Discarded RX Frames	0
RX Errors Frames	0
Total RX Frames	0
Total Discarded RX TLVs	0
Total Unrecognized RX TLVs	0
Total Aged out Neighbor Information	0

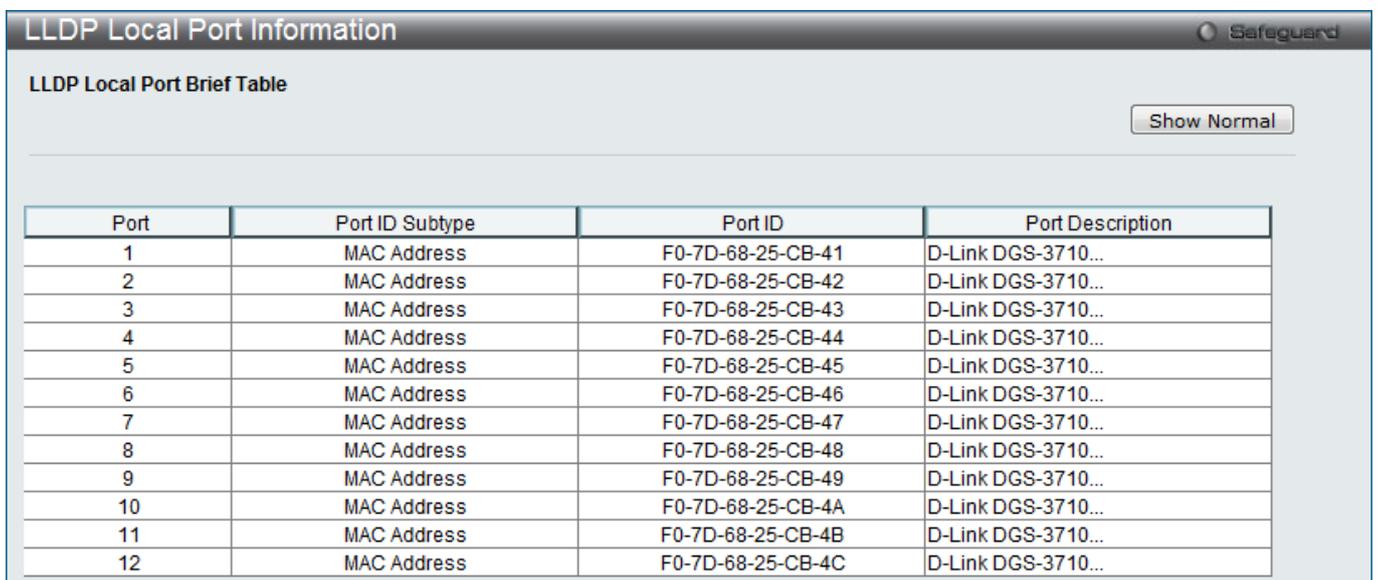
Figure 5-97 LLDP Statistics System window

Select a **Port** number from the drop-down menu and click the **Find** button to view statistics for a certain port.

LLDP Local Port Information

The LLDP Local Port Information page displays the information on a per port basis currently available for populating outbound LLDP advertisements in the local port brief table shown below.

To view the following window, click **L2 Features > LLDP > LLDP > LLDP Local Port Information**, as show below:



LLDP Local Port Information

LLDP Local Port Brief Table

Port	Port ID Subtype	Port ID	Port Description
1	MAC Address	F0-7D-68-25-CB-41	D-Link DGS-3710...
2	MAC Address	F0-7D-68-25-CB-42	D-Link DGS-3710...
3	MAC Address	F0-7D-68-25-CB-43	D-Link DGS-3710...
4	MAC Address	F0-7D-68-25-CB-44	D-Link DGS-3710...
5	MAC Address	F0-7D-68-25-CB-45	D-Link DGS-3710...
6	MAC Address	F0-7D-68-25-CB-46	D-Link DGS-3710...
7	MAC Address	F0-7D-68-25-CB-47	D-Link DGS-3710...
8	MAC Address	F0-7D-68-25-CB-48	D-Link DGS-3710...
9	MAC Address	F0-7D-68-25-CB-49	D-Link DGS-3710...
10	MAC Address	F0-7D-68-25-CB-4A	D-Link DGS-3710...
11	MAC Address	F0-7D-68-25-CB-4B	D-Link DGS-3710...
12	MAC Address	F0-7D-68-25-CB-4C	D-Link DGS-3710...

Figure 5-98 LLDP Local Port Information window

To view the normal LLDP Local Port information page per port, click the **Show Normal** button.

To view the brief LLDP Local Port information page per port, click the **Show Brief** button.

The screenshot shows the 'LLDP Local Port Information' window with the 'LLDP Local Port Normal Table' section. A dropdown menu for 'Port' is set to '01'. There are 'Find' and 'Show Brief' buttons. Below is a table of LLDP Normal Ports with various attributes and 'Show Detail' hyperlinks.

LLDP Normal Ports	
Port ID Subtype	MAC Address
Port ID	F0-7D-68-25-CB-41
Port Description	D-Link DGS-3710-12C R1.00.029 Port 1 on Unit 1
Port PVID	1
Management Address Count	Show Detail
PPVID Entries	Show Detail
VLAN Entries	Show Detail
Protocol Identity Entries Count	Show Detail
MAC / PHY Configuration/Status	Show Detail
Link Aggregation	Show Detail
Maximum Frame Size	1536

Figure 5-99 LLDP Local Port Information – Show Normal window

Select a **Port** number and click the **Find** button to locate a specific entry.

To view more details about, for example, the **Management Address Count**, click the [Show Detail](#) hyperlink.

The screenshot shows the 'LLDP Local Port Information' window with the 'LLDP Local Management Address Detail Table' section. A '<<Back' button is visible. Below is a table showing the details of the management address for port 1.

LLDP Local Management Address Detail Table				
Total Entries: 1				
Port	Subtype	Address	IF Type	OID
1	IPv4	10.90.90.90	IfIndex	1.3.6.1.4.1.171.10.1...

Figure 5-100 LLDP Local Port Information – Show Detail window

Click the **<<Back** button to return to the previous page.

LLDP Remote Port Information

This page displays port information learned from the neighbors. The switch receives packets from a remote station but is able to store the information as local.

To view the following window, click **L2 Features > LLDP > LLDP > LLDP Remote Port Information**, as show below:

The screenshot shows the 'LLDP Remote Port Information' window with the 'LLDP Remote Port Brief Table' section. A dropdown menu for 'Port' is set to '01'. There are 'Find' and 'Show Normal' buttons. Below is a table showing the total entries and a header for the remote port information table.

LLDP Remote Port Brief Table							
Total Entries: 0							
Entity	Chassis ID	Subtype	Chassis ID	Port ID	Subtype	Port ID	Port Description

Figure 5-101 LLDP Remote Port Information window

Select a **Port** number from the drop-down menu and click the **Find** button to view statistics for a certain port. To view the normal LLDP Remote Port information page per port, click the **Show Normal** button.

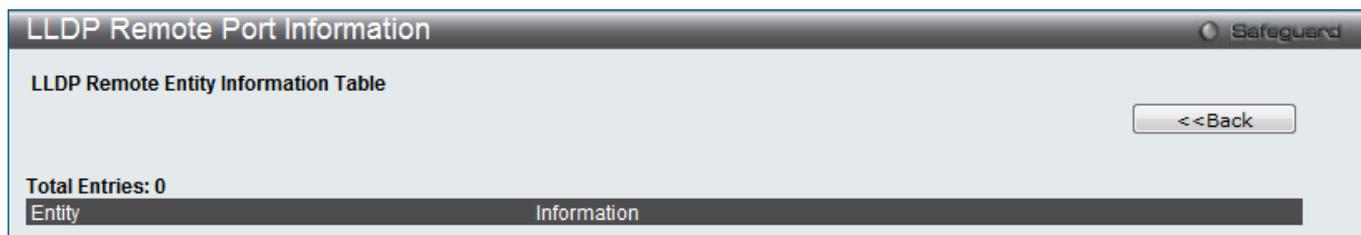


Figure 5-102 LLDP Remote Port Information – Show Normal window

Click the **<<Back** button to return to the previous page.

LLDP-MED

LLDP-MED System Settings

This window is used to configure the LLDP-MED log state and the fast start repeat count, and display the LLDP-MED system information.

To view the following window, click **L2 Features > LLDP > LLDP-MED > LLDP-MED System Settings**, as show below:

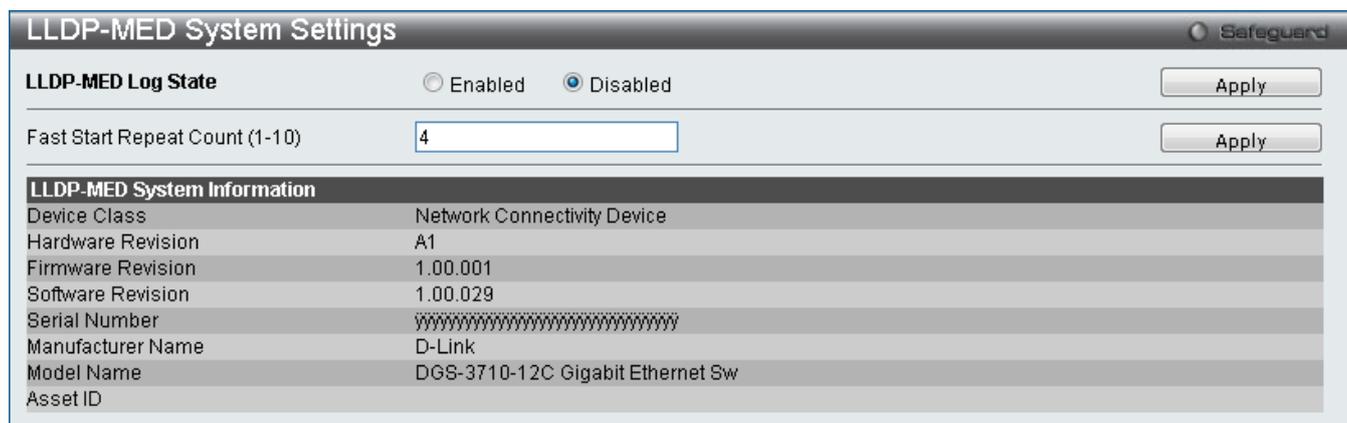


Figure 5-103 LLDP-MED System Settings window

The fields that can be configured are described below:

Parameter	Description
LLDP-MED Log State	Click the radio buttons to enable or disable the log state of LLDP-MED events.
Fast Start Repeat Count (1-10)	Enter a value between 1 and 10 for the fast start repeat count. When an LLDP-MED Capabilities TLV is detected for an MSAP identifier not associated with an existing LLDP remote system MIB, then the application layer shall start the fast start mechanism and set the 'medFastStart' timer to 'medFastStartRepeatCount' times 1. The default value is 4.

Click the **Apply** button to accept the changes made for each individual section.

LLDP-MED Port Settings

This window is used to enable or disable transmitting LLDP-MED TLVs.

To view the following window, click **L2 Features > LLDP > LLDP-MED > LLDP-MED Port Settings**, as show below:

Port	NTCS	Capabilities	Network Policy	Inventory
1	Disabled	Disabled	Disabled	Disabled
2	Disabled	Disabled	Disabled	Disabled
3	Disabled	Disabled	Disabled	Disabled
4	Disabled	Disabled	Disabled	Disabled
5	Disabled	Disabled	Disabled	Disabled
6	Disabled	Disabled	Disabled	Disabled
7	Disabled	Disabled	Disabled	Disabled
8	Disabled	Disabled	Disabled	Disabled
9	Disabled	Disabled	Disabled	Disabled
10	Disabled	Disabled	Disabled	Disabled
11	Disabled	Disabled	Disabled	Disabled

Figure 5-104 LLDP-MED Port Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select the port range to use for this configuration.
NTCS	Use the drop-down menu to enable or disable Notification Topology Change Status.
State	Use the drop-down menu to enable or disable transmit LLDP-MED TLVs, and tick the check boxes of the TLV types that the LLDP agent should transmit. TLV types are Capabilities , Network Policy , and Inventory . Tick the All check box to select all TLV types.

Click the **Apply** button to accept the changes made.

LLDP-MED Local Port Information

This window displays the per-port information currently available for populating outbound LLDP-MED advertisements.

To view the following window, click **L2 Features > LLDP > LLDP-MED > LLDP-MED Local Port Information**, as show below:



Figure 5-105 LLDP-MED Local Port Information window

Select a **Port** number from the drop-down menu and click the **Find** button to view statistics for a certain port.

LLDP-MED Remote Port Information

This window displays the information learned from the neighbor parameters.

To view the following window, click **L2 Features > LLDP > LLDP-MED > LLDP-MED Remote Port Information**, as show below:



Figure 5-106 LLDP-MED Remote Port Information window

Select a **Port** number from the drop-down menu and click the **Find** button to view statistics for a certain port.

To view the normal LLDP Remote Port information page per port, click the **Show Normal** button.



Figure 5-107 LLDP-MED Remote Port Information – Show Normal window

Click the **<<Back** button to return to the previous page.

Chapter 6 L3 Features

IPv4 Static/Default Route Settings

IPv4 Route Table

IPv6 Static/Default Route Settings

IPv6 Route Table

IP Forwarding Table

IPv4 Static/Default Route Settings

The Switch supports static routing for IPv4 formatted addressing. Users can create up to 256 static route entries for IPv4. For IPv4 static routes, once a static route has been set, the Switch will send an ARP request packet to the next hop router that has been set by the user. Once an ARP response has been retrieved by the switch from that next hop, the route becomes enabled. However, if the ARP entry already exists, an ARP request will not be sent.

The Switch also supports a floating static route, which means that the user may create an alternative static route to a different next hop. This secondary next hop device route is considered as a backup static route for when the primary static route is down. If the primary route is lost, the backup route will uplink and its status will become Active.

Entries into the Switch's forwarding table can be made using both an IP address subnet mask and a gateway.

To view the following window, click **L3 Features > IPv4 Static/Default Route Settings**, as show below:

Figure 6-1 IPv4 Static/Default Route Settings window

The fields that can be configured are described below:

Parameter	Description
IP Address	This field allows the entry of an IPv4 address to be assigned to the Static route. Tick the Default check box to be assigned to the default route.
Netmask	This field allows the entry of a subnet mask to be applied to the corresponding subnet mask of the IP address.
Gateway	This field allows the entry of a Gateway IP Address to be applied to the corresponding gateway of the IP address.

Metric (1-65535)	Represents the metric value of the IP interface entered into the table. This field may read a number between 1 and 65535.
Backup State	Each IP address can only have one primary route, while other routes should be assigned to the backup state. When the primary route failed, switch will try the backup routes according to the order learnt by the routing table until route success. The field represents the Backup state that the Static and Default Route is configured for.

Click the **Apply** button to accept the changes made.

IPv4 Route Table

The IP routing table stores all the external routes information of the switch. This window displays all the external route information on the Switch.

To view the following window, click **L3 Features > IPv4 Route Table**, as show below:

IP Address	Netmask	Gateway	Interface	Cost	Protocol
192.168.69.0	255.255.255.0	0.0.0.0	System	1	Local

Figure 6-2 IPv4 Route Table window

The fields that can be configured are described below:

Parameter	Description
Network Address	Enter the destination network address of the route want to be displayed.
IP Address	Enter the destination IP address of the route want to be displayed. The longest prefix matched route will be displayed.

Click the **Find** button to locate a specific entry based on the information entered.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

IPv6 Static/Default Route Settings

A static entry of an IPv6 address can be entered into the Switch's routing table for IPv6 formatted addresses.

To view the following window, click **L3 Features > IPv6 Static/Default Route Settings**, as show below:

Figure 6-3 IPv6 Static/Default Route Settings window

The fields that can be configured are described below:

Parameter	Description
IPv6 Address/Prefix Length	Enter the destination network for the route, or tick the Default check box to be assigned to the default route.
Interface Name	The IP Interface where the static IPv6 route is created.
Nexthop Address	The corresponding IPv6 address for the next hop Gateway address in IPv6 format.
Metric (1-65535)	The metric of the IPv6 interface entered into the table representing the number of routers between the Switch and the IPv6 address above. Metric values allowed are between 1 and 65535.
Backup State	Each IPv6 address can only have one primary route, while other routes should be assigned to the backup state. When the primary route failed, the switch will try the backup routes according to the order learnt by the routing table until route success. This field represents the backup state for the IPv6 configured. This field may be Primary or Backup.

Click the **Apply** button to accept the changes made.

Click the **Delete All** button to remove all the entries listed.

IPv6 Route Table

This window is used to locate an IPv6 route entry.

To view the following window, click **L3 Features > IPv6 Route Table**, as show below:

Figure 6-4 IPv6 Route Table window

The fields that can be configured are described below:

Parameter	Description
Network Address	Specifies the destination network for the route.

Click the **Find** button to locate a specific entry based on the information entered.

IP Forwarding Table

The IP forwarding table stores all the direct connected IP information. On this page the user can view all the direct connected IP information.

To view the following window, click **L3 Features > IP Forwarding Table**, as show below:

IP Forwarding Table Safeguard

IP Address Find

Total Entries: 1

Interface	IP Address	Port	Learned
System	192.168.69.66	1	Dynamic

1/1 1 Go

Figure 6-5 IP Forwarding Table

Enter the **IP Address** used and click the **Find** button to locate a specific entry based on the information entered.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

Chapter 7 QoS

802.1p Settings

Bandwidth Control

Traffic Control Settings

DSCP

HOL Blocking Prevention

Scheduling Settings

Management Packet Priority Settings

SRED

The Switch supports 802.1p priority queuing Quality of Service. The following section discusses the implementation of QoS (Quality of Service) and benefits of using 802.1p priority queuing.

Advantages of QoS

QoS is an implementation of the IEEE 802.1p standard that allows network administrators a method of reserving bandwidth for important functions that require a large bandwidth or have a high priority, such as VoIP (voice-over Internet Protocol), web browsing applications, file server applications or video conferencing. Not only can a larger bandwidth be created, but other less critical traffic can be limited, so excessive bandwidth can be saved. The Switch has separate hardware queues on every physical port to which packets from various applications can be mapped to, and, in turn prioritized. View the following map to see how the Switch implements basic 802.1P priority queuing.

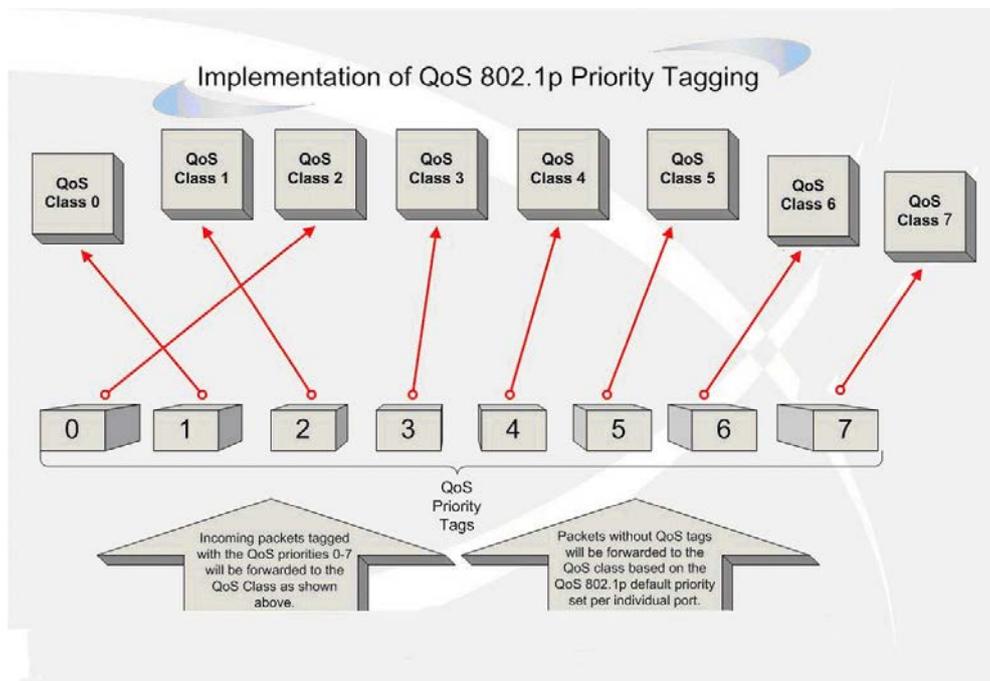


Figure 7-1 Mapping QoS on the Switch

The picture above shows the default priority setting for the Switch. Class-7 has the highest priority of the eight priority classes of service on the Switch. In order to implement QoS, the user is required to instruct the Switch to examine the header of a packet to see if it has the proper identifying tag. Then the user may forward these tagged packets to designated classes of service on the Switch where they will be emptied, based on priority.

For example, let's say a user wishes to have a video conference between two remotely set computers. The administrator can add priority tags to the video packets being sent out, utilizing the Access Profile commands. Then, on the receiving end, the administrator instructs the Switch to examine packets for this tag, acquires the tagged packets and maps them to a class queue on the Switch. Then in turn, the administrator will set a priority for this queue so that will be emptied before any other packet is forwarded. This result in the end user receiving all packets sent as quickly as possible, thus prioritizing the queue and allowing for an uninterrupted stream of packets, which optimizes the use of bandwidth available for the video conference.

Understanding QoS

The Switch supports 802.1p priority queuing. The Switch has eight priority queues. These priority queues are numbered from 7 (Class 7) — the highest priority queue — to 0 (Class 0) — the lowest priority queue. The eight priority tags specified in IEEE 802.1p (p0 to p7) are mapped to the Switch's priority queues as follows:

- Priority 0 is assigned to the Switch's Q2 queue.
- Priority 1 is assigned to the Switch's Q0 queue.
- Priority 2 is assigned to the Switch's Q1 queue.
- Priority 3 is assigned to the Switch's Q3 queue.
- Priority 4 is assigned to the Switch's Q4 queue.
- Priority 5 is assigned to the Switch's Q5 queue.
- Priority 6 is assigned to the Switch's Q6 queue.
- Priority 7 is assigned to the Switch's Q7 queue.

For strict priority-based scheduling, any packets residing in the higher priority classes of service are transmitted first. Multiple strict priority classes of service are emptied based on their priority tags. Only when these classes are empty, are packets of lower priority transmitted.

For weighted round-robin queuing, the number of packets sent from each priority queue depends upon the assigned weight. For a configuration of eight CoS queues, A~H with their respective weight value: 8~1, the packets are sent in the following sequence: A1, B1, C1, D1, E1, F1, G1, H1, A2, B2, C2, D2, E2, F2, G2, A3, B3, C3, D3, E3, F3, A4, B4, C4, D4, E4, A5, B5, C5, D5, A6, B6, C6, A7, B7, A8, A1, B1, C1, D1, E1, F1, G1, H1.

For weighted round-robin queuing, if each CoS queue has the same weight value, then each CoS queue has an equal opportunity to send packets just like round-robin queuing.

Remember that the Switch has eight configurable priority queues (and eight Classes of Service) for each port on the Switch.

802.1p Settings

802.1p Default Priority Settings

The Switch allows the assignment of a default 802.1p priority to each port on the Switch. This page allows the user to assign a default 802.1p priority to any given port on the switch that will insert the 802.1p priority tag to untagged packets received. The priority and effective priority tags are numbered from 0, the lowest priority, to 7, the highest priority. The effective priority indicates the actual priority assigned by RADIUS. If the RADIUS assigned value exceeds the specified limit, the value will be set at the default priority. For example, if the RADIUS assigns a limit of 8 and the default priority is 0, the effective priority will be 0.

To view the following window, click **QoS > 802.1p Settings > 802.1p Default Priority Settings**, as show below:

802.1p Default Priority Settings

From Port: 01 To Port: 01 Priority: 0 Apply

802.1p Default Priority Table

Port	Priority	Effective Priority
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0

Figure 7-2 802.1p Default Priority Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select the starting and ending ports to use.
Priority	Use the drop-down menu to select a value from 0 to 7.

Click the **Apply** button to accept the changes made.

802.1p User Priority Settings

The Switch allows the assignment of a class of service to each of the 802.1p priorities.

To view the following window, click **QoS > 802.1p Settings > 802.1p User Priority Settings**, as show below:

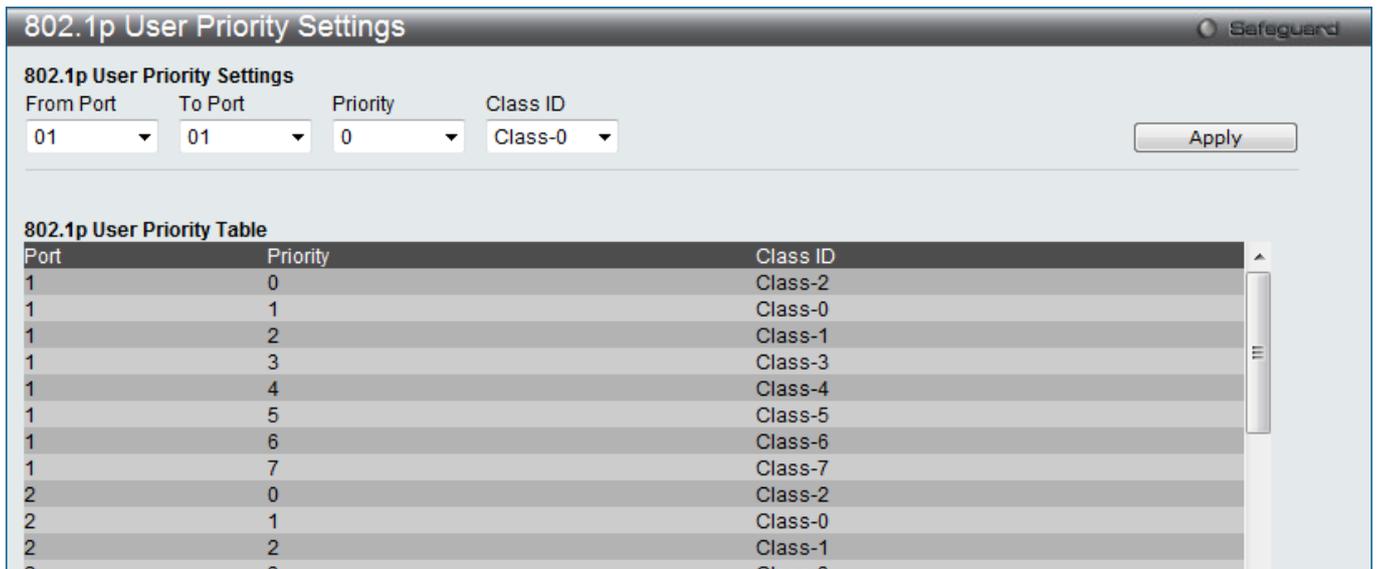


Figure 7-3 802.1p User Priority Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select the starting and ending ports to use.
Priority	Use the drop-down menu to select a value from 0 to 7.
Class ID	Specifies the 8 hardware priority queues that will be applied. The eight hardware priority queues are identified by a number from 0 to 7 with the 0 queue being the lowest priority.

Click the **Apply** button to accept the changes made.

802.1p Map Settings

On this page, the user can view and configure the 802.1p map settings.

To view the following window, click **QoS > 802.1p Settings > 802.1p Map Settings**, as show below:

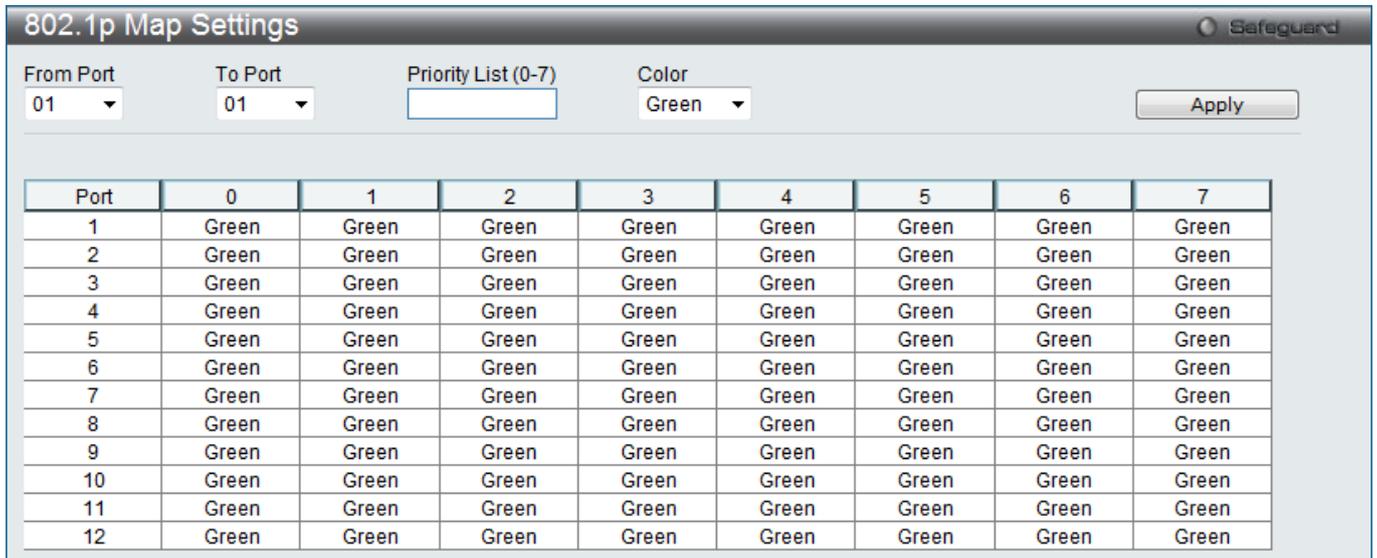


Figure 7-4 802.1p Map Settings Window

The fields that can be configured are described below:

Parameter	Description
From Port ~ To Port	Specifies the range of ports to be configured.
Priority List	Enter the priority list value used here.
Color	Select the appropriate color configuration that will be applied to the specified priority list

Click the **Apply** button to accept the changes made.

Bandwidth Control

The bandwidth control settings are used to place a ceiling on the transmitting and receiving data rates for any selected port.

Bandwidth Control Settings

The Effective RX/TX Rate refers to the actual bandwidth of the switch port, if it does not match the configured rate. This usually means that the bandwidth has been assigned by a higher priority resource, such as a RADIUS server.

To view the following window, click **QoS > Bandwidth Control > Bandwidth Control Settings**, as show below:

Bandwidth Control Settings Safeguard

From Port: 01 To Port: 01 Type: RX No Limit: Disabled Rate (64-1024000): Kbit/sec Apply

Port	RX Rate (Kbit/sec)	TX Rate (Kbit/sec)	Effective RX (Kbit/sec)	Effective TX (Kbit/sec)
1	No Limit	No Limit	No Limit	No Limit
2	No Limit	No Limit	No Limit	No Limit
3	No Limit	No Limit	No Limit	No Limit
4	No Limit	No Limit	No Limit	No Limit
5	No Limit	No Limit	No Limit	No Limit
A6	No Limit	No Limit	No Limit	No Limit
A7	No Limit	No Limit	No Limit	No Limit
8	No Limit	No Limit	No Limit	No Limit
9	No Limit	No Limit	No Limit	No Limit
10	No Limit	No Limit	No Limit	No Limit
11	No Limit	No Limit	No Limit	No Limit
12	No Limit	No Limit	No Limit	No Limit

The Effective RX/TX Rate refers to the actual bandwidth of the switch port, if it does not match the configured rate. This usually means that the bandwidth has been assigned by a higher priority resource, such as a RADIUS server.

Figure 7-5 Bandwidth Control Settings window

The fields that can be configured or displayed are described below:

Parameter	Description
From Port / To Port	Use the drop-down menu to select the port range to use for this configuration.
Type	This drop-down menu allows a selection between <i>RX</i> (receive), <i>TX</i> (transmit), and <i>Both</i> . This setting will determine whether the bandwidth ceiling is applied to receiving, transmitting, or both receiving and transmitting packets.
No Limit	This drop-down menu allows the user to specify that the selected port will have no bandwidth limit or not. NOTE: If the configured number is larger than the port speed, it means no bandwidth limit.
Rate (64-1024000)	This field allows the input of the data rate that will be the limit for the selected port. The user may choose a rate between 64 and 1024000 Kbits per second.
Effective RX	If a RADIUS server has assigned the RX bandwidth, then it will be the effective RX bandwidth. The authentication with the RADIUS sever can be per port or per user. For per user authentication, there may be multiple RX bandwidths assigned if there are multiple users attached to this specific port. The final RX bandwidth will be the largest one among these multiple RX bandwidths.
Effective TX	If a RADIUS server has assigned the TX bandwidth, then it will be the effective TX bandwidth. The authentication with the RADIUS sever can be per port or per user. For per user authentication, there may be multiple TX bandwidths assigned if there are multiple users attached to this specific port. The final TX bandwidth will be the largest one among these multiple TX bandwidths.

Click the **Apply** button to accept the changes made.

Queue Bandwidth Control Settings

To view the following window, click **QoS > Bandwidth Control > Queue Bandwidth Control Settings**, as show below:

Queue Bandwidth Control Settings
Safeguard

From Port	To Port	From Queue	To Queue	Min Rate (64-1024000)	Max Rate (64-1024000)
01	01	0	0	<input type="text"/> <input checked="" type="checkbox"/> No Limit	<input type="text"/> <input checked="" type="checkbox"/> No Limit

Queue Bandwidth Control Table On Port 1		
Queue	Min Rate (Kbit/sec)	Max Rate (Kbit/sec)
0	No Limit	No Limit
1	No Limit	No Limit
2	No Limit	No Limit
3	No Limit	No Limit
4	No Limit	No Limit
5	No Limit	No Limit
6	No Limit	No Limit
7	No Limit	No Limit

Queue Bandwidth Control Table On Port 2		
Queue	Min Rate (Kbit/sec)	Max Rate (Kbit/sec)
0	No Limit	No Limit
1	No Limit	No Limit
2	No Limit	No Limit
3	No Limit	No Limit
4	No Limit	No Limit
5	No Limit	No Limit
6	No Limit	No Limit
7	No Limit	No Limit

Figure 7-6 Queue Bandwidth Control Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Use the drop-down menu to select the port range to use for this configuration.
From Queue / To Queue	Use the drop-down menu to select the queue range to use for this configuration.
Min Rate (64-1024000)	Specify the minimum packet limit, in Kbps that the ports are allowed to receive. Tick the No limit check box to have unlimited rate of packets received by the specified queue.
Max Rate (64-1024000)	Specify the maximum packet limit, in Kbps that the ports are allowed to receive. Tick the No limit check box to have unlimited rate of packets received by the specified queue.

Click the **Apply** button to accept the changes made.



NOTE: The minimum granularity of queue bandwidth control is 64.

Traffic Control Settings

On a computer network, packets such as Multicast packets and Broadcast packets continually flood the network as normal procedure. At times, this traffic may increase due to a malicious end station on the network or a malfunctioning device, such as a faulty network card. Thus, switch throughput problems will arise and consequently affect the overall performance of the switch network. To help rectify this packet storm, the Switch will monitor and control the situation.

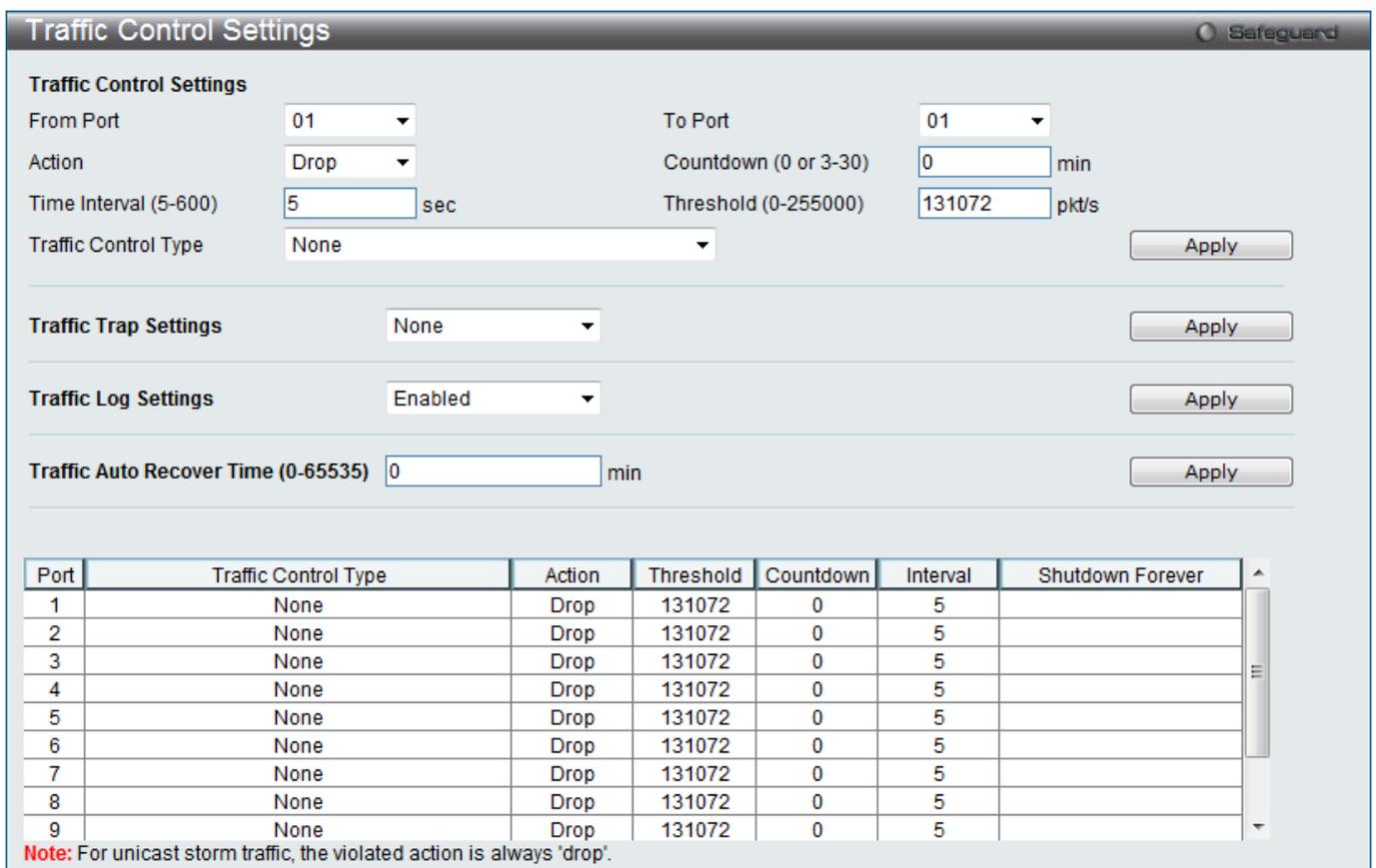
Packet storms are monitored to determine if too many packets are flooding the network based on threshold levels provided by the user. Once a packet storm has been detected, the Switch will drop packets coming into the Switch until the storm has subsided. This method can be utilized by selecting the *Drop* option of the Action parameter in the window below.

The Switch will also scan and monitor packets coming into the Switch by monitoring the Switch's chip counter. This method is only viable for Broadcast and Multicast storms because the chip only has counters for these two types of packets. Once a storm has been detected (that is, once the packet threshold set below has been exceeded), the Switch will shut down the port to all incoming traffic, with the exception of STP BPDU packets, for a time period specified using the Count Down parameter.

If a Time Interval parameter times-out for a port configured for traffic control and a packet storm continues, that port will be placed in Shutdown Forever mode, which will cause a warning message to be sent to the Trap Receiver. Once in Shutdown Forever mode, the method of recovering the port is to manually recoup it using the **System Configuration > Port configuration > Port Settings** window. Select the disabled port and return its State to *Enabled* status. To utilize this method of Storm Control, choose the *Shutdown* option of the Action parameter in the window below.

Use this window to enable or disable storm control and adjust the threshold for multicast and broadcast storms.

To view the following window, click **QoS > Traffic Control Settings**, as show below:



Port	Traffic Control Type	Action	Threshold	Countdown	Interval	Shutdown Forever
1	None	Drop	131072	0	5	
2	None	Drop	131072	0	5	
3	None	Drop	131072	0	5	
4	None	Drop	131072	0	5	
5	None	Drop	131072	0	5	
6	None	Drop	131072	0	5	
7	None	Drop	131072	0	5	
8	None	Drop	131072	0	5	
9	None	Drop	131072	0	5	

Note: For unicast storm traffic, the violated action is always 'drop'.

Figure 7-7 Traffic Control Settings window

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

From Port / To Port	Use the drop-down menu to select the port range to use for this configuration.
Action	<p>Select the method of traffic control from the drop-down menu. The choices are:</p> <p><i>Drop</i> – Utilizes the hardware Traffic Control mechanism, which means the Switch's hardware will determine the Packet Storm based on the Threshold value stated and drop packets until the issue is resolved.</p> <p><i>Shutdown</i> – Utilizes the Switch's software Traffic Control mechanism to determine the Packet Storm occurring. Once detected, the port will deny all incoming traffic to the port except STP BPDU packets, which are essential in keeping the Spanning Tree operational on the Switch. If the Count Down timer has expired and yet the Packet Storm continues, the port will be placed in Shutdown Forever mode is no longer operational until the port automatically recovers. After the auto recover time has expired or the user manually resets the port using the Port Settings window (System Configuration > Port Configuration > Port Settings). Choosing this option obligates the user to configure the Time Interval setting as well, which will provide packet count samplings from the Switch's chip to determine if a Packet Storm is occurring.</p>
Countdown (0 or 3-30)	The Count Down timer is set to determine the amount of time, in minutes, that the Switch will wait before shutting down the port that is experiencing a traffic storm. This parameter is only useful for ports configured as <i>Shutdown</i> in their Action field and therefore will not operate for hardware-based Traffic Control implementations. The possible time settings for this field are 0 and 3 to 30 minutes.
Time Interval (5-600)	The Time Interval will set the time between Multicast and Broadcast packet counts sent from the Switch's chip to the Traffic Control function. These packet counts are the determining factor in deciding when incoming packets exceed the Threshold value. The Time Interval may be set between 5 and 600 seconds, with a default setting of 5 seconds.
Threshold (0-255000)	Specifies the maximum number of packets per second that will trigger the Traffic Control function to commence. The configurable threshold range is from 0-255000 with a default setting of 131072 packets per second.
Traffic Control Type	Specifies the desired Storm Control Type: <i>None, Broadcast, Multicast, Unknown Unicast, Broadcast + Multicast, Broadcast + Unknown Unicast, Multicast + Unknown Unicast, and Broadcast + Multicast + Unknown Unicast.</i>
Traffic Trap Settings	<p>Enable sending of Storm Trap messages when the type of action taken by the Traffic Control function in handling a Traffic Storm is one of the following:</p> <p><i>None</i> – Will send no Storm trap warning messages regardless of action taken by the Traffic Control mechanism.</p> <p><i>Storm Occurred</i> – Will send Storm Trap warning messages upon the occurrence of a Traffic Storm only.</p> <p><i>Storm Cleared</i> – Will send Storm Trap messages when a Traffic Storm has been cleared by the Switch only.</p> <p><i>Both</i> – Will send Storm Trap messages when a Traffic Storm has been both detected and cleared by the Switch.</p> <p>This function cannot be implemented in the hardware mode. (When <i>Drop</i> is chosen for the Action parameter)</p>

Traffic Log Settings	<p>This option is used to configure the traffic control log state. When the log state is enabled, traffic control states are logged when a storm occurs and when a storm is cleared. If the log state is disabled, traffic control events are not logged.</p> <p>The log state is only applicable for shutdown mode. Since shutdown mode only support broadcast and multicast storm control, doesn't support unicast storm control. The log only generate for broadcast and multicast storm control.</p>
Traffic Auto Recover Time	<p>This option is used to configure the traffic auto recover time that allowed for a port to recover from shutdown forever status. The time allowed for auto recovery from shutdown for a port. The default value is 0, so no auto recovery is possible; the port remains in shutdown forever mode.</p>

Click the **Apply** button to accept the changes made for each individual section.



NOTE: Traffic Control cannot be implemented on ports that are set for Link Aggregation (Port Trunking).



NOTE: Ports that are in the Shutdown Forever mode will be seen as Discarding in Spanning Tree windows and implementations though these ports will still be forwarding BPDUs to the Switch's CPU.



NOTE: Ports that are in Shutdown Forever mode will be seen as link down in all windows and screens until the user recovers these ports.



NOTE: The minimum granularity of storm control on a GE port is 1pps.

DSCP

DSCP Trust Settings

This page is to configure the DSCP trust state of ports. When ports are under the DSCP trust mode, the switch will insert the priority tag to untagged packets by using the DSCP Map settings instead of the default port priority.

To view the following window, click **QoS > DSCP > DSCP Trust Settings**, as shown below:

DSCP Trust Settings
Safeguard

From Port

To Port

State

Port	DSCP Trust
1	Disabled
2	Disabled
3	Disabled
4	Disabled
5	Disabled
6	Disabled
7	Disabled
8	Disabled
9	Disabled
10	Disabled
11	Disabled
12	Disabled

Figure 7-8 DSCP Trust Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Here the user can select a range of port to configure.
State	Enable or disable to trust DSCP. By default, DSCP trust is disabled.

Click the **Apply** button to accept the changes made.

DSCP Map Settings

The mapping of DSCP to queue will be used to determine the priority of the packet (which will be then used to determine the scheduling queue) when the port is in DSCP trust state.

The DSCP-to-DSCP mapping is used in the swap of DSCP of the packet when the packet is ingresses to the port. The remaining processing of the packet will base on the new DSCP. By default, the DSCP is mapped to the same DSCP.

To view the following window, click **QoS > DSCP > DSCP Map Settings**, as show below:

Port	0	1	2	3	4	5	6	7
1	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63
2	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63
3	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63
4	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63
5	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63
6	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63
7	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63
8	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63
9	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63
10	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63
11	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63
12	0-7	8-15	16-23	24-31	32-39	40-47	48-55	56-63

Figure 7-9 DSCP Map Settings - DSCP Priority window

To view the following window, click **QoS > DSCP > DSCP Map Settings** and select **DSCP DSCP** from the DSCP Map drop-down menu, as show below:

Port 1	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	10	11	12	13	14	15	16	17	18	19
2	20	21	22	23	24	25	26	27	28	29
3	30	31	32	33	34	35	36	37	38	39
4	40	41	42	43	44	45	46	47	48	49
5	50	51	52	53	54	55	56	57	58	59
6	60	61	62	63						

Figure 7-10 DSCP Map Settings - DSCP DSCP window

To view the following window, click **QoS > DSCP > DSCP Map Settings** and select **DSCP Color** from the DSCP Map drop-down menu, as show below:

Port	Green	Red	Yellow
1	0-63		
2	0-63		
3	0-63		
4	0-63		
5	0-63		
6	0-63		
7	0-63		
8	0-63		
9	0-63		
10	0-63		
11	0-63		
12	0-63		

Figure 7-11 DSCP Map Settings - DSCP Color window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Use the drop-down menu to select a range of port to configure.
DSCP Map	Use the drop-down menu to select one of two options: <i>DSCP Priority</i> – Specify a list of DSCP values to be mapped to a specific priority. <i>DSCP DSCP</i> – Specify a list of DSCP value to be mapped to a specific DSCP.
DSCP List (0-63)	Enter a DSCP List value.
Priority	Use the drop-down menu to select a Priority value. This appears when selecting <i>DSCP Priority</i> in the DSCP Map drop-down menu.
DSCP (0-63)	Enter a DSCP value. This appears when selecting <i>DSCP DSCP</i> in the DSCP Map drop-down menu.
Color	Select the DSCP color used here.
Port	Use the drop-down menu to select a port.

Click the **Apply** button to accept the changes made.

Click the **Find** button to locate a specific entry based on the information entered.

HOL Blocking Prevention

HOL (Head of Line) Blocking happens when one of the destination ports of a broadcast or multicast packet are busy. The switch will hold this packet in the buffer while the other destination port will not transmit the packet even they are not busy.

The HOL Blocking Prevention will ignore the busy port and forward the packet directly to have lower latency and better performance.

On this page the user can enable or disable HOL Blocking Prevention.

To view the following window, click **QoS > HOL Blocking Prevention**, as show below:

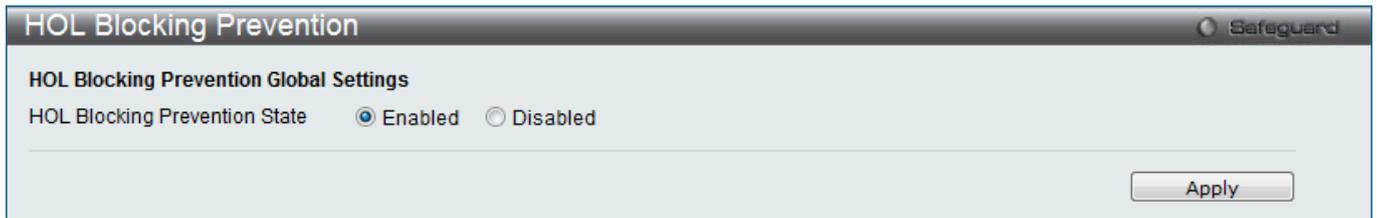


Figure 7-12 HOL blocking Prevention window

The fields that can be configured are described below:

Parameter	Description
HOL Blocking Prevention State	Click the radio buttons to enable or disable the HOL blocking prevention global settings.

Click the **Apply** button to accept the changes made.

Scheduling Settings

QoS Scheduling

This page is used to configure the traffic scheduling mechanism for each CoS queue.

To view this window, click **QoS > Scheduling Settings > QoS Scheduling** as shown below:

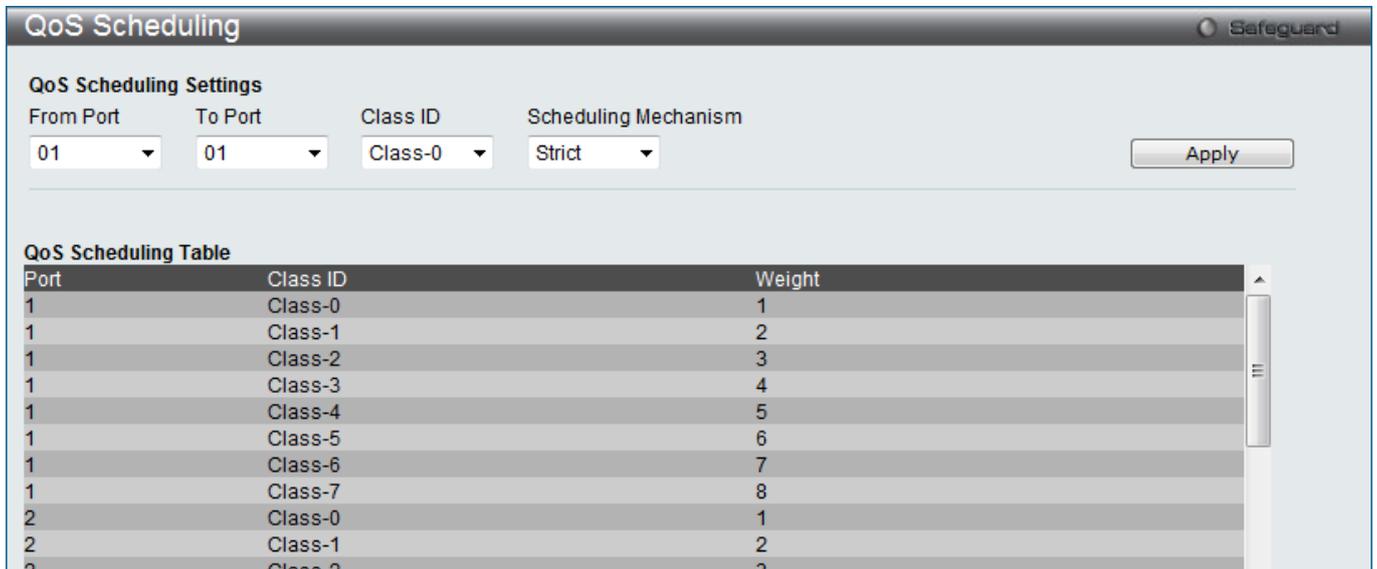


Figure 7-13 QoS Scheduling window

The following parameters can be configured:

Parameter	Description
From Port ~ To Port	Specifies the range of ports to be configured.

Class ID	Select any one of the 8 hardware priority queues. The eight hardware priority queues are identified by a number from 0 to 7 with the 0 queue being the lowest priority.
Scheduling Mechanism	<p><i>Strict</i> – The highest class of service is the first to process traffic. That is, the highest class of service will finish before other queues empty.</p> <p><i>Weight</i> – Use the weighted round-robin (<i>WRR</i>) algorithm to handle packets in an even distribution in priority classes of service.</p>

Click the **Apply** button to accept the changes made.

QoS Scheduling Mechanism

On this page the user can configure the scheduling group parameters.

To view this window, click **QoS > Scheduling Settings > QoS Scheduling Mechanism** as shown below:

QoS Scheduling Mechanism Settings		
From Port	To Port	Scheduling Mechanism
01	01	Strict

QoS Scheduling Mechanism Table	
Port	Mode
1	Strict
2	Strict
3	Strict
4	Strict
5	Strict
6	Strict
7	Strict
8	Strict
9	Strict
10	Strict
11	Strict
12	Strict

Figure 7-14 QoS Scheduling Mechanism window

The following parameters can be configured:

Parameter	Description
From Port ~ To Port	Specifies the range of ports to be configured.
Scheduling Mechanism	<p><i>Strict</i> – The highest class of service is the first to process traffic. That is, the highest class of service will finish before other queues empty.</p> <p><i>Weight</i> – Use the weighted round-robin (<i>WRR</i>) algorithm to handle packets in an even distribution in priority classes of service.</p>

Click the **Apply** button to accept the changes made.

Management Packet Priority Settings

This window allows users to set the Management Packet Priority.

To view this window, click **QoS > Management Packet Priority Settings**, as shown below:

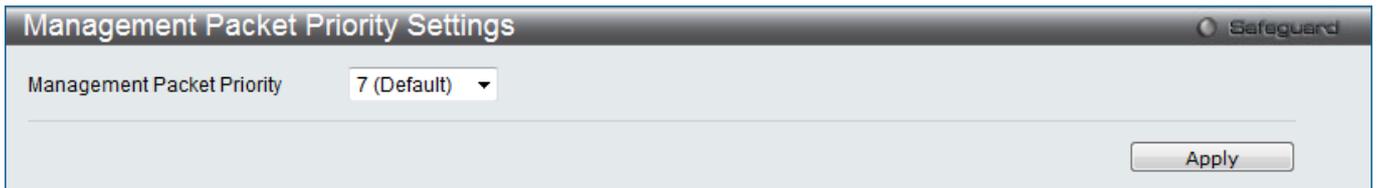


Figure 7-15 Management Packet Priority Settings Window

The following parameters can be configured:

Parameter	Description
Management Packet Priority	Use the drop-down menu to set the Management Packet Priority between 7 (Default) and 0.

Click the **Apply** button to accept the changes made.

SRED

Simple random early detection (sRED) is a simplified RED mechanism based on ASIC capability. Random Early Detection (RED) is a congestion avoidance mechanism at the gateway in packet switched networks. RED gateways keep the average queue size low while allowing occasional bursts of packets in the queue. The switch provides support for sRED through active queue management by probabilistic dropping of incoming colored packets.

Active queue management is a class of algorithms that attempt to proactively drop or mark frames before congestion becomes excessive. The goal is to detect the onset of persistent congestion and take proactive action so that TCP sources contributing to the congestion back off gracefully, insuring good network utilization while minimizing frame loss.

This proactive approach starts discarding specific colored packets before the packet buffer becomes full. If this queue depth is less than the threshold, there is minimal (or no) congestion and the packet is queued. If congestion is detected the packet is dropped or queued based on the DSCP.

SRED Settings

To view this window, click **QoS > SRED > SRED Settings**, as shown below:

SRED Settings
Safeguard

SRED Global Settings

 Enabled
 Disabled

Apply

From Port To Port Class ID

Drop Green
Threshold Low (0-100)
Threshold High (0-100)
Drop Rate Low
Drop Rate High

01 01 0

All
Disabled
60
80
1
1

Apply

Port	Class	Drop Green	Threshold Low	Threshold High	Drop Rate Low	Drop Rate High
1	0	Disabled	60	80	1	1
1	1	Disabled	60	80	1	1
1	2	Disabled	60	80	1	1
1	3	Disabled	60	80	1	1
1	4	Disabled	60	80	1	1
1	5	Disabled	60	80	1	1
1	6	Disabled	60	80	1	1
1	7	Disabled	60	80	1	1
2	0	Disabled	60	80	1	1
2	1	Disabled	60	80	1	1
2	2	Disabled	60	80	1	1
2	3	Disabled	60	80	1	1

Figure 7-16 SRED Settings Window

The following parameters can be configured:

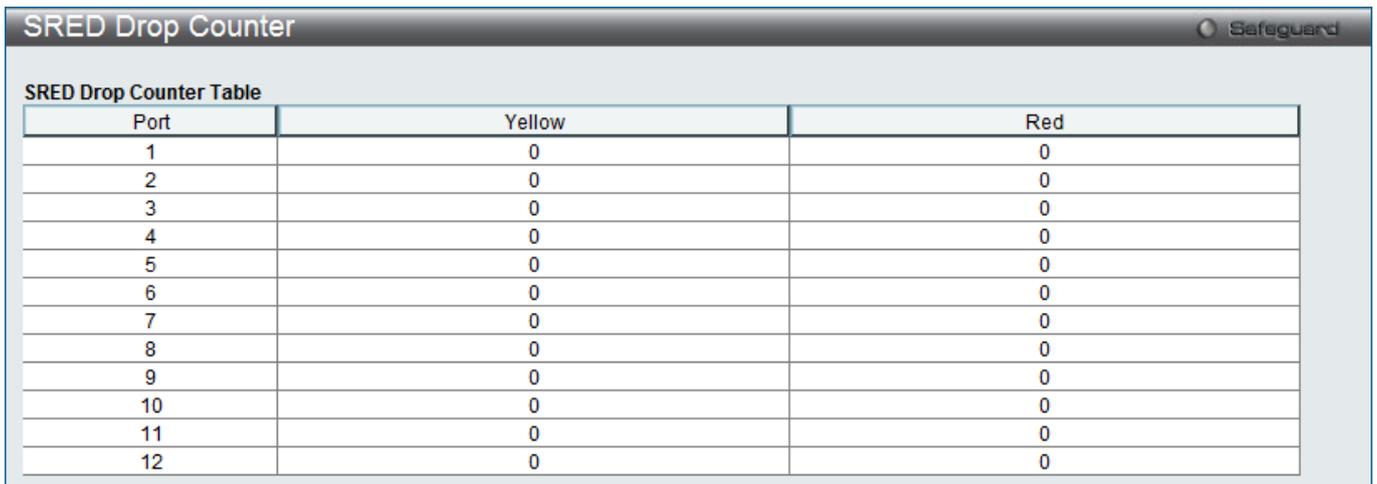
Parameter	Description
SRED Global Settings	Specifies the sRED feature's state on this Switch.
From Port ~ To Port	Specifies the list of port that will be used for this configuration.
Class ID	Select the Class ID, from 0-7, to configure for the SRED parameters. Selecting All will set the parameters configured here for all CoS queues.
Drop Green	<p><i>Enabled:</i> Probabilistic drop yellow and red colored packets if the queue depth is above the lower threshold, and probabilistic drop green colored packets if the queue depth is above the upper threshold.</p> <p><i>Disabled:</i> Probabilistic drop red colored packets if the queue depth is above the lower threshold, and probabilistic drop yellow colored packets if the queue depth is above the upper threshold. Green packets will not be dropped even it reach the threshold. □</p>
Threshold Low	Threshold Low refers to the drop red packets it might also include yellow packets.
Threshold High	Threshold High refers to the drop yellow or green packets depending on the drop mode.
Drop Rate Low	Specifies the low drop rate value used.
Drop Rate High	Specifies the high drop rate value used.

Click the **Apply** button to accept the changes made.

SRED Drop Counter

This window is used to view the SRED Drop Counter settings on the Switch.

To view this window, click **QoS > SRED > SRED Drop Counter**, as shown below:



Port	Yellow	Red
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0

Figure 7-17 SRED Drop Counter Window

Chapter 8 ACL

ACL Configuration Wizard

Access Profile List

CPU Access Profile List

ACL Finder

ACL Flow Meter

ACL Configuration Wizard

The ACL Configuration Wizard will aid the user in the creation of access profiles and ACL Rules automatically by simply inputting the address or service type and the action needed. It saves administrators a lot of time.

To view this window, click **ACL > ACL Configuration Wizard** as shown below:

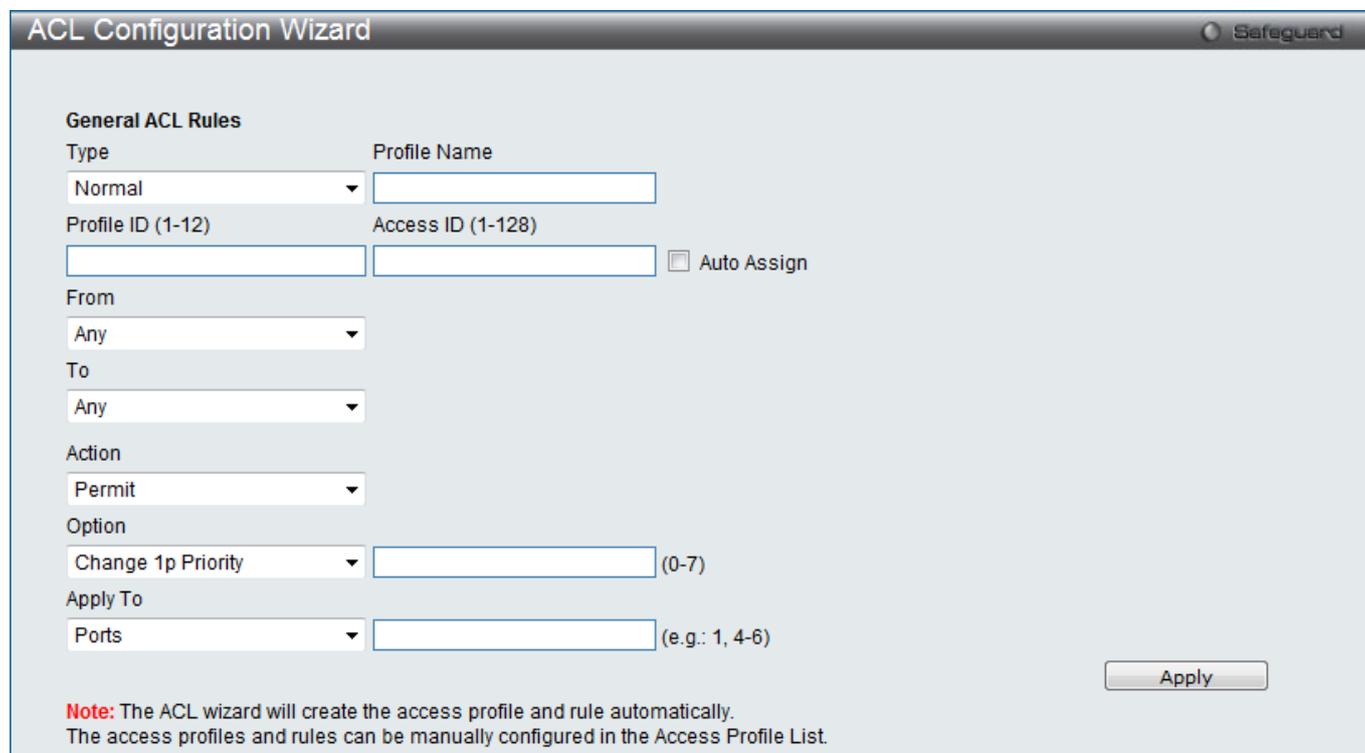


Figure 8-1 ACL Configuration Wizard window

The fields that can be configured are described below:

Parameter	Description
Type	Use the drop-down menu to select the general ACL Rule types: <i>Normal</i> – Selecting this option will create a Normal ACL Rule. <i>CPU</i> – Selecting this option will create a CPU ACL Rule.
Profile Name	After selecting to configure a Normal type rule, the user can enter the Profile Name for the new rule here.
Profile ID (1-12)	Enter the Profile ID for the new rule.

Access ID (1-128)	Enter the Access ID for the new rule. Selecting the Auto Assign option will allow the switch to automatically assign an unused access ID to this rule.
From / To	This rule can be created to apply to four different categories: <i>Any</i> – Selecting this option will include any starting category to this rule. <i>MAC Address</i> – Selecting this option will allow the user to enter a range of MAC addresses for this rule. <i>IPv4 Address</i> – Selecting this option will allow the user to enter a range of IPv4 addresses for this rule. <i>IPv6</i> – Selecting this option will allow the user to enter a range of IPv6 addresses for this rule.
Action	Select <i>Permit</i> to specify that the packets that match the access profile are forwarded by the Switch, according to any additional rule added (see below). Select <i>Deny</i> to specify that the packets that match the access profile are not forwarded by the Switch and will be filtered. Select <i>Mirror</i> to specify that packets that match the access profile are mirrored to a port defined in the mirror port section. Port Mirroring must be enabled and a target port must be set.
Option	After selecting the Permit action, the user can select one of the following options: <i>Change 1p Priority</i> – Here the user can enter the 1p priority value. <i>Replace DSCP</i> – Here the user can enter the DSCP value. <i>Replace ToS Precedence</i> – Here the user can enter the ToS Precedence value.
Apply To	Use the drop-down menu to select and enter the information that this rule will be applied to. <i>Ports</i> – Enter a port number or a port range. <i>VLAN Name</i> – Enter a VLAN name. <i>VLAN ID</i> – Enter a VLAN ID.

Click the **Apply** button to accept the changes made.



NOTE: The Switch will use one minimum mask to cover all the terms that user input, however, some extra bits may also be masked at the same time. To optimize the ACL profile and rules, please use manual configuration.

Access Profile List

Access profiles allow you to establish criteria to determine whether the Switch will forward packets based on the information contained in each packet's header.

To view Access Profile List window, click **ACL > Access Profile List** as shown below:

The Switch supports four Profile Types, Ethernet ACL, IPv4 ACL, IPv6 ACL, and Packet Content ACL.

Creating an access profile is divided into two basic parts. The first is to specify which part or parts of a frame the Switch will examine, such as the MAC source address or the IP destination address. The second part is entering

the criteria the Switch will use to determine what to do with the frame. The entire process is described below in two parts.

Users can display the currently configured Access Profiles on the Switch.

Profile ID	Profile Name	Profile Type	
1	ACL	Ethernet	Show Details Add/View Rules Delete
2	ACL	IP	Show Details Add/View Rules Delete
3	ACL	IPv6	Show Details Add/View Rules Delete
4	ACL	Packet Content	Show Details Add/View Rules Delete
13	System	-	Show Total Entries
14	System	-	Show Total Entries
15	System	-	Show Total Entries

Figure 8-2 Access Profile List window

Click the **Add ACL Profile** button to add an entry to the **Access Profile List**.

Click the **Delete All** button to remove all access profiles from this table.

Click the **Show Details** button to display the information of the specific profile ID entry.

Click the **Add/View Rules** button to view or add ACL rules within the specified profile ID.

Click the **Delete** button to remove the specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

There are four **Add Access Profile** windows;

- one for Ethernet (or MAC address-based) profile configuration,
- one for IPv6 address-based profile configuration,
- one for IPv4 address-based profile configuration, and
- one for packet content profile configuration.

Adding an Ethernet ACL Profile

The window shown below is the Add ACL Profile window for Ethernet. To use specific filtering masks in this ACL profile, click the packet filtering mask field to highlight it red. This will add more files to the mask.

After clicking the **Add ACL Profile** button, the following page will appear:

The screenshot shows the 'Add ACL Profile' window with the following configuration:

- Profile ID (1-12):** 1
- Profile Name:** EtherACL
- Select ACL Type:** Ethernet ACL (selected), Tagged (dropdown)
- Other ACL Types:** IPv4 ACL, Packet Content ACL (unselected)
- Filtering Mask Selection:** MAC Address, VLAN, 802.1p, Ethernet Type, Payload (all unselected)
- MAC Address Section:** Source MAC Mask, Destination MAC Mask (both unselected)
- 802.1Q VLAN Section:** VLAN, VLAN Mask (0-FFF) (both unselected)
- 802.1p Section:** (unselected)
- Buttons:** <<Back, Create

Figure 8-3 Add ACL Profile window (Ethernet ACL)

The fields that can be configured are described below:

Parameter	Description
Profile ID (1-12)	Enter a unique identifier number for this profile set. This value can be set from 1 to 12.
Profile Name	Enter a profile name for the profile created.
Select ACL Type	<p>Select profile based on Ethernet (MAC Address), IPv4 address, IPv6 address, or packet content. This will change the window according to the requirements for the type of profile.</p> <p>Select Ethernet ACL to instruct the Switch to examine the layer 2 part of each packet header.</p> <p>Select IPv4 ACL to instruct the Switch to examine the IPv4 address in each frame's header.</p> <p>Select IPv6 ACL to instruct the Switch to examine the IPv6 address in each frame's header.</p> <p>Select Packet Content to instruct the Switch to examine the packet content in each frame's header.</p>
Source MAC Mask	Enter a MAC address mask for the source MAC address, e.g. FF-FF-FF-FF-FF-FF.
Destination MAC Mask	Enter a MAC address mask for the destination MAC address, e.g. FF-FF-FF-FF-FF-FF.
802.1Q VLAN	Selecting this option instructs the Switch to examine the 802.1Q VLAN identifier of each packet header and use this as the full or partial criterion for forwarding.
802.1p	Selecting this option instructs the Switch to examine the 802.1p priority value of each

	packet header and use this as the, or part of the criterion for forwarding.
Ethernet Type	Selecting this option instructs the Switch to examine the Ethernet type value in each frame's header.

Click the **Select** button to select an ACL type.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **Create** button to create a profile.

After clicking the **Show Details** button, the following page will appear:



Figure 8-4 Access Profile Detail Information window (Ethernet ACL)

Click the **Show All Profiles** button to navigate back to the **Access Profile List** window.

After clicking the **Add/View Rules** button, the following page will appear:

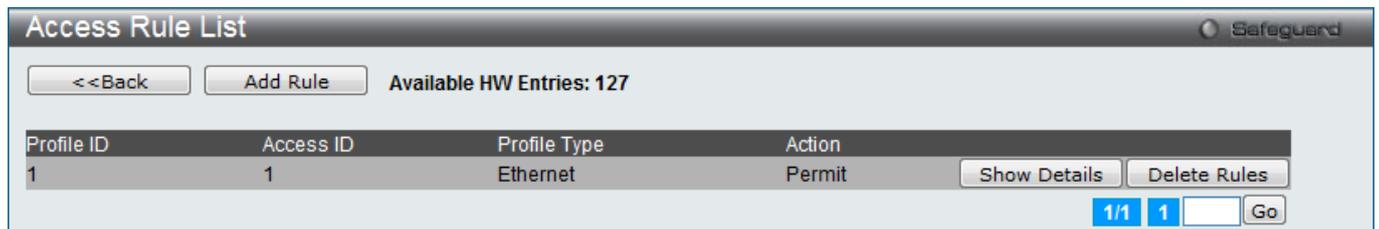


Figure 8-5 Access Rule List window (Ethernet ACL)

Click the **<<Back** button to return to the previous page.

Click the **Add Rule** button to create a new ACL rule in this profile.

Click the **Show Details** button to view more information about the specific rule created.

Click the **Delete Rules** button to remove the specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

After clicking the **Add Rule** button, the following page will appear:

Figure 8-6 Add Access Rule window (Ethernet ACL)

The fields that can be configured are described below:

Parameter	Description
Access ID (1-128)	Type in a unique identifier number for this access. This value can be set from 1 to 128. Auto Assign – Tick the check box will instruct the Switch to automatically assign an Access ID for the rule being created.
VLAN Name	Enter the VLAN name used here.
VLAN ID	Enter the VLAN ID used here.
VLAN Mask (0-FFF)	Enter the VLAN mask value used here.
802.1p (0-7)	Enter the value of the 802.1p priority tag here.
Ethernet Type (0-FFFF)	Enter the Ethernet type value used here.
Action	Select <i>Permit</i> to specify that the packets that match the access profile are forwarded by the Switch, according to any additional rule added (see below). Select <i>Deny</i> to specify that the packets that match the access profile are not

	<p>forwarded by the Switch and will be filtered.</p> <p>Select <i>Mirror</i> to specify that packets that match the access profile are mirrored to a port defined in the config mirror port command. Port Mirroring must be enabled and a target port must be set.</p>
Priority (0-7)	<p>Tick the corresponding check box if you want to re-write the 802.1p default priority of a packet to the value entered in the Priority field, which meets the criteria specified previously in this command, before forwarding it on to the specified CoS queue. Otherwise, a packet will have its incoming 802.1p user priority re-written to its original value before being forwarded by the Switch.</p> <p>For more information on priority queues, CoS queues and mapping for 802.1p, see the QoS section of this manual.</p>
Replace Priority	Tick this check box to replace the Priority value in the adjacent field.
Replace DSCP (0-63)	Select this option to instruct the Switch to replace the DSCP value (in a packet that meets the selected criteria) with the value entered in the adjacent field. When an ACL rule is added to change both the priority and DSCP of an IPv4 packet, only one of them can be modified due to a chip limitation. Currently the priority is changed when both the priority and DSCP are set to be modified.
Replace ToS Precedence (0-7)	Specify that the IP precedence of the outgoing packet is changed with the new value. If used without an action priority, the packet is sent to the default traffic class.
Time Range Name	Tick the check box and enter the name of the Time Range settings that has been previously configured in the Time Range Settings window. This will set specific times when this access rule will be implemented on the Switch.
Counter	Here the user can select the counter. By checking the counter, the administrator can see how many times that the rule was hit.
Ports	When a range of ports is to be configured, the Auto Assign check box MUST be ticked in the Access ID field of this window. If not, the user will be presented with an error message and the access rule will not be configured.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **Apply** button to accept the changes made.

After clicking the **Show Details** button in the **Access Rule List**, the following page will appear:

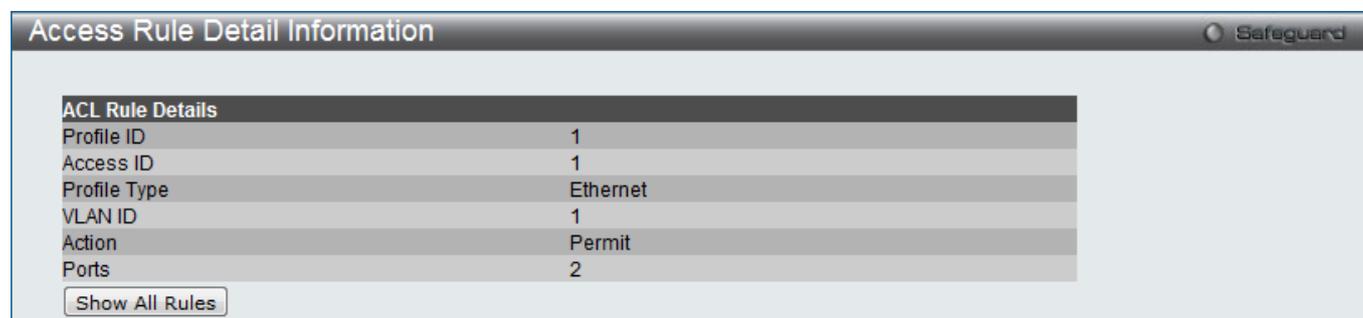


Figure 8-7 Access Rule Detail Information window (Ethernet ACL)

Click the **Show All Rules** button to navigate back to the Access Rule List.

Adding an IPv4 ACL Profile

The window shown below is the Add ACL Profile window for IPv4. To use specific filtering masks in this ACL profile, click the packet filtering mask field to highlight it red. This will add more fields to the mask.

After clicking the **Add ACL Profile** button, the following page will appear:

Figure 8-8 Add ACL Profile window (IPv4 ACL)

The fields that can be configured are described below:

Parameter	Description
Profile ID (1-12)	Enter a unique identifier number for this profile set. This value can be set from 1 to 12.
Profile Name	Enter a profile name for the profile created.
Select ACL Type	<p>Select profile based on Ethernet (MAC Address), IPv4 address, IPv6 address, or packet content. This will change the window according to the requirements for the type of profile.</p> <p>Select Ethernet ACL to instruct the Switch to examine the layer 2 part of each packet header.</p> <p>Select IPv4 ACL to instruct the Switch to examine the IPv4 address in each frame's header.</p> <p>Select IPv6 ACL to instruct the Switch to examine the IPv6 address in each frame's header.</p> <p>Select Packet Content to instruct the Switch to examine the packet content in each frame's header.</p>
802.1Q VLAN	Selecting this option instructs the Switch to examine the 802.1Q VLAN identifier of each packet header and use this as the full or partial criterion for forwarding.

IPv4 DSCP	Selecting this option instructs the Switch to examine the DiffServ Code part of each packet header and use this as the, or part of the criterion for forwarding.
IPv4 Source IP Mask	Enter an IP address mask for the source IP address, e.g. 255.255.255.255.
IPv4 Destination IP Mask	Enter an IP address mask for the destination IP address, e.g. 255.255.255.255.
Protocol	<p>Selecting this option instructs the Switch to examine the protocol type value in each frame's header. Then the user must specify what protocol(s) to include according to the following guidelines:</p> <p>Select <i>ICMP</i> to instruct the Switch to examine the Internet Control Message Protocol (ICMP) field in each frame's header.</p> <p>Select <i>Type</i> to further specify that the access profile will apply an ICMP type value, or specify <i>Code</i> to further specify that the access profile will apply an ICMP code value.</p> <p>Select <i>IGMP</i> to instruct the Switch to examine the Internet Group Management Protocol (IGMP) field in each frame's header.</p> <p>Select <i>Type</i> to further specify that the access profile will apply an IGMP type value.</p> <p>Select <i>TCP</i> to use the TCP port number contained in an incoming packet as the forwarding criterion. Selecting TCP requires that you specify a source port mask and/or a destination port mask.</p> <p><i>src port mask</i> - Specify a TCP port mask for the source port in hex form (hex 0x0-0xffff), which you wish to filter.</p> <p><i>dst port mask</i> - Specify a TCP port mask for the destination port in hex form (hex 0x0-0xffff) which you wish to filter.</p> <p><i>flag bit</i> - The user may also identify which flag bits to filter. Flag bits are parts of a packet that determine what to do with the packet. The user may filter packets by filtering certain flag bits within the packets, by checking the boxes corresponding to the flag bits of the TCP field. The user may choose between urg (urgent), ack (acknowledgement), psh (push), rst (reset), syn (synchronize), fin (finish).</p> <p>Select <i>UDP</i> to use the UDP port number contained in an incoming packet as the forwarding criterion. Selecting UDP requires that you specify a source port mask and/or a destination port mask.</p> <p><i>src port mask</i> - Specify a UDP port mask for the source port in hex form (hex 0x0-0xffff).</p> <p><i>dst port mask</i> - Specify a UDP port mask for the destination port in hex form (hex 0x0-0xffff).</p> <p>Select <i>Protocol ID</i> - Enter a value defining the protocol ID in the packet header to mask. Specify the protocol ID mask in hex form (hex 0x0-0xff).</p> <p><i>Protocol ID Mask</i> - Specify that the rule applies to the IP protocol ID traffic.</p> <p><i>User Define</i> - Specify the Layer 4 part mask</p>

Click the **Select** button to select an ACL type.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **Create** button to create a profile.

After clicking the **Show Details** button, the following page will appear:



Figure 8-9 Access Profile Detail Information window (IPv4 ACL)

Click the **Show All Profiles** button to navigate back to the **Access Profile List** window.

After clicking the **Add/View Rules** button, the following page will appear:



Figure 8-10 Access Rule List window (IPv4 ACL)

Click the **<<Back** button to return to the previous page.

Click the **Add Rule** button to create a new ACL rule in this profile.

Click the **Show Details** button to view more information about the specific rule created.

Click the **Delete Rules** button to remove the specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

After clicking the **Add Rule** button, the following page will appear:

Add Access Rule
Safeguard

Profile Information

Profile ID	2	Profile Name	ACL
Profile Type	IP	DSCP	Yes

Rule Detail
(Keep the input field blank to specify that the corresponding option does not matter).

Access ID (1-128) Auto Assign

DSCP (e.g.: 0-63)

Rule Action

Action

Priority (0-7)

Replace Priority

Replace DSCP (0-63)

Replace ToS Precedence (0-7)

Time Range Name

Counter

Ports (e.g.: 1, 4-6, 9)

Figure 8-11 Add Access Rule (IPv4 ACL)

The fields that can be configured are described below:

Parameter	Description
Access ID (1-128)	Type in a unique identifier number for this access. This value can be set from 1 to 128. Auto Assign – Tick the check box will instruct the Switch to automatically assign an Access ID for the rule being created.
VLAN Name	Specify the VLAN name to apply to the access rule.
VLAN ID	Specify the VLAN ID to apply to the access rule.
VLAN Mask (0-FFF)	Tick and enter the VLAN mask value used here.
DSCP	Enter the DSCP value used here.
Action	<p>Select Permit to specify that the packets that match the access profile are forwarded by the Switch, according to any additional rule added (see below).</p> <p>Select Deny to specify that the packets that match the access profile are not forwarded by the Switch and will be filtered.</p> <p>Select Mirror to specify that packets that match the access profile are mirrored to a port defined in the config mirror port command. Port Mirroring must be enabled and a target</p>

	port must be set.
Priority (0-7)	<p>Tick the corresponding check box if you want to re-write the 802.1p default priority of a packet to the value entered in the Priority field, which meets the criteria specified previously in this command, before forwarding it on to the specified CoS queue. Otherwise, a packet will have its incoming 802.1p user priority re-written to its original value before being forwarded by the Switch.</p> <p>For more information on priority queues, CoS queues and mapping for 802.1p, see the QoS section of this manual.</p>
Replace Priority	Tick this check box to replace the Priority value in the adjacent field.
Replace DSCP (0-63)	Select this option to instruct the Switch to replace the DSCP value (in a packet that meets the selected criteria) with the value entered in the adjacent field. When an ACL rule is added to change both the priority and DSCP of an IPv4 packet, only one of them can be modified due to a chip limitation. Currently the priority is changed when both the priority and DSCP are set to be modified.
Replace ToS Precedence (0-7)	Specify that the IP precedence of the outgoing packet is changed with the new value. If used without an action priority, the packet is sent to the default TC.
Time Range Name	Tick the check box and enter the name of the Time Range settings that has been previously configured in the Time Range Settings window. This will set specific times when this access rule will be implemented on the Switch.
Counter	Here the user can select the counter. By checking the counter, the administrator can see how many times that the rule was hit.
Ports	When a range of ports is to be configured, the Auto Assign check box MUST be ticked in the Access ID field of this window. If not, the user will be presented with an error message and the access rule will not be configured. Ticking the All Ports check box will denote all ports on the Switch.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **Apply** button to accept the changes made.

After clicking the **Show Details** button in the **Access Rule List**, the following page will appear:

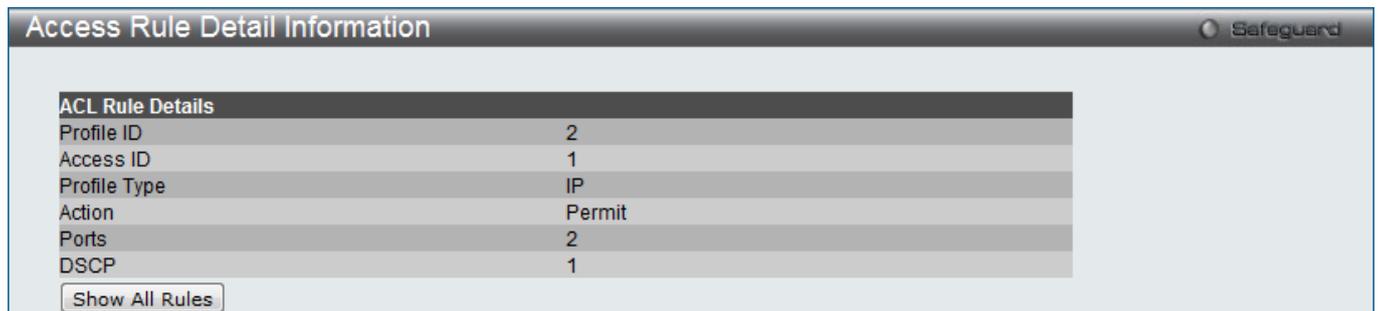


Figure 8-12 Access Rule Detail Information (IPv4 ACL)

Click the **Show All Rules** button to navigate back to the Access Rule List.

Adding an IPv6 ACL Profile

The window shown below is the Add ACL Profile window for IPv6. To use specific filtering masks in this ACL profile, click the packet filtering mask field to highlight it red. This will add more fields to the mask.

After clicking the **Add ACL Profile** button, the following page will appear:

Figure 8-13 Add ACL Profile window (IPv6 ACL)

The fields that can be configured are described below:

Parameter	Description
Profile ID (1-12)	Enter a unique identifier number for this profile set. This value can be set from 1 to 12.
Profile Name	Enter a profile name for the profile created.
Select ACL Type	<p>Select profile based on Ethernet (MAC Address), IPv4 address, IPv6 address, or packet content. This will change the window according to the requirements for the type of profile.</p> <p>Select Ethernet ACL to instruct the Switch to examine the layer 2 part of each packet header.</p> <p>Select IPv4 ACL to instruct the Switch to examine the IPv4 address in each frame's header.</p> <p>Select IPv6 ACL to instruct the Switch to examine the IPv6 address in each frame's header.</p> <p>Select Packet Content to instruct the Switch to examine the packet content in each frame's header.</p>
IPv6 Class	Ticking this check box will instruct the Switch to examine the <i>class</i> field of the IPv6 header. This class field is a part of the packet header that is similar to the Type of Service (ToS) or Precedence bits field in IPv4.

IPv6 Flow Label	Ticking this check box will instruct the Switch to examine the <i>flow label</i> field of the IPv6 header. This flow label field is used by a source to label sequences of packets such as non-default quality of service or real time service packets.
IPv6 TCP	<i>Source Port Mask</i> – Specify that the rule applies to the range of TCP source ports. <i>Destination Port Mask</i> – Specify the range of the TCP destination port range.
IPv6 UDP	<i>Source Port Mask</i> – Specify the range of the TCP source port range. <i>Destination Port Mask</i> – Specify the range of the TCP destination port mask.
ICMP	Select <i>ICMP</i> to instruct the Switch to examine the Internet Control Message Protocol (ICMP) field in each frame's header.
IPv6 Source Mask	The user may specify an IPv6 address mask for the source IPv6 address by ticking the corresponding check box and entering the IPv6 address mask.
IPv6 Destination Mask	The user may specify an IPv6 address mask for the destination IPv6 address by ticking the corresponding check box and entering the IPv6 address mask.

Click the **Select** button to select an ACL type.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **Create** button to create a profile.

After clicking the **Show Details** button, the following page will appear:

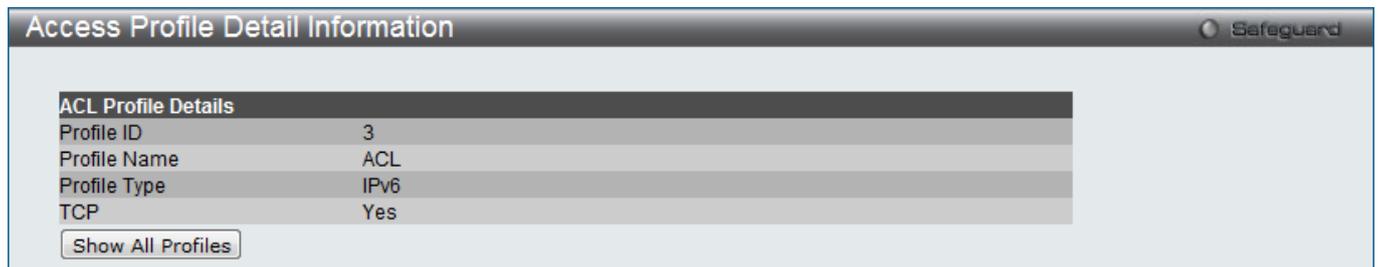


Figure 8-14 Access Profile Detail Information window (IPv6 ACL)

Click the **Show All Profiles** button to navigate back to the **Access Profile List** window.

After clicking the **Add/View Rules** button, the following page will appear:

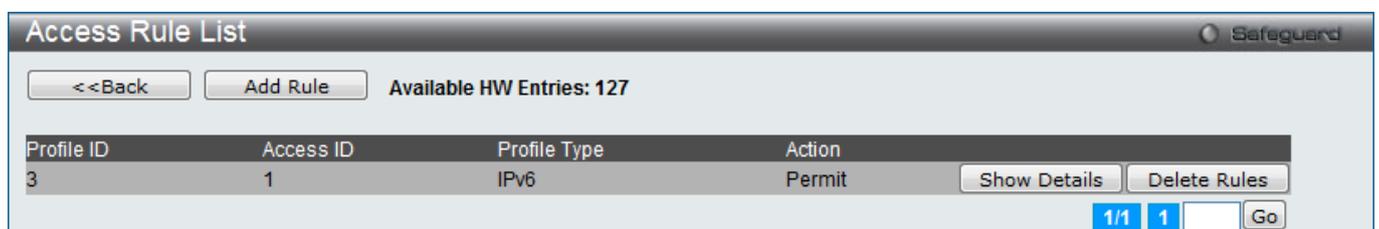


Figure 8-15 Access Rule List window (IPv6 ACL)

Click the **<<Back** button to return to the previous page.

Click the **Add Rule** button to create a new ACL rule in this profile.

Click the **Show Details** button to view more information about the specific rule created.

Click the **Delete Rules** button to remove the specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

After clicking the **Add Rule** button, the following page will appear:

Figure 8-16 Add Access Rule (IPv6 ACL)

The fields that can be configured are described below:

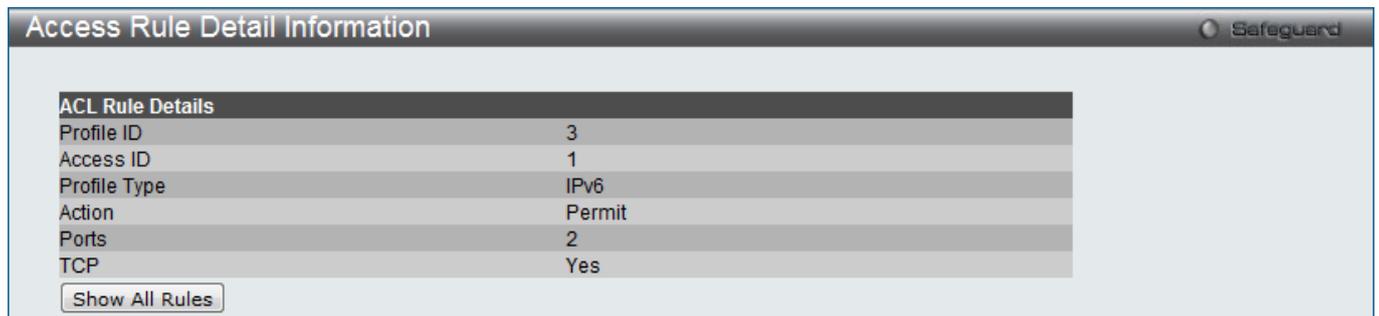
Parameter	Description
Access ID (1-128)	Type in a unique identifier number for this access. This value can be set from 1 to 128. Auto Assign – Tick the check box will instruct the Switch to automatically assign an Access ID for the rule being created.
TCP	Specifies that TCP will be used.
Action	Select <i>Permit</i> to specify that the packets that match the access profile are forwarded by the Switch, according to any additional rule added (see below). Select <i>Deny</i> to specify that packets that match the access profile are not forwarded by the Switch and will be filtered. Select <i>Mirror</i> to specify that packets that match the access profile are mirrored to a port defined in the config mirror port command. Port Mirroring must be enabled and a

	target port must be set.
Priority (0-7)	<p>Tick the corresponding check box to re-write the 802.1p default priority of a packet to the value entered in the Priority field, which meets the criteria specified previously in this command, before forwarding it on to the specified CoS queue. Otherwise, a packet will have its incoming 802.1p user priority re-written to its original value before being forwarded by the Switch.</p> <p>For more information on priority queues, CoS queues and mapping for 802.1p, see the QoS section of this manual.</p>
Replace Priority	Tick this check box to replace the Priority value in the adjacent field.
Replace DSCP (0-63)	Select this option to instruct the Switch to replace the DSCP value (in a packet that meets the selected criteria) with the value entered in the adjacent field. When an ACL rule is added to change both the priority and DSCP of an IPv6 packet, only one of them can be modified due to a chip limitation. Currently the priority is changed when both the priority and DSCP are set to be modified.
Replace ToS Precedence (0-7)	Specify that the IP precedence of the outgoing packet is changed with the new value. If used without an action priority, the packet is sent to the default TC.
Time Range Name	Tick the check box and enter the name of the Time Range settings that has been previously configured in the Time Range Settings window. This will set specific times when this access rule will be implemented on the Switch.
Counter	Here the user can select the counter. By checking the counter, the administrator can see how many times that the rule was hit.
Ports	When a range of ports is to be configured, the Auto Assign check box MUST be ticked in the Access ID field of this window. If not, the user will be presented with an error message and the access rule will not be configured. Ticking the All Ports check box will denote all ports on the Switch.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **Apply** button to accept the changes made.

After clicking the **Show Details** button in the **Access Rule List**, the following page will appear:



Access Rule Detail Information	
Safeguard	
ACL Rule Details	
Profile ID	3
Access ID	1
Profile Type	IPv6
Action	Permit
Ports	2
TCP	Yes
<input type="button" value="Show All Rules"/>	

Figure 8-17 Access Rule Detail Information (IPv6 ACL)

Click the **Show All Rules** button to navigate back to the Access Rule List.

Adding a Packet Content ACL Profile

The window shown below is the Add ACL Profile window for Packet Content: To use specific filtering masks in this ACL profile, click the packet filtering mask field to highlight it red. This will add more fields to the mask.

After clicking the **Add ACL Profile** button, the following page will appear:

Figure 8-18 Add ACL Profile (Packet Content ACL)

The fields that can be configured are described below:

Parameter	Description
Profile ID (1-12)	Enter a unique identifier number for this profile set. This value can be set from 1 to 12.
Profile Name	Enter a profile name for the profile created.
Select ACL Type	Select profile based on Ethernet (MAC Address), IPv4 address, IPv6 address, or packet content. This will change the window according to the requirements for the type of profile. Select Ethernet ACL to instruct the Switch to examine the layer 2 part of each packet header. Select IPv4 ACL to instruct the Switch to examine the IPv4 address in each frame's header. Select IPv6 ACL to instruct the Switch to examine the IPv6 address in each frame's header. Select Packet Content to instruct the Switch to examine the packet content in each frame's header.
Packet Content	Allows users to examine up to 4 specified offset_chunks within a packet at one time and specifies the frame content offset and mask. There are 4 chunk offsets and masks that can be configured. A chunk mask presents 4 bytes. 4 offset_chunks can be selected from a possible 32 predefined offset_chunks as described below: offset_chunk_1,

offset_chunk_2,
offset_chunk_3,
offset_chunk_4.

chunk0	chunk1	chunk2	chunk29	chunk30	chunk31
B126, B127, B0, B1	B2, B3, B4, B5	B6, B7, B8, B9	B114, B115, B116, B117	B118, B119, B120, B121	B122, B123, B124, B125

Example:

offset_chunk_1 0 0xffffffff will match packet byte offset 126,127,0,1

offset_chunk_1 0 0x0000ffff will match packet byte offset,0,1

NOTE: Only one packet_content_mask profile can be created.

With this advanced unique Packet Content Mask (also known as Packet Content Access Control List - ACL), the D-Link switch family can effectively mitigate some network attacks like the common ARP Spoofing attack that is wide spread today. This is why the Packet Content ACL is able to inspect any specified content of a packet in different protocol layers.

Click the **Select** button to select an ACL type.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **Create** button to create a profile.

After clicking the **Show Details** button, the following page will appear:

ACL Profile Details	
Profile ID	4
Profile Name	ACL
Profile Type	Packet Content
Chunk 1	1, Value: 0x00000000

Show All Profiles

Figure 8-19 Access Profile Detail Information (Packet Content ACL)

Click the **Show All Profiles** button to navigate back to the **Access Profile List** window.



NOTE: Address Resolution Protocol (ARP) is the standard for finding a host's hardware address (MAC address). However, ARP is vulnerable as it can be easily spoofed and utilized to attack a LAN (i.e. an ARP spoofing attack). For a more detailed explanation on how ARP protocol works and how to employ D-Link's unique Packet Content ACL to prevent ARP spoofing attack, please see Appendix E at the end of this manual.

After clicking the **Add/View Rules** button, the following page will appear:

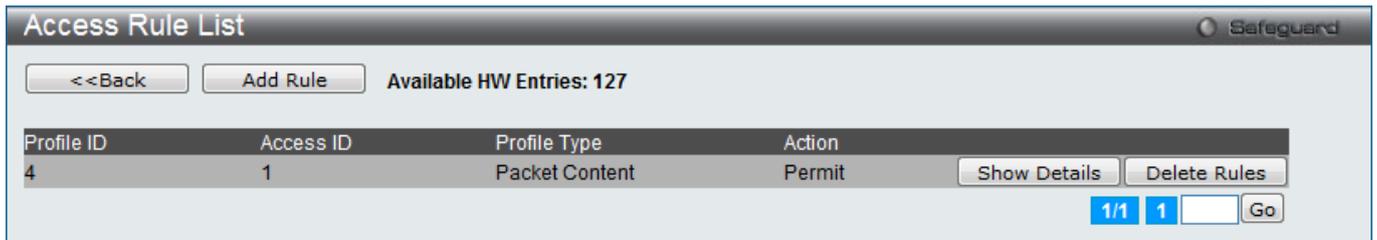


Figure 8-20 Access Rule List (Packet Content ACL)

Click the **<<Back** button to return to the previous page.

Click the **Add Rule** button to create a new ACL rule in this profile.

Click the **Show Details** button to view more information about the specific rule created.

Click the **Delete Rules** button to remove the specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

After clicking the **Add Rule** button, the following page will appear:

Profile Information

Profile ID	4	Profile Name	ACL
Profile Type	Packet Content	Chunk 1	1, Value: 0x00000000

Rule Detail
(Keep the input field blank to specify that the corresponding option does not matter).

Access ID (1-128) Auto Assign

Chunk 1

Chunk 2

Chunk 3

Chunk 4

Rule Action

Action

Priority (0-7)

Replace Priority

Replace DSCP (0-63)

Replace ToS Precedence (0-7)

Time Range Name

Figure 8-21 Add Access Rule (Packet Content ACL)

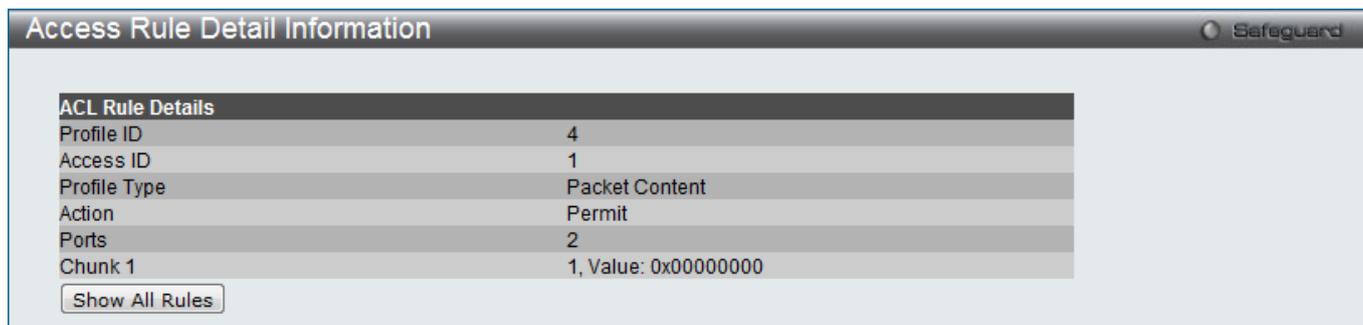
The fields that can be configured are described below:

Parameter	Description
Access ID (1-128)	Type in a unique identifier number for this access. This value can be set from 1 to 128. Auto Assign – Tick the check box will instruct the Switch to automatically assign an Access ID for the rule being created.
Chunk1-4	Enter the Chunk 1 to 4 values used here.
Action	Select <i>Permit</i> to specify that the packets that match the access profile are forwarded by the Switch, according to any additional rule added (see below). Select <i>Deny</i> to specify that the packets that match the access profile are not forwarded by the Switch and will be filtered. Select <i>Mirror</i> to specify that packets that match the access profile are mirrored to a port defined in the config mirror port command. Port Mirroring must be enabled and a target port must be set.
Priority (0-7)	Tick the corresponding check box if you want to re-write the 802.1p default priority of a packet to the value entered in the Priority field, which meets the criteria specified previously in this command, before forwarding it on to the specified CoS queue. Otherwise, a packet will have its incoming 802.1p user priority re-written to its original value before being forwarded by the Switch. For more information on priority queues, CoS queues and mapping for 802.1p, see the QoS section of this manual.
Replace Priority	Tick this check box to replace the Priority value in the adjacent field.
Replace DSCP (0-63)	Select this option to instruct the Switch to replace the DSCP value (in a packet that meets the selected criteria) with the value entered in the adjacent field. When an ACL rule is added to change both the priority and DSCP of an IPv4 packet, only one of them can be modified due to a chip limitation. Currently the priority is changed when both the priority and DSCP are set to be modified.
Replace ToS Precedence (0-7)	Specify that the IP precedence of the outgoing packet is changed with the new value. If used without an action priority, the packet is sent to the default TC.
Time Range Name	Tick the check box and enter the name of the Time Range settings that has been previously configured in the Time Range Settings window. This will set specific times when this access rule will be implemented on the Switch.
Counter	Here the user can select the counter. By checking the counter, the administrator can see how many times that the rule was hit.
Ports	When a range of ports is to be configured, the Auto Assign check box MUST be ticked in the Access ID field of this window. If not, the user will be presented with an error message and the access rule will not be configured. Ticking the All Ports check box will denote all ports on the Switch.

Click the <<**Back** button to discard the changes made and return to the previous page.

Click the **Apply** button to accept the changes made.

After clicking the **Show Details** button in the **Access Rule List**, the following page will appear:



ACL Rule Details	
Profile ID	4
Access ID	1
Profile Type	Packet Content
Action	Permit
Ports	2
Chunk 1	1, Value: 0x00000000

Show All Rules

Figure 8-22 Access Rule Detail Information (Packet Content ACL)

Click the **Show All Rules** button to navigate back to the Access Rule List.

CPU Access Profile List

Due to a chipset limitation and needed extra switch security, the Switch incorporates CPU Interface filtering. This added feature increases the running security of the Switch by enabling the user to create a list of access rules for packets destined for the Switch's CPU interface. Employed similarly to the Access Profile feature previously mentioned, CPU interface filtering examines Ethernet, IP and Packet Content Mask packet headers destined for the CPU and will either forward them or filter them, based on the user's implementation. As an added feature for the CPU Filtering, the Switch allows the CPU filtering mechanism to be enabled or disabled globally, permitting the user to create various lists of rules without immediately enabling them.



NOTE: CPU Interface Filtering is used to control traffic access to the switch directly such as protocols transition or management access. A CPU interface filtering rule won't impact normal L2/3 traffic forwarding. However, an improper CPU interface filtering rule may cause the network to become unstable.

To view CPU Access Profile List window, click **ACL > CPU Access Profile List** as shown below:

Creating an access profile for the CPU is divided into two basic parts. The first is to specify which part or parts of a frame the Switch will examine, such as the MAC source address or the IP destination address. The second part is entering the criteria the Switch will use to determine what to do with the frame. The entire process is described below.

Users may globally enable or disable the CPU Interface Filtering State mechanism by using the radio buttons to change the running state. Choose Enabled to enable CPU packets to be scrutinized by the Switch and Disabled to disallow this scrutiny.



Figure 8-23 CPU Access Profile List window

The fields that can be configured are described below:

Parameter	Description
CPU Interface Filtering State	Here the user can enable or disable the CPU interface filtering state.

Click the **Apply** button to accept the changes made.

Click the **Add CPU ACL Profile** button to add an entry to the **CPU ACL Profile List**.

Click the **Delete All** button to remove all access profiles from this table.

Click the **Show Details** button to display the information of the specific profile ID entry.

Click the **Add/View Rules** button to view or add CPU ACL rules within the specified profile ID.

Click the **Delete** button to remove the specific entry.

There are four **Add CPU ACL Profile** windows;

1. one for Ethernet (or MAC address-based) profile configuration,
2. one for IPv6 address-based profile configuration,
3. one for IPv4 address-based profile configuration,
4. one for packet content profile configuration.

Adding a CPU Ethernet ACL Profile

The window shown below is the Add CPU ACL Profile window for Ethernet. To use specific filtering masks in this ACL profile, click the packet filtering mask field to highlight it red. This will add more files to the mask.

After clicking the **Add CPU ACL Profile** button, the following page will appear:

Figure 8-24 Add CPU ACL Profile (Ethernet ACL)

The fields that can be configured are described below:

Parameter	Description
Profile ID (1-5)	Enter a unique identifier number for this profile set. This value can be set from 1 to 5.
Select ACL Type	<p>Select profile based on Ethernet (MAC Address), IPv4 address, IPv6 address, or packet content mask. This will change the window according to the requirements for the type of profile.</p> <p>Select Ethernet ACL to instruct the Switch to examine the layer 2 part of each packet header.</p> <p>Select IPv4 ACL to instruct the Switch to examine the IP address in each frame's header.</p> <p>Select IPv6 ACL to instruct the Switch to examine the IP address in each frame's header.</p> <p>Select Packet Content ACL to specify a mask to hide the content of the packet header.</p>
Source MAC Mask	Enter a MAC address mask for the source MAC address.
Destination MAC Mask	Enter a MAC address mask for the destination MAC address.
802.1Q VLAN	Selecting this option instructs the Switch to examine the VLAN identifier of each packet header and use this as the full or partial criterion for forwarding.
802.1p	Selecting this option instructs the Switch to specify that the access profile will apply only to packets with this 802.1p priority value.
Ethernet Type	Selecting this option instructs the Switch to examine the Ethernet type value in each

	frame's header.
--	-----------------

Click the **Select** button to select a CPU ACL type.

Click the **Create** button to create a profile.

Click the **<<Back** button to discard the changes made and return to the previous page.

After clicking the **Show Details** button, the following page will appear:

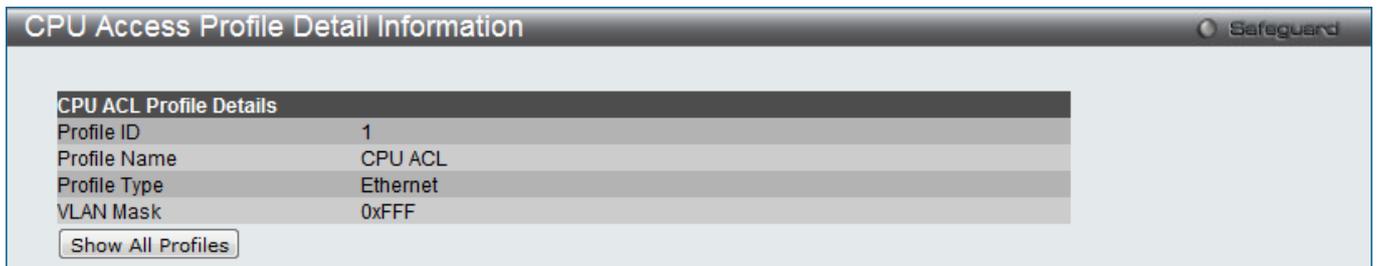


Figure 8-25 CPU Access Profile Detail Information (Ethernet ACL)

Click the **Show All Profiles** button to navigate back to the **CPU ACL Profile List** window.

After clicking the **Add/View Rules** button, the following page will appear:

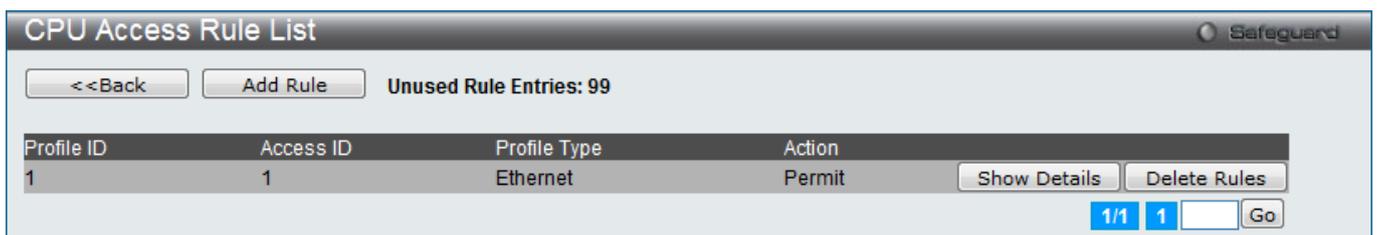


Figure 8-26 CPU Access Rule List (Ethernet ACL)

Click the **Add Rule** button to create a new CPU ACL rule in this profile.

Click the **<<Back** button to return to the previous page.

Click the **Show Details** button to view more information about the specific rule created.

Click the **Delete Rules** button to remove the specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

After clicking the **Add Rule** button, the following page will appear:

Add CPU Access Rule
Safeguard

Profile Information

Profile ID	1	Profile Name	CPU ACL
Profile Type	Ethernet	VLAN Mask	0xFFFF

Rule Detail
(Keep the input field blank to specify that the corresponding option does not matter).

Access ID (1-100)

VLAN Name

VLAN ID

Rule Action

Action Permit ▼

Time Range Name

Ports (e.g.: 1, 4-6, 9)

Figure 8-27 Add CPU Access Rule (Ethernet ACL)

The fields that can be configured are described below:

Parameter	Description
Access ID (1-100)	Type in a unique identifier number for this access. This value can be set from 1 to 100. Auto Assign – Tick the check box will instruct the Switch to automatically assign an Access ID for the rule being created.
VLAN Name	Enter the VLAN name used here.
VLAN ID	Enter the VLAN ID used here.
Action	Select <i>Permit</i> to specify that the packets that match the access profile are forwarded by the Switch, according to any additional rule added (see below). Select <i>Deny</i> to specify that the packets that match the access profile are not forwarded by the Switch and will be filtered.
Time Range Name	Tick the check box and enter the name of the Time Range settings that has been previously configured in the Time Range Settings window. This will set specific times when this access rule will be implemented on the Switch.
Ports	Ticking the All Ports check box will denote all ports on the Switch.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

After clicking the **Show Details** button in the **CPU Access Rule List**, the following page will appear:

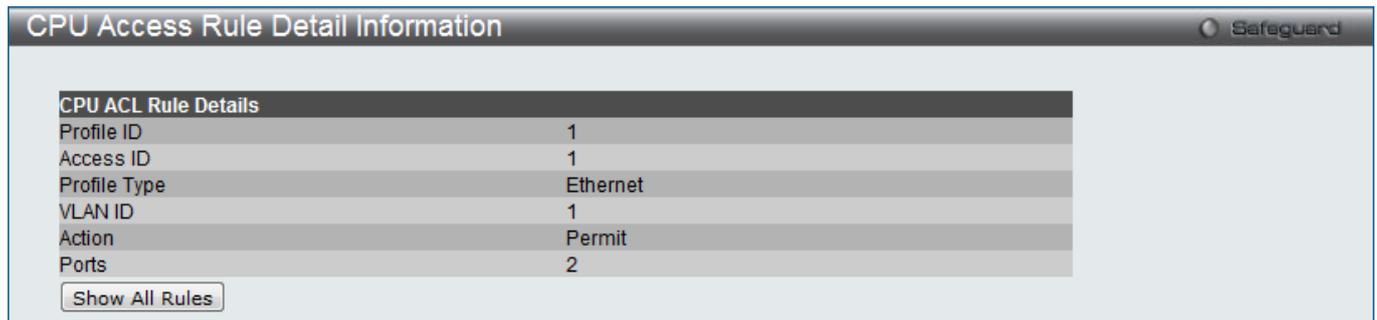


Figure 8-28 CPU Access Rule Detail Information (Ethernet ACL)

Click the **Show All Rules** button to navigate back to the CPU Access Rule List.

Adding a CPU IPv4 ACL Profile

The window shown below is the **Add CPU ACL Profile** window for IP (IPv4). To use specific filtering masks in this ACL profile, click the packet filtering mask field to highlight it red. This will add more filed to the mask.

After clicking the **Add CPU ACL Profile** button, the following page will appear:

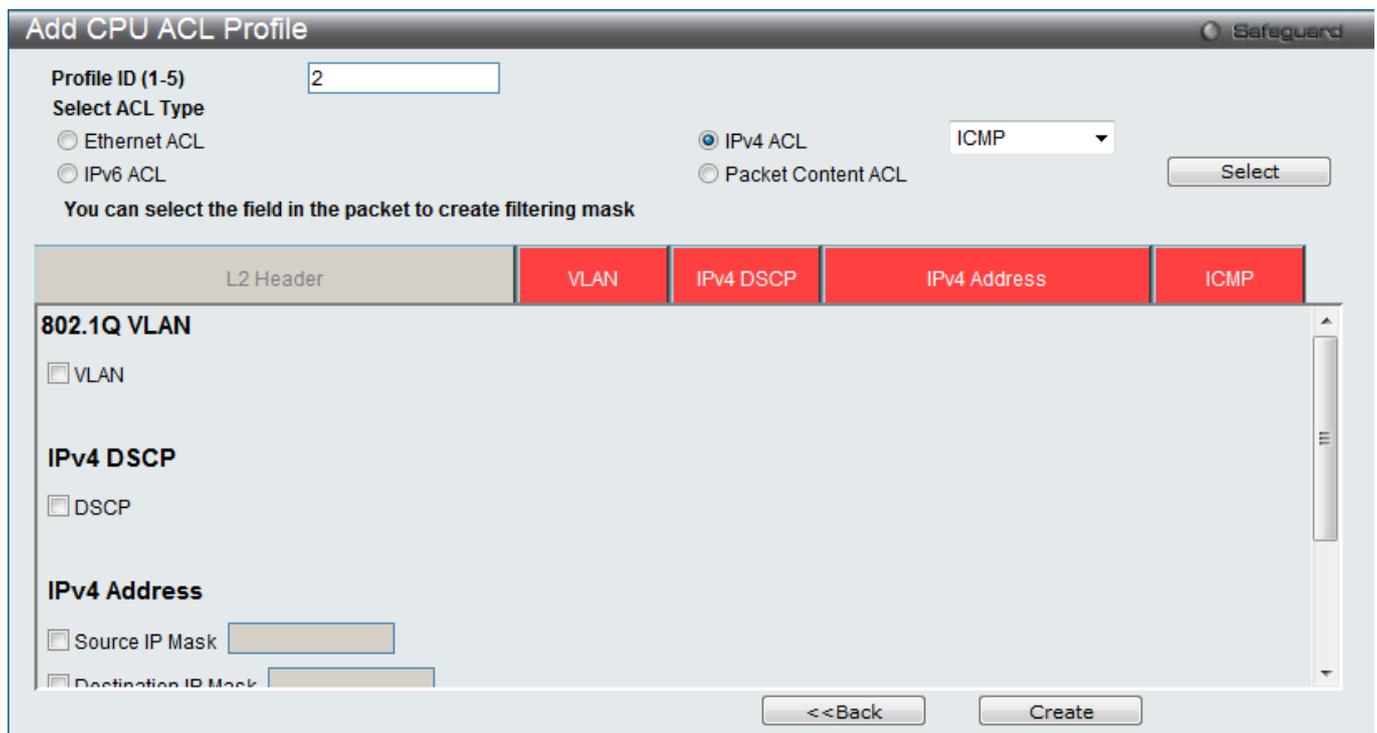


Figure 8-29 Add CPU ACL Profile (IPv4 ACL)

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

Profile ID (1-5)	Enter a unique identifier number for this profile set. This value can be set from 1 to 5.
Select ACL Type	<p>Select profile based on Ethernet (MAC Address), IPv4 address, IPv6 address, or packet content mask. This will change the menu according to the requirements for the type of profile.</p> <p>Select Ethernet ACL to instruct the Switch to examine the layer 2 part of each packet header.</p> <p>Select IPv4 ACL to instruct the Switch to examine the IP address in each frame's header.</p> <p>Select IPv6 ACL to instruct the Switch to examine the IP address in each frame's header.</p> <p>Select Packet Content ACL to specify a mask to hide the content of the packet header.</p>
802.1Q VLAN	Selecting this option instructs the Switch to examine the VLAN part of each packet header and use this as the, or part of the criterion for forwarding.
IPv4 DSCP	Selecting this option instructs the Switch to examine the DiffServ Code part of each packet header and use this as the, or part of the criterion for forwarding.
Source IP Mask	Enter an IP address mask for the source IP address, e.g. 255.255.255.255.
Destination IP Mask	Enter an IP address mask for the destination IP address, e.g. 255.255.255.255.
Protocol	<p>Selecting this option instructs the Switch to examine the protocol type value in each frame's header. You must then specify what protocol(s) to include according to the following guidelines:</p> <p>Select <i>ICMP</i> to instruct the Switch to examine the Internet Control Message Protocol (ICMP) field in each frame's header.</p> <p>Select <i>Type</i> to further specify that the access profile will apply an ICMP type value, or specify <i>Code</i> to further specify that the access profile will apply an ICMP code value.</p> <p>Select <i>IGMP</i> to instruct the Switch to examine the Internet Group Management Protocol (IGMP) field in each frame's header.</p> <p>Select <i>Type</i> to further specify that the access profile will apply an IGMP type value.</p> <p>Select <i>TCP</i> to use the TCP port number contained in an incoming packet as the forwarding criterion. Selecting TCP requires a source port mask and/or a destination port mask is to be specified. The user may also identify which flag bits to filter. Flag bits are parts of a packet that determine what to do with the packet. The user may filter packets by filtering certain flag bits within the packets, by checking the boxes corresponding to the flag bits of the TCP field. The user may choose between urg (urgent), ack (acknowledgement), psh (push), rst (reset), syn (synchronize), fin (finish).</p> <p><i>src port mask</i> - Specify a TCP port mask for the source port in hex form (hex 0x0-0xffff), which you wish to filter.</p> <p><i>dst port mask</i> - Specify a TCP port mask for the destination port in hex form (hex 0x0-0xffff) which you wish to filter.</p> <p>Select <i>UDP</i> to use the UDP port number contained in an incoming packet as the</p>

	<p>forwarding criterion. Selecting UDP requires that you specify a source port mask and/or a destination port mask.</p> <p><i>src port mask</i> - Specify a UDP port mask for the source port in hex form (hex 0x0-0xffff).</p> <p><i>dst port mask</i> - Specify a UDP port mask for the destination port in hex form (hex 0x0-0xffff).</p> <p>Select <i>Protocol ID</i> - Enter a value defining the protocol ID in the packet header to mask. Specify the protocol ID mask in hex form (hex 0x0-0xff).</p> <p><i>Protocol ID Mask</i> – Specify that the rule applies to the IP Protocol ID Traffic.</p> <p><i>User Define</i> – Specify the L4 part mask.</p>
--	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Click the **Select** button to select a CPU ACL type.

Click the **Create** button to create a profile.

Click the **<<Back** button to discard the changes made and return to the previous page.

After clicking the **Show Details** button, the following page will appear:

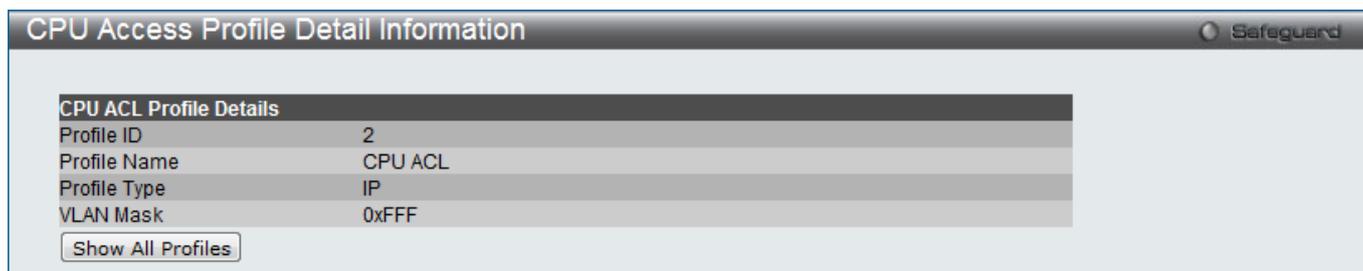


Figure 8-30 CPU Access Profile Detail Information (IPv4 ACL)

Click the **Show All Profiles** button to navigate back to the **CPU ACL Profile List** window.

After clicking the **Add/View Rules** button, the following page will appear:

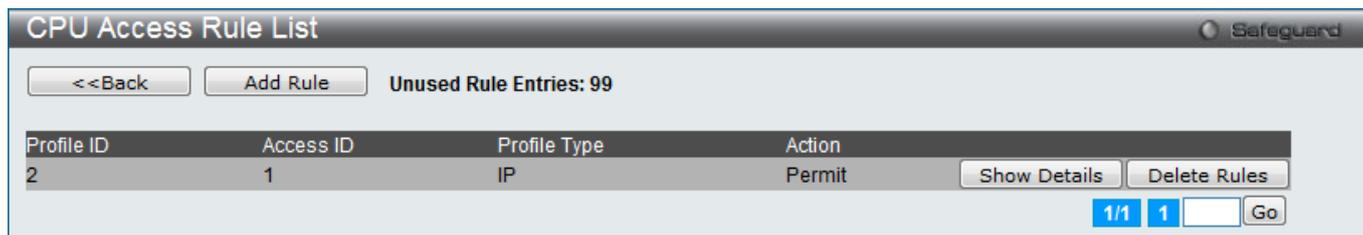


Figure 8-31 CPU Access Rule List (IPv4 ACL)

Click the **Add Rule** button to create a new CPU ACL rule in this profile.

Click the **<<Back** button to return to the previous page.

Click the **Show Details** button to view more information about the specific rule created.

Click the **Delete Rules** button to remove the specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

After clicking the **Add Rule** button, the following page will appear:

Add CPU Access Rule Safeguard

Profile Information

Profile ID	2	Profile Name	CPU ACL
Profile Type	IP	VLAN Mask	0xFFF

Rule Detail
(Keep the input field blank to specify that the corresponding option does not matter).

Access ID (1-100)

VLAN Name

VLAN ID

Rule Action

Action

Time Range Name

Ports (e.g.: 1, 4-6, 9)

Figure 8-32 Add CPU Access Rule (IPv4 ACL)

The fields that can be configured are described below:

Parameter	Description
Access ID (1-100)	Type in a unique identifier number for this access. This value can be set from 1 to 100. Auto Assign – Tick the check box will instruct the Switch to automatically assign an Access ID for the rule being created.
VLAN Name	Enter the VLAN name used here.
VLAN ID	Enter the VLAN ID used here.
Action	Select <i>Permit</i> to specify that the packets that match the access profile are forwarded by the Switch, according to any additional rule added (see below). Select <i>Deny</i> to specify that the packets that match the access profile are not forwarded by the Switch and will be filtered.
Time Range Name	Tick the check box and enter the name of the Time Range settings that has been previously configured in the Time Range Settings window. This will set specific times when this access rule will be implemented on the Switch.
Ports	Ticking the All Ports check box will denote all ports on the Switch.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

After clicking the **Show Details** button in the **CPU Access Rule List**, the following page will appear:

CPU ACL Rule Details	
Profile ID	2
Access ID	1
Profile Type	IP
VLAN ID	1
Action	Permit
Ports	2

[Show All Rules](#)

Figure 8-33 CPU Access Rule Detail Information (IPv4 ACL)

Click the **Show All Rules** button to navigate back to the CPU Access Rule List.

Adding a CPU IPv6 ACL Profile

The window shown below is the **Add CPU ACL Profile** window for IPv6. To use specific filtering masks in this ACL profile, click the packet filtering mask field to highlight it red. This will add more fields to the mask.

After clicking the **Add CPU ACL Profile** button, the following page will appear:

Add CPU ACL Profile Safeguard

Profile ID (1-5)

Select ACL Type

Ethernet ACL IPv4 ACL Packet Content ACL [Select](#)

IPv6 ACL

You can select the field in the packet to create filtering mask

IPv6 Class **IPv6 Flow Label** **IPv6 Address**

IPv6 Class

IPv6 Flow Label

IPv6 Flow Label

<<Back Create

Figure 8-34 Add CPU ACL Profile (IPv6 ACL)

The fields that can be configured are described below:

Parameter	Description
Profile ID (1-5)	Enter a unique identifier number for this profile set. This value can be set from 1 to 5.

Select ACL Type	<p>Select profile based on Ethernet (MAC Address), IPv4 address, IPv6 address, or packet content mask. This will change the menu according to the requirements for the type of profile.</p> <p>Select Ethernet ACL to instruct the Switch to examine the layer 2 part of each packet header.</p> <p>Select IPv4 ACL to instruct the Switch to examine the IP address in each frame's header.</p> <p>Select IPv6 ACL to instruct the Switch to examine the IP address in each frame's header.</p> <p>Select Packet Content ACL to specify a mask to hide the content of the packet header.</p>
IPv6 Class	Checking this field will instruct the Switch to examine the <i>class</i> field of the IPv6 header. This class field is a part of the packet header that is similar to the Type of Service (ToS) or Precedence bits field in IPv4.
IPv6 Flow Label	Checking this field will instruct the Switch to examine the <i>flow label</i> field of the IPv6 header. This flow label field is used by a source to label sequences of packets such as non-default quality of service or real time service packets.
IPv6 Source Mask	The user may specify an IPv6 address mask for the source IPv6 address by checking the corresponding box and entering the IPv6 address mask.
IPv6 Destination Mask	The user may specify an IPv6 address mask for the destination IPv6 address by checking the corresponding box and entering the IPv6 address mask.

Click the **Select** button to select a CPU ACL type. Click the **Create** button to create a profile.

Click the **<<Back** button to discard the changes made and return to the previous page.

After clicking the **Show Details** button, the following page will appear:

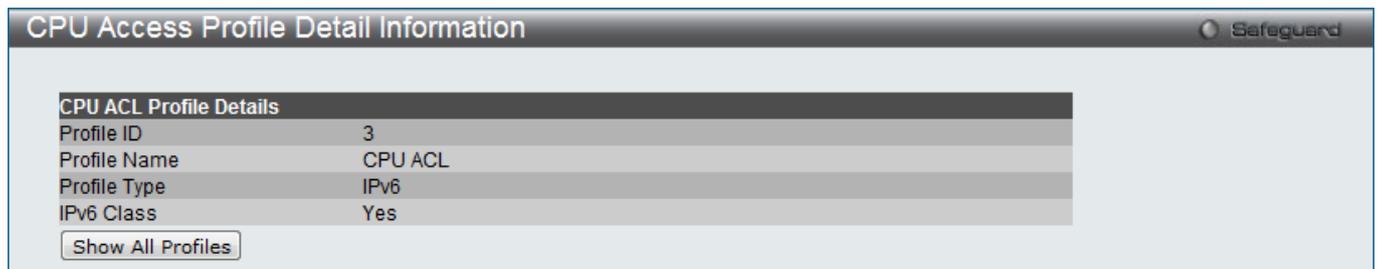


Figure 8-35 CPU Access Profile Detail Information (IPv6 ACL)

Click the **Show All Profiles** button to navigate back to the **CPU ACL Profile List** window.

After clicking the **Add/View Rules** button, the following page will appear:

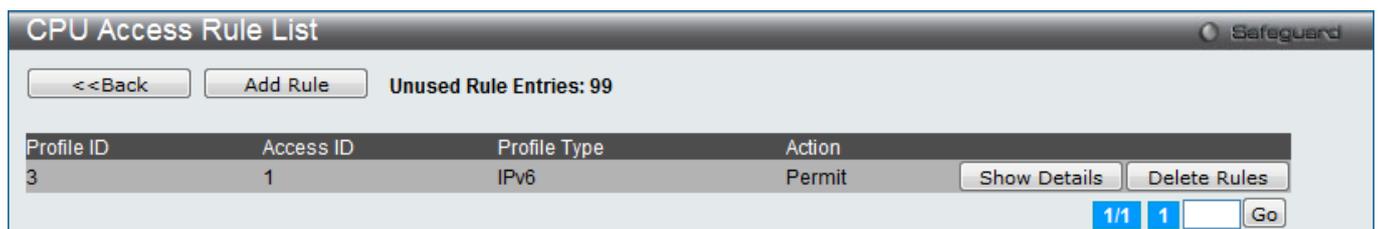


Figure 8-36 CPU Access Rule List (IPv6 ACL)

Click the **Add Rule** button to create a new CPU ACL rule in this profile.

Click the **<<Back** button to return to the previous page.

Click the **Show Details** button to view more information about the specific rule created.

Click the **Delete Rules** button to remove the specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

After clicking the **Add Rule** button, the following page will appear:

Figure 8-37 Add CPU Access Rule (IPv6 ACL)

The fields that can be configured are described below:

Parameter	Description
Access ID (1-100)	Enter a unique identifier number for this access. This value can be set from 1 to 100. Auto Assign – Tick the check box will instruct the Switch to automatically assign an Access ID for the rule being created.
Class	Enter the IPv6 class value used here.
Action	Select <i>Permit</i> to specify that the packets that match the access profile are forwarded by the Switch, according to any additional rule added (see below). Select <i>Deny</i> to specify that the packets that match the access profile are not forwarded by the Switch and will be filtered.

Time Range Name	Tick the check box and enter the name of the Time Range settings that has been previously configured in the Time Range Settings window. This will set specific times when this access rule will be implemented on the Switch.
Ports	Ticking the All Ports check box will denote all ports on the Switch.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

After clicking the **Show Details** button in the **CPU Access Rule List**, the following page will appear:

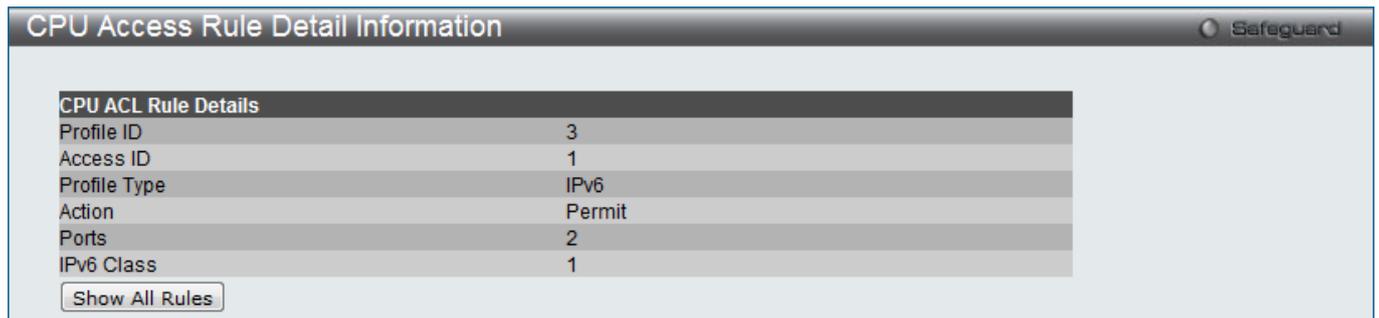


Figure 8-38 CPU Access Rule Detail Information (IPv6 ACL)

Click the **Show All Rules** button to navigate back to the CPU Access Rule List.

Adding a CPU Packet Content ACL Profile

The window shown below is the Add CPU ACL Profile window for Packet Content. To use specific filtering masks in this ACL profile, click the packet filtering mask field to highlight it red. This will add more files to the mask.

After clicking the **Add CPU ACL Profile** button, the following page will appear:

Add CPU ACL Profile Safeguard

Profile ID (1-5)

Select ACL Type

Ethernet ACL IPv4 ACL

IPv6 ACL Packet Content ACL Select

You can select the field in the packet to create filtering mask

Packet Content

Packet Content

Offset 0-15 mask

Offset 16-31 mask

Offset 32-47 mask

Offset 48-63 mask

Offset 64-79 mask

<<Back Create

Figure 8-39 Add CPU ACL Profile (Packet Content ACL)

The fields that can be configured are described below:

Parameter	Description
Profile ID (1-5)	Here the user can enter a unique identifier number for this profile set. This value can be set from 1 to 5.
Select ACL Type	<p>Select profile based on Ethernet (MAC Address), IPv4 address, IPv6 address, or packet content mask. This will change the menu according to the requirements for the type of profile.</p> <p>Select Ethernet ACL to instruct the Switch to examine the layer 2 part of each packet header.</p> <p>Select IPv4 ACL to instruct the Switch to examine the IP address in each frame's header.</p> <p>Select IPv6 ACL to instruct the Switch to examine the IP address in each frame's header.</p> <p>Select Packet Content ACL to specify a mask to hide the content of the packet header.</p>
Offset	<p>This field will instruct the Switch to mask the packet header beginning with the offset value specified:</p> <p><i>0-15</i> - Enter a value in hex form to mask the packet from the beginning of the packet to the 15th byte.</p> <p><i>16-31</i> – Enter a value in hex form to mask the packet from byte 16 to byte 31.</p> <p><i>32-47</i> – Enter a value in hex form to mask the packet from byte 32 to byte 47.</p> <p><i>48-63</i> – Enter a value in hex form to mask the packet from byte 48 to byte 63.</p> <p><i>64-79</i> – Enter a value in hex form to mask the packet from byte 64 to byte 79.</p>

Click the **Select** button to select a CPU ACL type. Click the **Create** button to create a profile.

Click the **<<Back** button to discard the changes made and return to the previous page.

After clicking the **Show Details** button, the following page will appear:

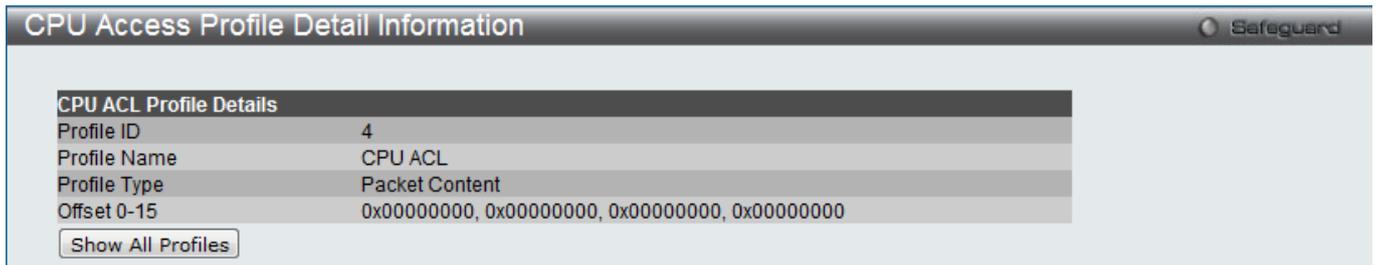


Figure 8-40 CPU Access Profile Detail Information (Packet Content ACL)

Click the **Show All Profiles** button to navigate back to the **CPU ACL Profile List** window.

After clicking the **Add/View Rules** button, the following page will appear:

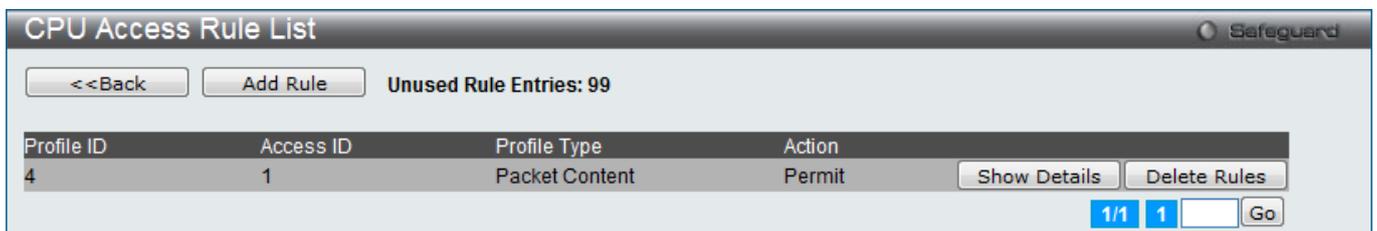


Figure 8-41 CPU Access Rule List (Packet Content ACL)

Click the **Add Rule** button to create a new CPU ACL rule in this profile.

Click the **<<Back** button to return to the previous page.

Click the **Show Details** button to view more information about the specific rule created.

Click the **Delete Rules** button to remove the specific entry.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

After clicking the **Add Rule** button, the following page will appear:

Add CPU Access Rule
Safeguard

Profile Information

Profile ID	4	Profile Name	CPU ACL
Profile Type	Packet Content	Offset 0-15	0x00000000, 0x00000000, 0x00000000, 0x00000000

Rule Detail

(Keep the input field blank to specify that the corresponding option does not matter).

Access ID (1-100)

Offset 0-15

Rule Action

Action Permit ▼

Time Range Name

Ports (e.g.: 1, 4-6, 9)

<<Back
Apply

Figure 8-42 Add CPU Access Rule (Packet Content ACL)

The fields that can be configured are described below:

Parameter	Description
Access ID (1-100)	Type in a unique identifier number for this access. This value can be set from 1 to 100. Auto Assign – Tick the check box will instruct the Switch to automatically assign an Access ID for the rule being created.
Offset	Select and enter the offset value used here.
Action	Select <i>Permit</i> to specify that the packets that match the access profile are forwarded by the Switch, according to any additional rule added (see below). Select <i>Deny</i> to specify that the packets that match the access profile are not forwarded by the Switch and will be filtered.
Time Range Name	Tick the check box and enter the name of the Time Range settings that has been previously configured in the Time Range Settings window. This will set specific times when this access rule will be implemented on the Switch.
Ports	Ticking the All Ports check box will denote all ports on the Switch.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

After clicking the **Show Details** button in the **CPU Access Rule List**, the following page will appear:

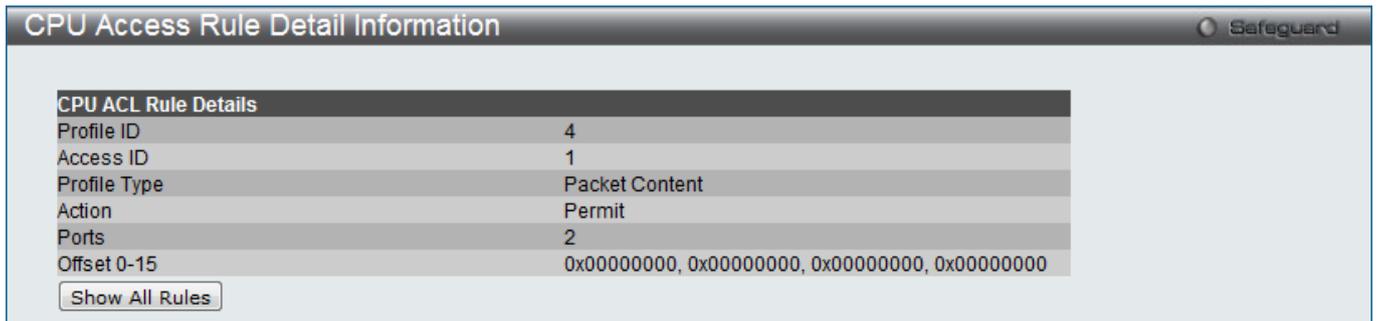


Figure 8-43 CPU Access Rule Detail Information (Packet Content ACL)

Click the **Show All Rules** button to navigate back to the CPU Access Rule List.

ACL Finder

The ACL rule finder helps you to identify any rules that have been assigned to a specific port and edit existing rules quickly.

To view this window, click **ACL > ACL Finder** as shown below:

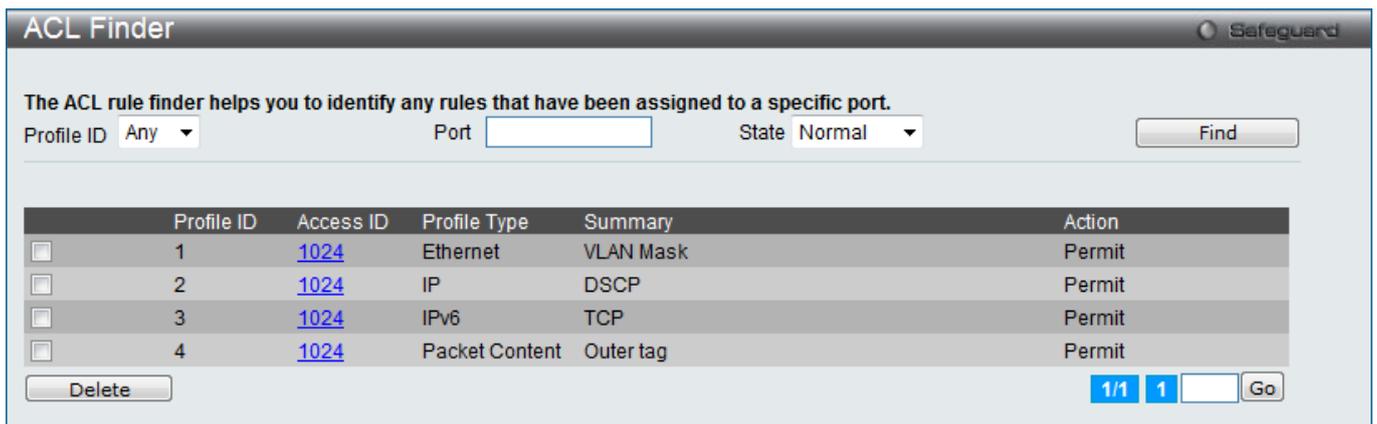


Figure 8-44 ACL Finder window

The fields that can be configured are described below:

Parameter	Description
Profile ID	Use the drop-down menu to select the Profile ID for the ACL rule finder to identify the rule.
Port	Enter the port number for the ACL rule finder to identify the rule.
State	Use the drop-down menu to select the state. <i>Normal</i> - Allow the user to find normal ACL rules. <i>CPU</i> - Allow the user to find CPU ACL rules.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Delete** button to remove the specific entry selected.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

ACL Flow Meter

Before configuring the ACL Flow Meter, here is a list of acronyms and terms users will need to know.

trTCM – Two Rate Three Color Marker. This, along with the srTCM, are two methods available on the switch for metering and marking packet flow. The trTCM meters and IP flow and marks it as a color based on the flow's surpassing of two rates, the CIR and the PIR.

CIR – Committed Information Rate. Common to both the trTCM and the srTCM, the CIR is measured in bytes of IP packets. IP packet bytes are measured by taking the size of the IP header but not the link specific headers. For the trTCM, the packet flow is marked green if it doesn't exceed the CIR and yellow if it does. The configured rate of the CIR must not exceed that of the PIR. The CIR can also be configured for unexpected packet bursts using the CBS and PBS fields.

CBS – Committed Burst Size. Measured in bytes, the CBS is associated with the CIR and is used to identify packets that exceed the normal boundaries of packet size. The CBS should be configured to accept the biggest IP packet that is expected in the IP flow.

PIR – Peak Information Rate. This rate is measured in bytes of IP packets. IP packet bytes are measured by taking the size of the IP header but not the link specific headers. If the packet flow exceeds the PIR, that packet flow is marked red. The PIR must be configured to be equal or more than that of the CIR.

PBS – Peak Burst Size. Measured in bytes, the PBS is associated with the PIR and is used to identify packets that exceed the normal boundaries of packet size. The PBS should be configured to accept the biggest IP packet that is expected in the IP flow.

srTCM – Single Rate Three Color Marker. This, along with the trTCM, are two methods available on the switch for metering and marking packet flow. The srTCM marks its IP packet flow based on the configured CBS and EBS. A packet flow that does not reach the CBS is marked green, if it exceeds the CBS but not the EBS its marked yellow, and if it exceeds the EBS its marked red.

CBS – Committed Burst Size. Measured in bytes, the CBS is associated with the CIR and is used to identify packets that exceed the normal boundaries of packet size. The CBS should be configured to accept the biggest IP packet that is expected in the IP flow.

EBS – Excess Burst Size. Measured in bytes, the EBS is associated with the CIR and is used to identify packets that exceed the boundaries of the CBS packet size. The EBS is to be configured for an equal or larger rate than the CBS.

DSCP – Differentiated Services Code Point. The part of the packet header where the color will be added. Users may change the DSCP field of incoming packets.

The ACL Flow Meter function will allow users to color code IP packet flows based on the rate of incoming packets. Users have two types of Flow metering to choose from, trTCM and srTCM, as explained previously. When a packet flow is placed in a color code, the user can choose what to do with packets that have exceeded that color-coded rate.

Green – When an IP flow is in the green mode, its configurable parameters can be set in the Conform field, where the packets can have their DSCP field changed. This is an acceptable flow rate for the ACL Flow Meter function.

Yellow – When an IP flow is in the yellow mode, its configurable parameters can be set in the Exceed field. Users may choose to either Permit or Drop exceeded packets. Users may also choose to change the DSCP field of the packets.

Red – When an IP flow is in the red mode, its configurable parameters can be set in the Violate field. Users may choose to either Permit or Drop exceeded packets. Users may also choose to change the DSCP field of the packets.

Users may also choose to count exceeded packets by clicking the Counter check box. If the counter is enabled, the counter setting in the access profile will be disabled. Users may only enable two counters for one flow meter at any given time.

To view this window, click **ACL > ACL Flow Meter**, as shown below:

Figure 8-45 ACL Flow Meter

The fields that can be configured are described below:

Parameter	Description
Profile ID	Enter the Profile ID for the flow meter.
Profile Name	Enter the Profile Name for the flow meter.
Access ID (1-128)	Enter the Access ID for the flow meter.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Add** button to add a new entry based on the information entered.

Click the **View All** button to display all the existing entries.

Click the **Delete All** button to remove all the entries listed.

Click the **Modify** button to re-configure the specific entry.

Click the **View** button to display the information of the specific entry.

Click the **Delete** button to remove the specific entry.

After clicking the **Add** or **Modify** button, the following page will appear:

ACL Flow Meter Configuration				
<input checked="" type="radio"/> Profile ID (1-12)	<input type="text"/>			
<input type="radio"/> Profile Name	<input type="text"/>			
Access ID (1-128)	<input type="text"/>			
Mode	<input checked="" type="radio"/> Rate	Rate (Kbps)	<input type="text"/> (0-1000000)	
		Burst Size (Kbyte)	<input type="text"/> (0-16384)	
		Rate Exceeded	<input type="radio"/> Drop Packet	
			<input checked="" type="radio"/> Remark DSCP	<input type="text"/> (0-63)
	<input type="radio"/> trTCM	CIR (Kbps)	<input type="text"/> (0-1000000)	
		PIR (Kbps)	<input type="text"/> (0-1000000)	
		CBS (Kbyte)	<input type="text"/> (0-16384)	
		PBS (Kbyte)	<input type="text"/> (0-16384)	
	<input type="radio"/> srTCM	CIR (Kbps)	<input type="text"/> (0-1000000)	
		CBS (Kbyte)	<input type="text"/> (0-16384)	
EBS (Kbyte)		<input type="text"/> (0-16384)		
TCM Color		<input checked="" type="radio"/> Color Blind <input type="radio"/> Color Aware		
Action	Conform	<input type="checkbox"/> Replace DSCP	<input type="text"/> (0-63)	
		Counter	Disabled ▾	
	Exceed <input checked="" type="radio"/> Permit <input type="radio"/> Drop	<input type="checkbox"/> Replace DSCP	<input type="text"/> (0-63)	
		Counter	Disabled ▾	
	Violate <input checked="" type="radio"/> Permit <input type="radio"/> Drop	<input type="checkbox"/> Replace DSCP	<input type="text"/> (0-63)	
		Counter	Disabled ▾	
		<input type="button" value=" <<Back"/>	<input type="button" value="Apply"/>	

Figure 8-46 ACL Flow meter Configuration window

The fields that can be configured are described below:

Parameter	Description
Profile ID	Here the user can enter the Profile ID for the flow meter.
Profile Name	Here the user can enter the Profile Name for the flow meter.
Access ID	Here the user can enter the Access ID for the flow meter.
Mode	<p>Rate – Specify the rate for single rate two color mode.</p> <p><i>Rate</i> – Specify the committed bandwidth in Kbps for the flow.</p> <p><i>Burst Size</i> – Specify the burst size for the single rate two color mode. The unit is in kilobyte.</p> <p><i>Rate Exceeded</i> – Specify the action for packets that exceed the committed rate in single rate two color mode. The action can be specified as one of the following:</p> <p><i>Drop Packet</i> – Drop the packet immediately.</p> <p><i>Remark DSCP</i> – Mark the packet with a specified DSCP. The packet is set to drop for packets with a high precedence.</p> <p>trTCM – Specify the “two-rate three-color mode.”</p> <p><i>CIR</i> – Specify the Committed information Rate. The unit is Kbps. CIR should always be equal or less than PIR.</p> <p><i>PIR</i> – Specify the Peak information Rate. The unit is Kbps. PIR should always be equal to or greater than CIR.</p>

	<p>CBS – Specify the Committed Burst Size. The unit is in kilobyte.</p> <p>PBS – Specify the Peak Burst Size. The unit is in kilobyte.</p> <p>srTCM – Specify the “single-rate three-color mode”.</p> <p>CIR – Specify the Committed Information Rate. The unit is in kilobyte.</p> <p>CBS – Specify the Committed Burst Size. The unit is in kilobyte.</p> <p>EBS – Specify the Excess Burst Size. The unit is in kilobyte.</p> <p>TCM Color – Specifies the TCM color meter mode.</p> <p><i>Color Blind</i> - Specifies the meter mode as color-blind. The default is color-blind mode.</p> <p><i>Color Aware</i> - Specifies the meter mode as color-aware. The final color of the packet is determined by the initial color of the packet and the metering result.</p>
Action	<p>Conform – This field denotes the green packet flow. Green packet flows may have their <i>DSCP</i> field rewritten to a value stated in this field. Users may also choose to count green packets by using counter parameter.</p> <p><i>Replace DSCP</i> – Packets that are in the green flow may have their DSCP field rewritten using this parameter and entering the DSCP value to replace.</p> <p><i>Counter</i> – Use this parameter to enable or disable the packet counter for the specified ACL entry in the green flow.</p> <p>Exceed – This field denotes the yellow packet flow. Yellow packet flows may have excess packets permitted through or dropped. Users may replace the DSCP field of these packets by checking its radio button and entering a new DSCP value in the allotted field.</p> <p><i>Counter</i> – Use this parameter to enable or disable the packet counter for the specified ACL entry in the yellow flow.</p> <p>Violate – This field denotes the red packet flow. Red packet flows may have excess packets permitted through or dropped. Users may replace the DSCP field of these packets by checking its radio button and entering a new DSCP value in the allotted field.</p> <p><i>Counter</i> – Use this parameter to enable or disable the packet counter for the specified ACL entry in the red flow.</p>

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **Apply** button to accept the changes made.

After clicking the **View** button, the following page will appear:

ACL Flow Meter Display			
Profile ID	1		
Access ID	1		
Mode	Rate	Rate (Kbps)	1000000
		Burst Size (Kbyte)	16384
		Rate Exceeded	Remark DSCP
<<Back			

Figure 8-47 ACL Flow meter Display window

Click the **<<Back** button to return to the previous page.

Chapter 9 Security

802.1X

RADIUS

IP-MAC-Port Binding (IMPB)

MAC-based Access Control (MAC)

Web-based Access Control (WAC)

Compound Authentication

Port Security

ARP Spoofing Prevention Settings

BPDU Attack Protection

Loopback Detection Settings

Traffic Segmentation Settings

NetBIOS Filtering Settings

DHCP Server Screening

Access Authentication Control

SSL Settings

SSH

Trusted Host Settings

Safeguard Engine Settings

802.1X

802.1X (Port-Based and Host-Based Access Control)

The IEEE 802.1X standard is a security measure for authorizing and authenticating users to gain access to various wired or wireless devices on a specified Local Area Network by using a Client and Server based access control model. This is accomplished by using a RADIUS server to authenticate users trying to access a network by relaying Extensible Authentication Protocol over LAN (EAPOL) packets between the Client and the Server. The following figure represents a basic EAPOL packet:

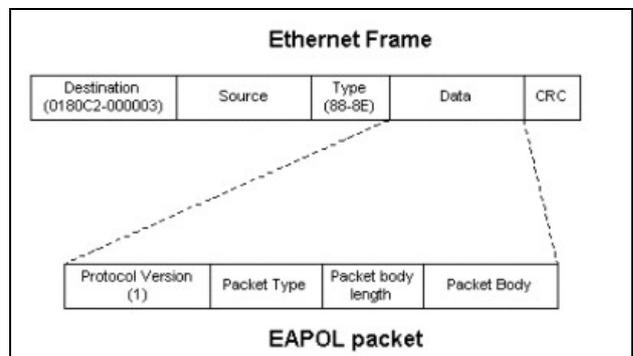


Figure 9-1 The EAPOL Packet

Utilizing this method, unauthorized devices are restricted from connecting to a LAN through a port to which the user is connected. EAPOL packets are the only traffic that can be transmitted through the specific port until authorization is granted. The 802.1X Access Control method has three roles, each of which are vital to creating and up keeping a stable and working Access Control security method.

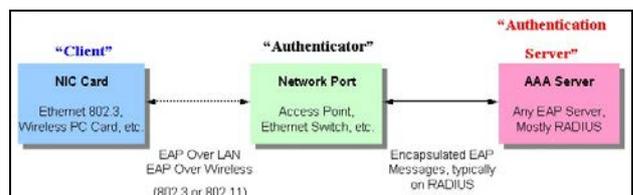


Figure 9-2 The three roles of 802.1X

The following section will explain the three roles of Client, Authenticator and Authentication Server in greater detail.

Authentication Server

The Authentication Server is a remote device that is connected to the same network as the Client and Authenticator, must be running a RADIUS Server program and must be configured properly on the Authenticator (Switch). Clients connected to a port on the Switch must be authenticated by the Authentication Server (RADIUS) before attaining any services offered by the Switch on the LAN. The role of the Authentication Server is to certify the identity of the Client attempting to access the network by exchanging secure information between the RADIUS server and the Client through EAPOL packets and, in turn, informs the Switch whether or not the Client is granted access to the LAN and/or switches services.

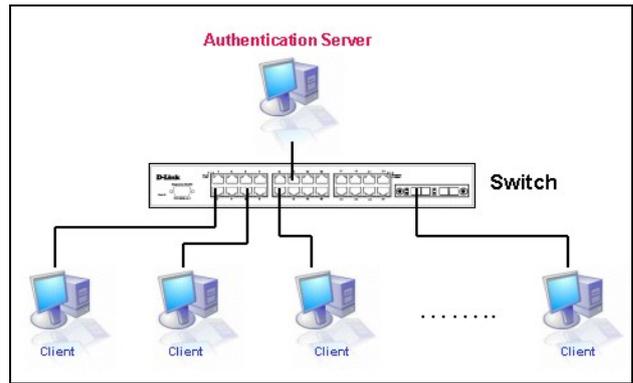


Figure 9-3 The Authentication Server

Authenticator

The Authenticator (the Switch) is an intermediary between the Authentication Server and the Client. The Authenticator serves two purposes when utilizing the 802.1X function. The first purpose is to request certification information from the Client through EAPOL packets, which is the only information allowed to pass through the Authenticator before access is granted to the Client. The second purpose of the Authenticator is to verify the information gathered from the Client with the Authentication Server, and to then relay that information back to the Client.

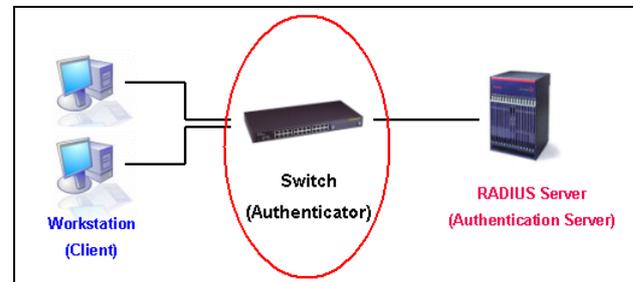


Figure 9-4 The Authenticator

Three steps must be implemented on the Switch to properly configure the Authenticator.

1. The 802.1X State must be *Enabled*. (**Security / 802.1X / 802.1X Settings**)
2. The 802.1X settings must be implemented by port (**Security / 802.1X / 802.1X Settings**)
3. A RADIUS server must be configured on the Switch. (**Security / 802.1X / Authentic RADIUS Server**)

Client

The Client is simply the end station that wishes to gain access to the LAN or switch services. All end stations must be running software that is compliant with the 802.1X protocol. For users running Windows XP and Windows Vista, that software is included within the operating system. All other users are required to attain 802.1X client software from an outside source. The Client will request access to the LAN and or Switch through EAPOL packets and, in turn will respond to requests from the Switch.

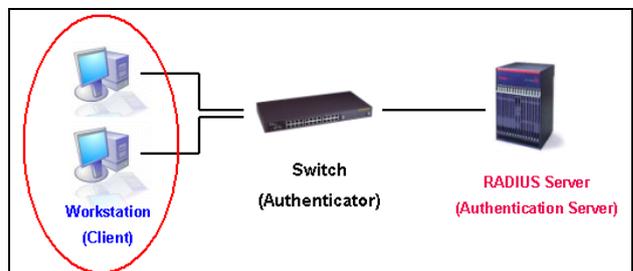


Figure 9-5 The Client

Authentication Process

Utilizing the three roles stated above, the 802.1X protocol provides a stable and secure way of authorizing and authenticating users attempting to access the network. Only EAPOL traffic is allowed to pass through the specified port before a successful authentication is made. This port is “locked” until the point when a Client with the correct username and password (and MAC address if 802.1X is enabled by MAC address) is granted access and therefore successfully “unlocks” the port. Once unlocked, normal traffic is allowed to pass through the port. The following figure displays a more detailed explanation of how the authentication process is completed between the three roles stated above.

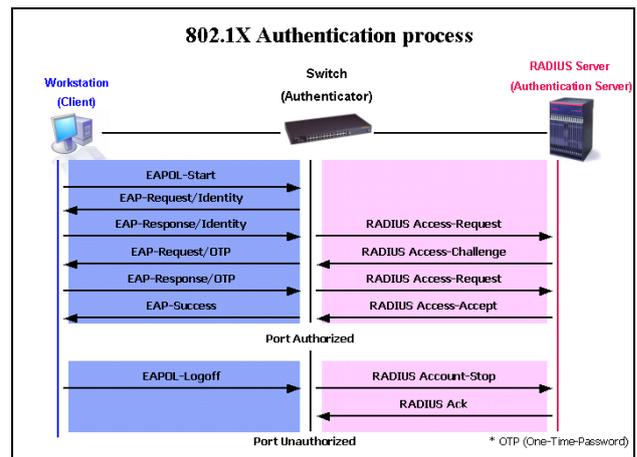


Figure 9-6 The 802.1X Authentication Process

The D-Link implementation of 802.1X allows network administrators to choose between two types of Access Control used on the Switch, which are:

- Port-Based Access Control – This method requires only one user to be authenticated per port by a remote RADIUS server to allow the remaining users on the same port access to the network.
- Host-Based Access Control – Using this method, the Switch will automatically learn up to a maximum of 448 MAC addresses by port and set them in a list. Each MAC address must be authenticated by the Switch using a remote RADIUS server before being allowed access to the Network.

Understanding 802.1X Port-based and Host-based Network Access Control

The original intent behind the development of 802.1X was to leverage the characteristics of point-to-point in LANs. As any single LAN segment in such infrastructures has no more than two devices attached to it, one of which is a Bridge Port. The Bridge Port detects events that indicate the attachment of an active device at the remote end of the link, or an active device becoming inactive. These events can be used to control the authorization state of the Port and initiate the process of authenticating the attached device if the Port is unauthorized. This is the Port-Based Network Access Control.

Port-based Network Access Control

Once the connected device has successfully been authenticated, the Port then becomes Authorized, and all subsequent traffic on the Port is not subject to access control restriction until an event occurs that causes the Port to become Unauthorized. Hence, if the Port is actually connected to a shared media LAN segment with more than one attached device, successfully authenticating one of the attached devices effectively provides access to the LAN for all devices on the shared segment. Clearly, the security offered in this situation is open to attack.

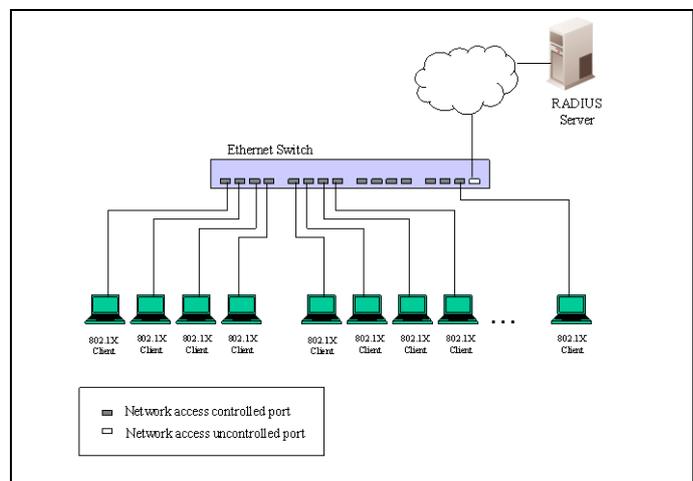


Figure 9-7 Example of Typical Port-based Configuration

Host-based Network Access Control

In order to successfully make use of 802.1X in a shared media LAN segment, it would be necessary to create “logical” Ports, one for each attached device that required access to the LAN. The Switch would regard the single physical Port connecting it to the shared media segment as consisting of a number of distinct logical Ports, each logical Port being independently controlled from the point of view of EAPOL exchanges and authorization state. The Switch learns each attached devices’ individual MAC addresses, and effectively creates a logical Port that the attached device can then use to communicate with the LAN via the Switch.

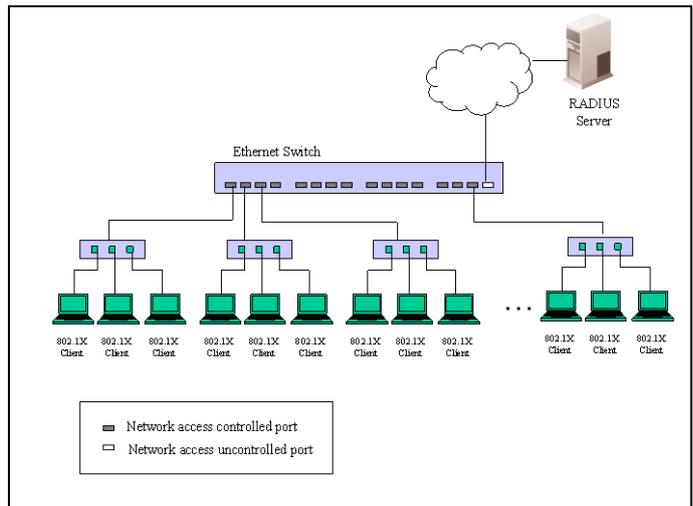


Figure 9-8 Example of Typical Host-based Configuration

802.1X Global Settings

Users can configure the 802.1X global parameter.

To view this window, click **Security > 802.1X > 802.1X Global Settings** as shown below:



Figure 9-9 802.1X Global Settings window

The fields that can be configured are described below:

Parameter	Description
Authentication State	Use the drop-down menu to enable or disable the 802.1X function.
Authentication Protocol	Choose the authenticator protocol, <i>Local</i> or <i>RADIUS EAP</i> .
Forward EAPOL PDU	This is a global setting to control the forwarding of EAPOL PDU. When 802.1X functionality is disabled globally or for a port, and if 802.1X forward PDU is enabled both globally and for the port, a received EAPOL packet on the port will be flooded in the same VLAN to those ports for which 802.1X forward PDU is enabled and 802.1X is disabled (globally or just for the port). The default state is disabled.
Max Users	Specifies the maximum number of users. The limit on the maximum users is 1536

	users. This the No Limit check box to have unlimited users.
RADIUS Authorization	This option is used to enable or disable acceptance of authorized configuration. When the authorization is enabled for 802.1X's RADIUS, the authorized data assigned by the RADIUS server will be accepted if the global authorization network is enabled.

Click the **Apply** button to accept the changes made.

802.1X Port Settings

Users can configure the 802.1X authenticator port settings.

To view this window, click **Security > 802.1X > 802.1X Port Settings** as shown below:

802.1X Port Settings Safeguard

802.1X Port Access Control

From Port: 01 To Port: 01

QuietPeriod (0-65535): 60 sec SuppTimeout (1-65535): 30 sec

ServerTimeout (1-65535): 30 sec MaxReq (1-10): 2 times

TxPeriod (1-65535): 30 sec ReAuthPeriod (1-65535): 3600 sec

ReAuthentication: Disabled Port Control: Auto

Capability: None Direction: Both

Forward EAPOL PDU: Disabled Max User (1-128): 128 No Limit

Buttons: Refresh, Apply

Port	AdmDir	OpenCrIDir	Port Control	TX Period	Quiet Period	Supp-Timeout	Server-Timeout	MaxReq	ReAuth Period	ReAuth	Capability	Forward EAPOL PDU	Max User
1	Both	Both	Auto	30	60	30	30	2	3600	Disabled	None	Disabled	128
2	Both	Both	Auto	30	60	30	30	2	3600	Disabled	None	Disabled	128
3	Both	Both	Auto	30	60	30	30	2	3600	Disabled	None	Disabled	128
4	Both	Both	Auto	30	60	30	30	2	3600	Disabled	None	Disabled	128
5	Both	Both	Auto	30	60	30	30	2	3600	Disabled	None	Disabled	128
6	Both	Both	Auto	30	60	30	30	2	3600	Disabled	None	Disabled	128
7	Both	Both	Auto	30	60	30	30	2	3600	Disabled	None	Disabled	128
8	Both	Both	Auto	30	60	30	30	2	3600	Disabled	None	Disabled	128
9	Both	Both	Auto	30	60	30	30	2	3600	Disabled	None	Disabled	128
10	Both	Both	Auto	30	60	30	30	2	3600	Disabled	None	Disabled	128
11	Both	Both	Auto	30	60	30	30	2	3600	Disabled	None	Disabled	128
12	Both	Both	Auto	30	60	30	30	2	3600	Disabled	None	Disabled	128

Figure 9-10 802.1X Port Settings

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select a range of ports you wish to configure.
QuietPeriod	This allows the user to set the number of seconds that the Switch remains in the quiet state following a failed authentication exchange with the client. The default setting is 60 seconds.
SuppTimeout	This value determines timeout conditions in the exchanges between the Authenticator and the client. The default setting is 30 seconds. It is defined in SuppTimeout, IEEE-802.1X-2001, page 47. The initialization value is used for the awhile timer when timing out the Supplicant. Its default value is 30 seconds; however, if the type of challenge

	involved in the current exchange demands a different value of timeout (for example, if the challenge requires an action on the part of the user), then the timeout value is adjusted accordingly. It can be set by management to any value in the range from 1 to 65535 seconds.
ServerTimeout	This value determines timeout conditions in the exchanges between the Authenticator and the authentication server. The default setting is 30 seconds.
MaxReq	The maximum number of times that the Switch will retransmit an EAP Request to the client before it times out of the authentication sessions. The default setting is 2. It is defined in MaxReq, IEEE-802.1X-2001 page 47. The maximum number of times that the state machine will retransmit an EAP Request packet to the Supplicant before it times out the authentication session. Its default value is 2; it can be set by management to any value in the range from 1 to 10.
TxPeriod	This sets the TxPeriod of time for the authenticator PAE state machine. This value determines the period of an EAP Request/Identity packet transmitted to the client. The default setting is 30 seconds.
ReAuthPeriod	A constant that defines a nonzero number of seconds between periodic re-authentication of the client. The default setting is 3600 seconds.
ReAuthentication	Determines whether regular re-authentication will take place on this port. The default setting is <i>Disabled</i> .
Port Control	<p>This allows the user to control the port authorization state.</p> <p>Select <i>ForceAuthorized</i> to disable 802.1X and cause the port to transition to the authorized state without any authentication exchange required. This means the port transmits and receives normal traffic without 802.1X-based authentication of the client.</p> <p>If <i>ForceUnauthorized</i> is selected, the port will remain in the unauthorized state, ignoring all attempts by the client to authenticate. The Switch cannot provide authentication services to the client through the interface.</p> <p>If <i>Auto</i> is selected, it will enable 802.1X and cause the port to begin in the unauthorized state, allowing only EAPOL frames to be sent and received through the port. The authentication process begins when the link state of the port transitions from down to up, or when an EAPOL-start frame is received. The Switch then requests the identity of the client and begins relaying authentication messages between the client and the authentication server.</p> <p>The default setting is <i>Auto</i>.</p>
Capability	This allows the 802.1X Authenticator settings to be applied on a per-port basis. Select <i>Authenticator</i> to apply the settings to the port. When the setting is activated, a user must pass the authentication process to gain access to the network. Select <i>None</i> to disable 802.1X functions on the port.
Direction	Sets the administrative-controlled direction to <i>Both</i> or <i>In</i> . If <i>Both</i> is selected, control is exerted over both incoming and outgoing traffic through the controlled port selected in the first field. If <i>In</i> is selected, the control is only exerted over incoming traffic through the port the user selected in the first field.

Forward EAPOL PDU	This is a port-based setting to control the forwarding of EAPOL PDU. When 802.1X functionality is disabled globally or for a port, and if 802.1X forward PDU is enabled both globally and for the port, a received EAPOL packet on the port will be flooded in the same VLAN to those ports for which 802.1X forward PDU is enabled and 802.1X is disabled (globally or just for the port). The default state is disabled.
Max Users	Specifies the maximum number of users. The maximum user limit is 1792 users. The default is 16.

Click the **Refresh** button to refresh the display table so that new entries will appear.

Click the **Apply** button to accept the changes made.

802.1X User Settings

Users can set different 802.1X users in switch's local database.

To view this window, click **Security > 802.1X > 802.1X User Settings** as shown below:

Figure 9-11 802.1X User Settings window

The fields that can be configured are described below:

Parameter	Description
802.1X User	The user can enter an 802.1X user's username in here.
Password	The user can enter an 802.1X user's password in here.
Confirm Password	The user can re-enter an 802.1X user's password in here.

Click the **Apply** button to accept the changes made.

Click the **Delete** button to remove the specific entry.



NOTE: The **802.1X User** and **Password** values should be less than 16 characters.

Guest VLAN Settings

On 802.1X security-enabled networks, there is a need for non- 802.1X supported devices to gain limited access to the network, due to lack of the proper 802.1X software or incompatible devices, such as computers running Windows 98 or older operating systems, or the need for guests to gain access to the network without full authorization or local authentication on the Switch. To supplement these circumstances, this switch now implements 802.1X Guest VLANs. These VLANs should have limited access rights and features separate from other VLANs on the network.

To implement 802.1X Guest VLANs, the user must first create a VLAN on the network with limited rights and then enable it as an 802.1X guest VLAN. Then the administrator must configure the guest accounts accessing the Switch to be placed in a Guest VLAN when trying to access the Switch. Upon initial entry to the Switch, the client wishing services on the Switch will need to be authenticated by a remote RADIUS Server or local authentication on the Switch to be placed in a fully operational VLAN.

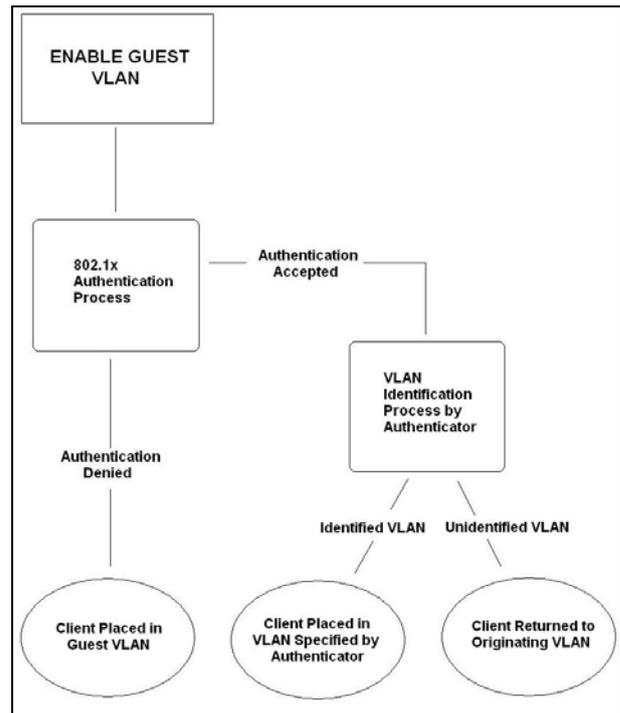


Figure 9-12 Guest VLAN Authentication Process

If authenticated and the authenticator possess the VLAN placement information, that client will be accepted into the fully operational target VLAN and normal switch functions will be open to the client. If the authenticator does not have target VLAN placement information, the client will be returned to its originating VLAN. Yet, if the client is denied authentication by the authenticator, it will be placed in the Guest VLAN where it has limited rights and access. The adjacent figure should give the user a better understanding of the Guest VLAN process.

Limitations Using the Guest VLAN

1. Ports supporting Guest VLANs cannot be GVRP enabled and vice versa.
2. A port cannot be a member of a Guest VLAN and a static VLAN simultaneously.
3. Once a client has been accepted into the target VLAN, it can no longer access the Guest VLAN.

Remember, to set an 802.1X guest VLAN, the user must first configure a normal VLAN, which can be enabled here for guest VLAN status. Only one VLAN may be assigned as the 802.1X guest VLAN.

To view this window, click **Security > 802.1X > Guest VLAN Settings** as shown below:

Port	01	02	03	04	05	06	07	08	09	10	11	12
All	<input type="checkbox"/>											

Figure 9-13 Guest VLAN Settings window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	Enter the pre-configured VLAN name to create as an 802.1X guest VLAN.
Port	Set the ports to be enabled for the 802.1X guest VLAN. Click the All button to select all the ports.

Click the **Apply** button to accept the changes made.

Click the **Delete** button to remove the specific entry based on the information entered.

Authenticator State

This window is used to display the authenticator state.



NOTE: The user must first globally enable **Authentication Mode** in the Error! Reference source not found. window before initializing ports. Information in this window cannot be viewed before enabling the authentication mode for either **Port-based** or **MAC-based**.

To view this window, click **Security > 802.1X > Authenticator State** as shown below:

Figure 9-14 Authenticator State window

The fields that can be configured are described below:

Parameter	Description
Port	Select a port to be displayed.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Refresh** button to refresh the display table so that new entries will appear.

Authenticator Statistics

This window is used to display the authenticator statistics information.

To view this window, click **Security > 802.1X > Authenticator Statistics** as shown below:

Port	Frames RX	Frames TX	RX Start	TX ReqId	RX LogOff	TX Rec
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0

Figure 9-15 Authenticator Statistics window



NOTE: The user must first globally enable **Authentication Mode** in the **Error! Reference source not found.** window before initializing ports. Information in this window cannot be viewed before enabling the authentication mode for either **Port-based** or **MAC-based**.

Authenticator Session Statistics

This window is used to display the authenticator session statistics information.

To view this window, click **Security > 802.1X > Authenticator Session Statistics** as shown below:

Authenticator Session Statistics				
Port	Octets RX	Octets TX	Frames RX	Frames TX
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0

Figure 9-16 Authenticator Session Statistics window



NOTE: The user must first globally enable **Authentication Mode** in the **Error! Reference source not found.** window before initializing ports. Information in this window cannot be viewed before enabling the authentication mode for either **Port-based** or **MAC-based**.

Authenticator Diagnostics

This window is used to display the authenticator diagnostics information.

To view this window, click **Security > 802.1X > Authenticator Diagnostics** as shown below:

Authenticator Diagnostics					
Port	Connect Enter	Connect LogOff	Auth Enter	Auth Success	Auth Tim
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0

Figure 9-17 Authenticator Diagnostics window



NOTE: The user must first globally enable **Authentication Mode** in the **Error! Reference source not found.** window before initializing ports. Information in this window cannot be viewed before enabling the authentication mode for either **Port-based** or **MAC-based**.

Initialize Port-based Port(s)

This window is used to display the authenticator diagnostics information.

To view this window, click **Security > 802.1X > Initialize Port-based Port(s)** as shown below:

Initialize Port(s)						
From Port	01	To Port	01			
				Apply		
Port	MAC Address	PAE State	Backend State	Status	VID	Priority

Figure 9-18 Initialize Port-based Port(s) window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select a range of ports to be displayed.

Click the **Apply** button to accept the changes made.



NOTE: The user must first globally enable **Authentication Mode** in the **Error! Reference source not found.** window before initializing ports. Information in this window cannot be viewed before enabling the authentication mode for either **Port-based** or **MAC-based**.

Initialize MAC-based Port(s)

This window is used to display the current initialized host-based ports.

To view this window, click **Security > 802.1X > Initialize MAC-based Port(s)** as shown below:

Figure 9-19 Initialize MAC-based Port(s) window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select a range of ports to be displayed.
MAC Address	Tick the check box and enter the authenticated MAC address of the client connected to the corresponding port.

Click the **Apply** button to accept the changes made.



NOTE: The user must first globally enable **Authentication Mode** in the **Error! Reference source not found.** window before initializing ports. Information in this window cannot be viewed before enabling the authentication mode for either **Port-based** or **MAC-based**.

Reauthenticate Port-based Port(s)

This window is used to display the current status of the re-authenticated port-based port(s).

To view this window, click **Security > 802.1X > Reauthenticate Port-based Port(s)** as shown below:

The screenshot shows a web interface window titled "Reauthenticate Port(s)" with a "Safeguard" icon in the top right. Below the title bar, there are two dropdown menus for "From Port" and "To Port", both set to "01". To the right of these is an "Apply" button. Below the dropdowns is a table with the following columns: Port, MAC Address, PAE State, Backend State, Status, VID, and Priority.

Figure 9-20 Reauthenticate Port-based Port(s) window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select a range of ports to be displayed.

Click the **Apply** button to accept the changes made.



NOTE: The user must first globally enable **Authentication Mode** in the **Error! Reference source not found.** window before initializing ports. Information in this window cannot be viewed before enabling the authentication mode for either **Port-based** or **MAC-based**.

Reauthenticate MAC-based Port(s)

This window is used to display the current status of the re-authenticated host-based port(s).

To view this window, click **Security > 802.1X > Reauthenticate MAC-based Port(s)** as shown below:

The screenshot shows a web interface window titled "Reauthenticate Port(s)" with a "Safeguard" icon in the top right. Below the title bar, there are two dropdown menus for "From Port" and "To Port", both set to "01". To the right of these is a checkbox labeled "MAC Address" which is unchecked, followed by an empty text input field. To the right of the input field is an "Apply" button.

Figure 9-21 Reauthenticate MAC-based Port(s) window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select a range of ports to be displayed.
MAC Address	Tick the check box and enter the authenticated MAC address of the client connected to the corresponding port.

Click the **Apply** button to accept the changes made.



NOTE: The user must first globally enable **Authentication Mode** in the **Error! Reference source not found.** window before initializing ports. Information in this window cannot be viewed before enabling the authentication mode for either **Port-based** or **MAC-based**.

RADIUS

Authentication RADIUS Server Settings

The RADIUS feature of the Switch allows the user to facilitate centralized user administration as well as providing protection against a sniffing, active hacker.

To view this window, click **Security > RADIUS > Authentication RADIUS Server Settings** as shown below:

Figure 9-22 Authentication RADIUS Server Settings window

The fields that can be configured are described below:

Parameter	Description
Index	Choose the desired RADIUS server to configure: 1, 2 or 3 and select the IPv4 Address.
IPv4 Address	Set the RADIUS server IP address.
IPv6 Address	Set the RADIUS server IPv6 address.
Authentication Port (1-65535)	Set the RADIUS authentication server(s) UDP port which is used to transmit RADIUS data between the Switch and the RADIUS server.
Accounting Port (1-65535)	Set the RADIUS account server(s) UDP port which is used to transmit RADIUS accounting statistics between the Switch and the RADIUS server.
Timeout (1-255)	Set the RADIUS server age-out, in seconds.
Retransmit (1-20)	Set the RADIUS server retransmit time, in times.
Key	Set the key the same as that of the RADIUS server.

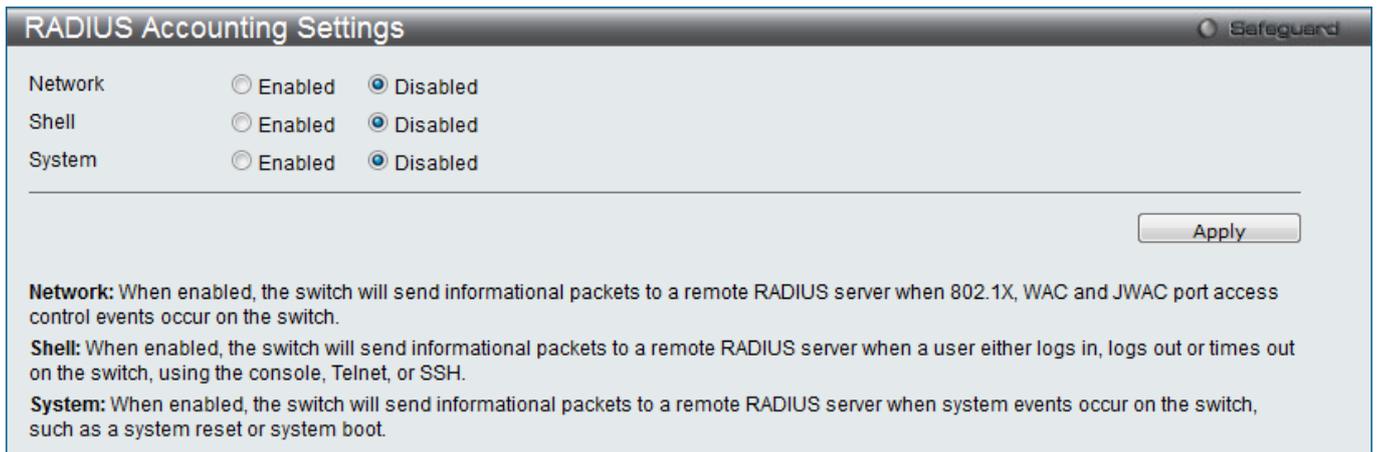
Confirm Key	Confirm the key the same as that of the RADIUS server.
--------------------	--------------------------------------------------------

Click the **Apply** button to accept the changes made.

RADIUS Accounting Settings

Users can configure the state of the specified RADIUS accounting service.

To view this window, click **Security > RADIUS > RADIUS Accounting Settings** as shown below:



Network Enabled Disabled

Shell Enabled Disabled

System Enabled Disabled

Apply

Network: When enabled, the switch will send informational packets to a remote RADIUS server when 802.1X, WAC and JWAC port access control events occur on the switch.

Shell: When enabled, the switch will send informational packets to a remote RADIUS server when a user either logs in, logs out or times out on the switch, using the console, Telnet, or SSH.

System: When enabled, the switch will send informational packets to a remote RADIUS server when system events occur on the switch, such as a system reset or system boot.

Figure 9-23 RADIUS Accounting Settings window

The fields that can be configured are described below:

Parameter	Description
Network	When enabled, the Switch will send informational packets to a remote RADIUS server when 802.1X and WAC port access control events occur on the Switch.
Shell	When enabled, the Switch will send informational packets to a remote RADIUS server when a user either logs in, logs out or times out on the Switch, using the console, Telnet, or SSH.
System	When enabled, the Switch will send informational packets to a remote RADIUS server when system events occur on the Switch, such as a system reset or system boot.

Click the **Apply** button to accept the changes made.

RADIUS Authentication

Users can display information concerning the activity of the RADIUS authentication client on the client side of the RADIUS authentication protocol.

To view this window, click **Security > RADIUS > RADIUS Authentication** as shown below:

ServerIndex	InvalidServerAddr	Identifier	AuthServerAddr	ServerPortNumber	RoundTripTime
1	0			0	0
2	0			0	0
3	0			0	0

Figure 9-24 RADIUS Authentication window

The user may also select the desired time interval to update the statistics, between *1s* and *60s*, where “s” stands for seconds. The default value is one second.

The fields that can be configured are described below:

Parameter	Description
ServerIndex	The identification number assigned to each RADIUS Authentication server that the client shares a secret with.
InvalidServerAddr	The number of RADIUS Access-Response packets received from unknown addresses.
Identifier	The NAS-Identifier of the RADIUS authentication client.
AuthServerAddr	The (conceptual) table listing the RADIUS authentication servers with which the client shares a secret.
ServerPortNumber	The UDP port the client is using to send requests to this server.
RoundTripTime	The time interval (in hundredths of a second) between the most recent Access-Reply/Access-Challenge and the Access-Request that matched it from this RADIUS authentication server.
AccessRequests	The number of RADIUS Access-Request packets sent to this server. This does not include retransmissions.
AccessRetrans	The number of RADIUS Access-Request packets retransmitted to this RADIUS authentication server.
AccessAccepts	The number of RADIUS Access-Accept packets (valid or invalid) received from this server.
AccessRejects	The number of RADIUS Access-Reject packets (valid or invalid) received from this server.
AccessChallenges	The number of RADIUS Access-Challenge packets (valid or invalid) received from

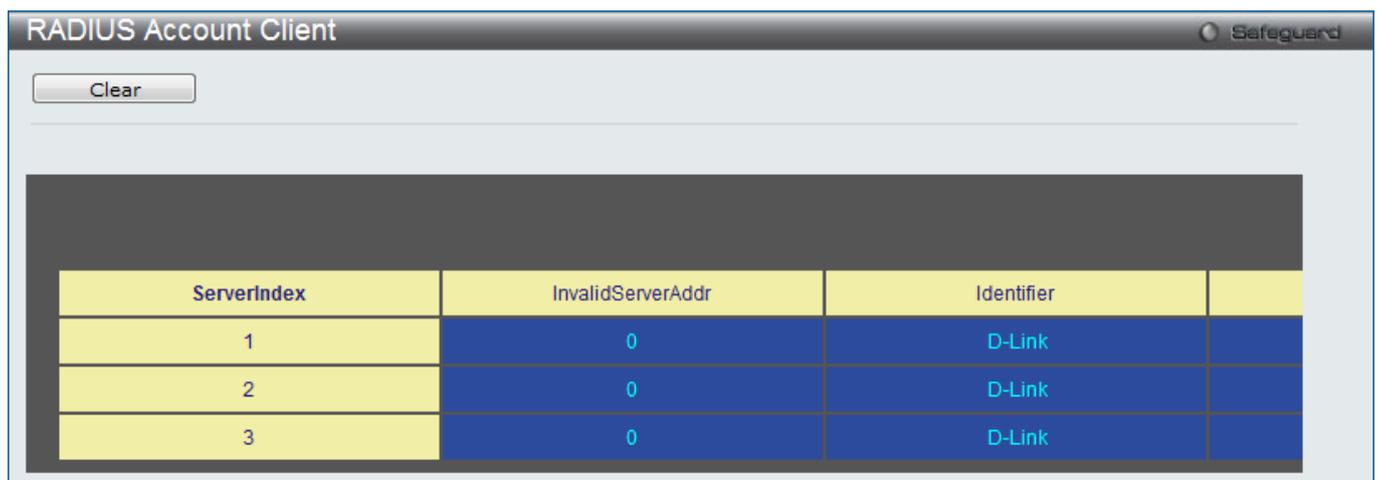
	this server.
AccessResponses	The number of malformed RADIUS Access-Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators or Signature attributes or known types are not included as malformed access responses.
BadAuthenticators	The number of RADIUS Access-Response packets containing invalid authenticators or Signature attributes received from this server.
PendingRequests	The number of RADIUS Access-Request packets destined for this server that have not yet timed out or received a response. This variable is incremented when an Access-Request is sent and decremented due to receipt of an Access-Accept, Access-Reject or Access-Challenge, a timeout or retransmission.
Timeouts	The number of authentication timeouts to this server. After a timeout the client may retry to the same server, send to a different server, or give up. A retry to the same server is counted as a retransmit as well as a timeout. A send to a different server is counted as a Request as well as a timeout.
UnknownTypes	The number of RADIUS packets of unknown type which were received from this server on the authentication port
PacketsDropped	The number of RADIUS packets of which were received from this server on the authentication port and dropped for some other reason.

Click the **Clear** button to clear the current statistics shown.

RADIUS Account Client

Users can display managed objects used for managing RADIUS accounting clients, and the current statistics associated with them.

To view this window, click **Security > RADIUS > RADIUS Account Client** as shown below:



ServerIndex	InvalidServerAddr	Identifier	
1	0	D-Link	
2	0	D-Link	
3	0	D-Link	

Figure 9-25 RADIUS Account Client window

The user may also select the desired time interval to update the statistics, between 1s and 60s, where “s” stands for seconds. The default value is one second.

The fields that can be configured are described below:

Parameter	Description
ServerIndex	The identification number assigned to each RADIUS Accounting server that the client shares a secret with.
InvalidServerAddr	The number of RADIUS Accounting-Response packets received from unknown addresses.
Identifier	The NAS-Identifier of the RADIUS accounting client.
ServerAddr	The IP address of the RADIUS authentication server referred to in this table entry.
ServerPortNumber	The UDP port the client is using to send requests to this server.
RoundTripTime	The time interval between the most recent Accounting-Response and the Accounting-Request that matched it from this RADIUS accounting server.
Requests	The number of RADIUS Accounting-Request packets sent. This does not include retransmissions.
Retransmissions	The number of RADIUS Accounting-Request packets retransmitted to this RADIUS accounting server. Retransmissions include retries where the Identifier and Acct-Delay have been updated, as well as those in which they remain the same.
Responses	The number of RADIUS packets received on the accounting port from this server.
MalformedResponses	The number of malformed RADIUS Accounting-Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators and unknown types are not included as malformed accounting responses.
BadAuthenticators	The number of RADIUS Accounting-Response packets, which contained invalid authenticators, received from this server.
PendingRequests	The number of RADIUS Accounting-Request packets sent to this server that have not yet timed out or received a response. This variable is incremented when an Accounting-Request is sent and decremented due to receipt of an Accounting-Response, a timeout or a retransmission.
Timeouts	The number of accounting timeouts to this server. After a timeout the client may retry to the same server, send to a different server, or give up. A retry to the same server is counted as a retransmit as well as a timeout. A send to a different server is counted as an Accounting-Request as well as a timeout.
UnknownTypes	The number of RADIUS packets of unknown type which were received from this server on the accounting port.
PacketsDropped	The number of RADIUS packets, which were received from this server on the accounting port and dropped for some other reason.

Click the **Clear** button to clear the current statistics shown.

IP-MAC-Port Binding (IMPB)

The IP network layer uses a IPv4/IPv6 address. The Ethernet link layer uses a MAC address. Binding these two address types together allows the transmission of data between the layers. The primary purpose of IP-MAC-port binding is to restrict the access to a switch to a number of authorized users. Authorized clients can access a switch's port by either checking the pair of IP-MAC addresses with the pre-configured database or if DHCP snooping has been enabled in which case the switch will automatically learn the IP/MAC pairs by snooping DHCP packets and saving them to the IMPB white list. If an unauthorized user tries to access an IP-MAC binding enabled port, the system will block the access by dropping its packet. For the DGS-3710 Series switch, active and inactive entries use the same database. The maximum number of IPv4/IPv6 entries is 510/511. The creation of authorized users can be manually configured by CLI or Web. The function is port-based, meaning a user can enable or disable the function on the individual port.

IMPB Global Settings

Users can enable or disable the Trap/Log State and DHCP Snoop state on the Switch. The Trap/Log field will enable and disable the sending of trap/log messages for IP-MAC-port binding. When enabled, the Switch will send a trap message to the SNMP agent and the Switch log when an ARP/IP packet is received that doesn't match the IP-MAC-port binding configuration set on the Switch.

To view this window, click **Security > IP-MAC-Port Binding (IMPB) > IMPB Global Settings** as shown below:

Figure 9-26 IMPB Global Settings window

The fields that can be configured are described below:

Parameter	Description
Trap / Log	Click the radio buttons to enable or disable the sending of trap/log messages for IP-MAC-port binding. When <i>Enabled</i> , the Switch will send a trap message to the SNMP agent and the Switch log when an ARP/IP packet is received that doesn't match the IP-MAC-port binding configuration set on the Switch. The default is <i>Disabled</i> .
DHCP Snoop (IPv4)	Click the radio buttons to enable or disable the DHCP snooping State for IPv4-MAC-port binding. The default is <i>Disabled</i> .
DHCP Snoop (IPv6)	Click the radio buttons to enable or disable the DHCP snooping State for IPv6-MAC-port binding. The default is <i>Disabled</i> .
ND Snoop	Click the radio buttons to enable or disable the ND snooping State for IP-MAC-port binding. The default is <i>Disabled</i> .
Recover Learning	Enter the port numbers used to recover the learning port state. Tick the All check

Ports	box to apply to all ports.
--------------	----------------------------

Click the **Apply** button to accept the changes made for each individual section.

IMPB Port Settings

Select a port or a range of ports with the From Port and To Port fields. Enable or disable the port with the State, Allow Zero IP and Forward DHCP Packet field, and configure the port's Max Entry.

To view this window, click **Security > IP-MAC-Port Binding (IMPB) > IMPB Port Settings** as shown below:

The screenshot shows the 'IMPB Port Settings' window with a 'Safeguard' indicator. At the top, there are configuration fields: 'From Port' (01), 'To Port' (01), 'IPv4 State' (Disabled), 'IPv6 State' (Disabled), 'Zero IP' (Disabled), 'DHCP Packet' (Enabled), 'Mode' (ARP), and 'Stop Learning Threshold' (500). An 'Apply' button is located to the right of the threshold field. Below these fields is a table with 7 columns: Port, IPv4 State, IPv6 State, Mode, Zero IP, DHCP Packet, and Stop Learning Threshold/Mode. The table lists ports 1 through 12, all with 'Disabled' IPv4 and IPv6 states, 'ARP' mode, 'Not Allow' Zero IP, 'Forward' DHCP Packet, and '500/Normal' Stop Learning Threshold/Mode.

From Port	To Port	IPv4 State	IPv6 State	Zero IP	DHCP Packet	Mode	Stop Learning Threshold
01	01	Disabled	Disabled	Disabled	Enabled	ARP	(0-500)

Port	IPv4 State	IPv6 State	Mode	Zero IP	DHCP Packet	Stop Learning Threshold/Mode
1	Disabled	Disabled	ARP	Not Allow	Forward	500/Normal
2	Disabled	Disabled	ARP	Not Allow	Forward	500/Normal
3	Disabled	Disabled	ARP	Not Allow	Forward	500/Normal
4	Disabled	Disabled	ARP	Not Allow	Forward	500/Normal
5	Disabled	Disabled	ARP	Not Allow	Forward	500/Normal
6	Disabled	Disabled	ARP	Not Allow	Forward	500/Normal
7	Disabled	Disabled	ARP	Not Allow	Forward	500/Normal
8	Disabled	Disabled	ARP	Not Allow	Forward	500/Normal
9	Disabled	Disabled	ARP	Not Allow	Forward	500/Normal
10	Disabled	Disabled	ARP	Not Allow	Forward	500/Normal
11	Disabled	Disabled	ARP	Not Allow	Forward	500/Normal
12	Disabled	Disabled	ARP	Not Allow	Forward	500/Normal

Figure 9-27 IMPB Port Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select a range of ports to set for IP-MAC-port binding.
IPv4 State	<p>When the ARP inspection function is enabled, for IPv4, the legal ARP packets are forwarded, while the illegal packets are dropped.</p> <p><i>Disabled</i> - Disable the ARP inspection function.</p> <p><i>Enabled (Strict)</i> - This mode disables hardware learning of the MAC address. All packets are dropped by default until a legal ARP or IP packets are detected. When enabling this mode, the Switch stops writing dropped FDB entries on these ports. If detecting legal packets, the Switch needs to write forward FDB entry.</p> <p><i>Enabled (Loose)</i> - In this mode, all packets are forwarded by default until an illegal ARP or broadcast IP packet is detected.</p> <p>The default value is Disabled.</p>
IPv6 State	<p>When the ARP inspection function is enabled, for IPv6, the legal ARP packets are forwarded, while the illegal packets are dropped.</p> <p><i>Disabled</i> - Disable the ARP inspection function.</p> <p><i>Enabled (Strict)</i> - This mode disables hardware learning of the MAC address. All</p>

	<p>packets are dropped by default until a legal ARP or IP packets are detected. When enabling this mode, the Switch stops writing dropped FDB entries on these ports. If detecting legal packets, the Switch needs to write forward FDB entry.</p> <p>The default value is Disabled.</p>
Zero IP	Use the drop-down menu to enable or disable this feature. Allow zero IP configures the state which allows ARP packets with 0.0.0.0 source IP to bypass.
DHCP Packet	By default, the DHCP packet with broadcast DA will be flooded. When set to disable, the broadcast DHCP packet received by the specified port will not be forwarded in strict mode. This setting is effective when DHCP snooping is enabled, in the case when a DHCP packet which has been trapped by the CPU needs to be forwarded by the software. This setting controls the forwarding behavior in this situation.
Mode	Use the drop-down menu to select the IMPB port setting mode. Options to choose from are <i>ARP</i> and <i>ACL</i> .
Stop Learning Threshold	Here is displayed the number of blocked entries on the port. The default value is 500.

Click the **Apply** button to accept the changes made.

IMPB Entry Settings

This window is used to create static IP-MAC-binding port entries and view all IMPB entries on the Switch.

To view this window, click **Security > IP-MAC-Port Binding (IMPB) > IMPB Entry Settings** as shown below:

Figure 9-28 IMPB Entry Settings window

The fields that can be configured are described below:

Parameter	Description
IPv4 Address	Enter the IPv4 address to bind to the MAC address.
IPv6 Address	Enter the IPv6 address to bind to the MAC address.
MAC Address	Enter the MAC address to bind to the IP Address set above.
Ports	Specify the switch ports for which to configure this IP-MAC binding entry (IP Address + MAC Address). Tick the All Ports check box to configure this entry for all ports on

the Switch.

Click the **Apply** button to accept the changes made.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **View All** button to display all the existing entries.

Click the **Delete All** button to remove all the entries listed.

Click the **Edit** button to configure the specified entry.

Click the **Delete** button to remove the specified entry.

MAC Block List

This window is used to view unauthorized devices that have been blocked by IP-MAC binding restrictions.

To view this window, click **Security > IP-MAC-Port Binding (IMPB) > MAC Block List** as shown below:

Figure 9-29 MAC Block List window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	Enter a VLAN Name.
MAC Address	Enter a MAC address.

Click the **Find** button to find an unauthorized device that has been blocked by the IP-MAC binding restrictions

Click the **View All** button to display all the existing entries.

Click the **Delete All** button to remove all the entries listed.

DHCP Snooping

DHCP Snooping Maximum Entry Settings

Users can configure the maximum DHCP snooping entry for ports on this page.

To view this window, click **Security > IP-MAC-Port Binding (IMPB) > DHCP Snooping > DHCP Snooping Maximum Entry Settings** as shown below:

Port	Maximum Entry	Maximum IPv6 Entry
1	No Limit	No Limit
2	No Limit	No Limit
3	No Limit	No Limit
4	No Limit	No Limit
5	No Limit	No Limit
6	No Limit	No Limit
7	No Limit	No Limit
8	No Limit	No Limit
9	No Limit	No Limit
10	No Limit	No Limit
11	No Limit	No Limit
12	No Limit	No Limit

Figure 9-30 DHCP Snooping Max Entry Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Use the drop-down menus to select a range of ports to use.
Maximum Entry (1-50)	Enter the maximum entry value used for IPv4. Tick the No Limit check box to have unlimited maximum number of the learned entries.
Maximum IPv6 Entry (1-50)	Enter the maximum entry value used for IPv6. Tick the No Limit check box to have unlimited maximum number of the learned entries.

Click the **Apply** button to accept the changes made.

DHCP Snooping Entry

This window is used to view dynamic entries on specific ports.

To view this window, click **Security > IP-MAC-Port Binding (IMPB) > DHCP Snooping > DHCP Snooping Entry** as shown below:

Figure 9-31 DHCP Snooping Entry window

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

Port	Use the drop-down menu to select the desired port.
Ports	Specify the ports for DHCP snooping entries. Tick the All Ports check box to select all entries for all ports.
IPv4	Tick this option to search for IPv4 based entries.
IPv6	Tick this option to search for IPv6 based entries.

Click the **Find** button to locate a specific entry based on the port number selected.

Click the **Clear** button to clear all the information entered in the fields.

Click the **View All** button to display all the existing entries.

ND Snoop

The ND Snoop section includes ND Snoop Maximum Entry Settings and ND Snoop Entry.

ND Snoop Maximum Entry Settings

This window is used to configure ND snooping maximum entry settings.

To view this window, click **Security > IP-MAC-Port Binding > ND Snoop > ND Snoop Maximum Entry Settings**, as shown below:

Port	Maximum Entry
1	No Limit
2	No Limit
3	No Limit
4	No Limit
5	No Limit
6	No Limit
7	No Limit
8	No Limit
9	No Limit
10	No Limit
11	No Limit
12	No Limit

Figure 9-32 ND Snoop Maximum Entry Settings Window

The fields that can be configured are described below:

Parameter	Description
From Port ~ To Port	Specifies the list of ports that will be used for this configuration.
Maximum Entry	Enter the maximum number of entries. The range is 1 to 10. Alternatively, tick the No Limit check box.

Click the **Apply** button to accept the changes made.

ND Snoop Entry

This window is used to configure ND snooping entry settings.

To view this window, click **Security > IP-MAC-Port Binding > ND Snoop > ND Snoop Entry**, as shown below:

Figure 9-33 ND Snoop Entry Window

The fields that can be configured are described below:

Parameter	Description
Port	Use the drop-down menu to select a port.
Ports	Enter the desired ports or tick the All Ports check box.

Click the **Find** button to locate a specific entry based on the port number selected.

Click the **Clear** button to clear all the information entered in the fields.

Click the **View All** button to display all the existing entries.

MAC-based Access Control (MAC)

MAC-based access control is a method to authenticate and authorize access using either a port or host. For port-based MAC-based access control, the method decides port access rights, while for host-based MAC-based access control, the method determines the MAC access rights.

A MAC user must be authenticated before being granted access to a network. Both local authentication and remote RADIUS server authentication methods are supported. In MAC-based access control, MAC user information in a local database or a RADIUS server database is searched for authentication. Following the authentication result, users achieve different levels of authorization.

Notes about MAC-based Access Control

There are certain limitations and regulations regarding MAC-based access control:

1. Once this feature is enabled for a port, the Switch will clear the FDB of that port.
2. If a port is granted clearance for a MAC address in a VLAN that is not a Guest VLAN, other MAC addresses on that port must be authenticated for access and otherwise will be blocked by the Switch.
3. Ports that have been enabled for Link Aggregation and Port Security cannot be enabled for MAC-based Authentication.
4. Ports that have been enabled for GVRP cannot be enabled for Guest VLAN.

MAC-based Access Control Settings

This window is used to set the parameters for the MAC-based access control function on the Switch. The user can set the running state, method of authentication, RADIUS password, view the Guest VLAN configuration to be associated with the MAC-based access control function of the Switch, and configure ports to be enabled or disabled for the MAC-based access control feature of the Switch. Please remember, ports enabled for certain other features, listed previously, and cannot be enabled for MAC-based access control.

To view this window, click **Security > MAC-based Access Control (MAC) > MAC-based Access Control Settings** as shown below:

MAC-based Access Control Global Settings

MAC-based Access Control State: Enabled Disabled Apply

Method: Local Password: default

RADIUS Authorization: Enabled Local Authorization: Enabled

Trap State: Enabled Log State: Enabled

Max User (1-1000): No Limit Apply

Guest VLAN Settings

VLAN Name: VID (1-4094): Member Ports (e.g.: 1, 5-9): Apply

Port Settings

From Port	To Port	State	Mode	Aging Time (1-1440)	Block Time (1-300)	Max User (1-1000)
01	01	Disabled	Host-based	1440 min <input type="checkbox"/> Infinite	300 sec <input type="checkbox"/> Infinite	128 <input type="checkbox"/> No Limit

Port	State	Mode	Aging Time (min)	Block Time (sec)	Max User
1	Disabled	Host-based	1440	300	128
2	Disabled	Host-based	1440	300	128

Figure 9-34 MAC-based Access Control Settings window

The fields that can be configured are described below:

Parameter	Description
MAC-based Access Control State	Toggle to globally enable or disable the MAC-based access control function on the Switch.
Method	Use this drop-down menu to choose the type of authentication to be used when authentication MAC addresses on a given port. The user may choose between the following methods: <i>Local</i> – Use this method to utilize the locally set MAC address database as the authenticator for MAC-based access control. This MAC address list can be configured in the MAC-based access control Local Database Settings window. <i>RADIUS</i> – Use this method to utilize a remote RADIUS server as the authenticator for MAC-based access control. Remember, the MAC list must be previously set on the RADIUS server.
RADIUS	Use the drop-down menu to enable or disable the use of RADIUS Authorization.

Authorization	
Max User (1-1000)	Enter the maximum amount of users of the Switch. Tick the No Limit check box to have unlimited users.
Password	Enter the password for the RADIUS server, which is to be used for packets being sent requesting authentication. The default password is "default".
Local Authorization	Use the drop-down menu to enable or disable the use of Local Authorization.
Trap State	This option specifies the trap option's state for MAC-based access control.
Log State	This option specifies the log option's state for MAC-based access control.
VLAN Name	Enter the name of the previously configured Guest VLAN being used for this function.
Member Ports	Enter the list of ports that have been configured for the Guest VLAN.
VID	Click the radio button and enter a Guest VLAN ID.
From Port / To Port	Use the drop-down menus to select a range of ports to be configured for MAC-based access control.
State	Use this drop-down menu to enable or disable MAC-based access control on the port or range of ports selected in the Port Settings section of this window.
Mode	Select the MAC-based Access Control mode used here. Options to choose from are Port-based and Host-based .
Aging Time (1-1440)	Enter a value between 1 and 1440 minutes. The default is 1440. To set this value to have no aging time, select the Infinite option.
Block Time (0-300)	Enter a value between 0 and 300 seconds. The default is 300.
Max User (1-1000)	Enter the maximum user used for this configuration. When No Limit is selected, there will be no user limit applied to this rule.

Click the **Apply** button to accept the changes made for each individual section.

MAC-based Access Control Local Settings

Users can set a list of MAC addresses, along with their corresponding target VLAN, which will be authenticated for the Switch. Once a queried MAC address is matched in this window, it will be placed in the VLAN associated with it here. The Switch administrator may enter up to 128 MAC addresses to be authenticated using the local method configured here.

To view this window, click **Security > MAC-based Access Control (MAC) > MAC-based Access Control Local Settings** as shown below:

Figure 9-35 MAC-based Access Control Local Settings window

The fields that can be configured are described below:

Parameter	Description
MAC address	Enter the MAC address that will be added to the local authentication list here.
VLAN Name	Enter the VLAN name of the corresponding MAC address here.
VID (1-4094)	Enter the VLAN ID of the corresponding MAC address here.

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete by MAC** button to remove the specific entry based on the MAC address entered.

Click the **Delete by VLAN** button to remove the specific entry based on the VLAN name or ID entered.

Click the **Find by MAC** button to locate a specific entry based on the MAC address entered.

Click the **Find by VLAN** button to locate a specific entry based on the VLAN name or ID entered.

Click the **View All** button to display all the existing entries.

Click the **Edit by Name** button to change the specific MAC address' VLAN name.

Click the **Edit by ID** button to change the specific MAC address' VLAN ID.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

MAC-based Access Control Authentication State

This window displays MAC-based access control Authentication State information.

To view this window, click **Security > MAC-based Access Control (MAC) > MAC-based Access Control Authentication State** as shown below:

Figure 9-36 MAC-based Access Control Authentication State window

The fields that can be configured are described below:

Parameter	Description
Port List	Enter a list of ports.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Clear by Port** button to clear all the information linked to the port number entered.

Click the **View All Hosts** button to display all the existing hosts.

Click the **Clear All hosts** button to clear out all the existing hosts.

Web-based Access Control (WAC)

Web-based Authentication Login is a feature designed to authenticate a user when the user is trying to access the Internet via the Switch. The authentication process uses the HTTP or HTTPS protocol. The Switch enters the authenticating stage when users attempt to browse Web pages (e.g., <http://www.dlink.com>) through a Web browser. When the Switch detects HTTP or HTTPS packets and this port is un-authenticated, the Switch will launch a pop-up user name and password window to query users. Users are not able to access the Internet until the authentication process is passed.

The Switch can be the authentication server itself and do the authentication based on a local database, or be a RADIUS client and perform the authentication process via the RADIUS protocol with a remote RADIUS server. The client user initiates the authentication process of WAC by attempting to gain Web access.

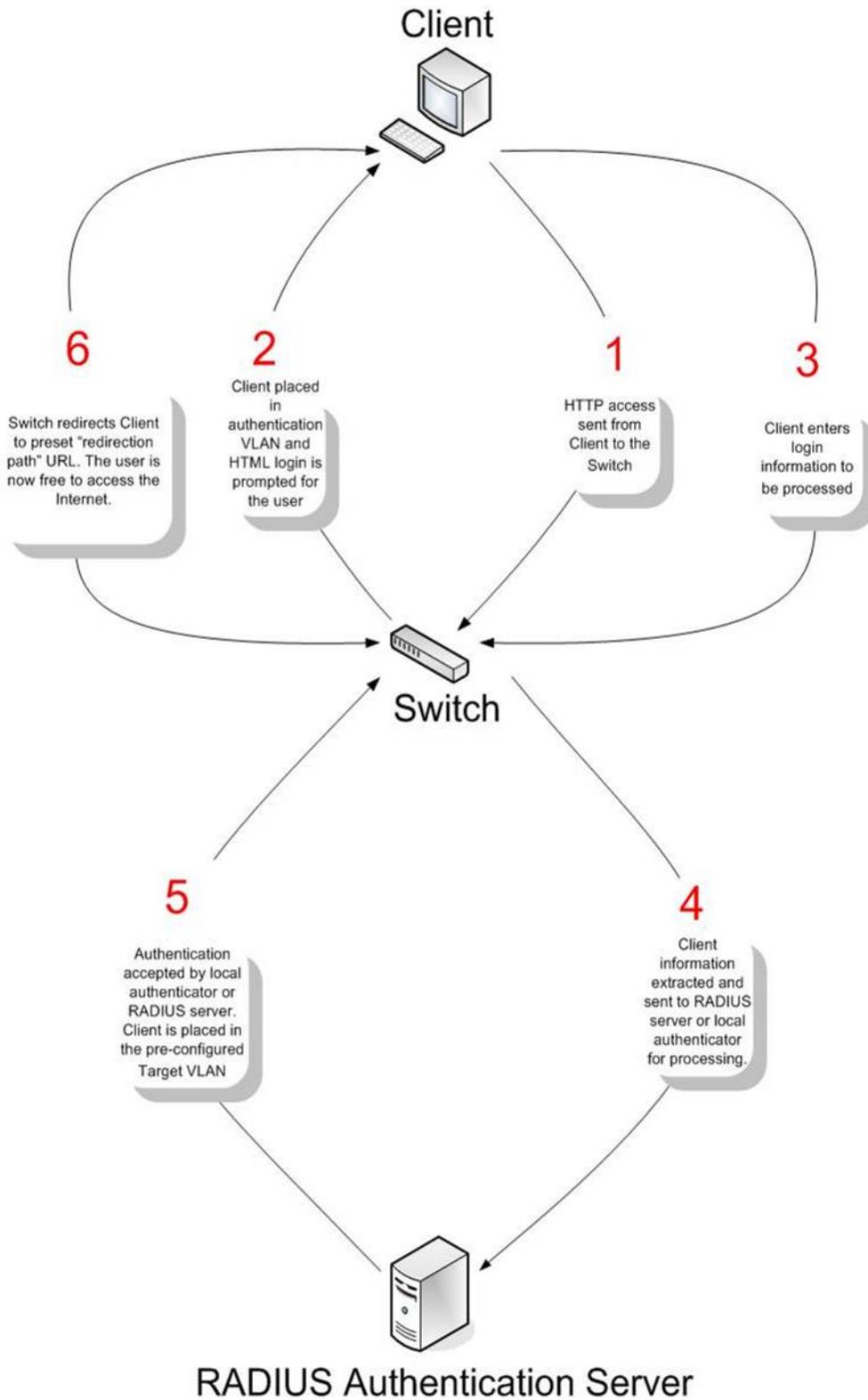
D-Link's implementation of WAC uses a virtual IP that is exclusively used by the WAC function and is not known by any other modules of the Switch. In fact, to avoid affecting a Switch's other features, WAC will only use a virtual IP address to communicate with hosts. Thus, all authentication requests must be sent to a virtual IP address but not to the IP address of the Switch's physical interface.

Virtual IP works like this, when a host PC communicates with the WAC Switch through a virtual IP, the virtual IP is transformed into the physical IPIF (IP interface) address of the Switch to make the communication possible. The host PC and other servers' IP configurations do not depend on the virtual IP of WAC. The virtual IP does not respond to any ICMP packets or ARP requests, which means it is not allowed to configure a virtual IP on the same subnet as the Switch's IPIF (IP interface) or the same subnet as the host PCs' subnet.

As all packets to a virtual IP from authenticated and authenticating hosts will be trapped to the Switch's CPU, if the virtual IP is the same as other servers or PCs, the hosts on the WAC-enabled ports cannot communicate with the server or PC which really own the IP address. If the hosts need to access the server or PC, the virtual IP cannot be the same as the one of the server or PC. If a host PC uses a proxy to access the Web, to make the authentication work properly the user of the PC should add the virtual IP to the exception of the proxy configuration. Whether or not a virtual IP is specified, users can access the WAC pages through the Switch's system IP. When a virtual IP is not specified, the authenticating Web request will be redirected to the Switch's system IP.

The Switch's implementation of WAC features a user-defined port number that allows the configuration of the TCP port for either the HTTP or HTTPS protocols. This TCP port for HTTP or HTTPS is used to identify the HTTP or HTTPS packets that will be trapped to the CPU for authentication processing, or to access the login page. If not specified, the default port number for HTTP is 80 and the default port number for HTTPS is 443. If no protocol is specified, the default protocol is HTTP.

The following diagram illustrates the basic six steps all parties go through in a successful Web Authentication process:



Conditions and Limitations

- If the client is utilizing DHCP to attain an IP address, the authentication VLAN must provide a DHCP server or a DHCP relay function so that client may obtain an IP address.
- Certain functions exist on the Switch that will filter HTTP packets, such as the Access Profile function. The user needs to be very careful when setting filter functions for the target VLAN, so that these HTTP packets are not denied by the Switch.

- If a RADIUS server is to be used for authentication, the user must first establish a RADIUS Server with the appropriate parameters, including the target VLAN, before enabling Web Authentication on the Switch.

WAC Global Settings

Users can configure the Switch for the Web-based access control function.

To view this window, click **Security > Web-based Access Control (WAC) > WAC Global Settings** as shown below:

Figure 9-37 WAC Global Settings window

The fields that can be configured are described below:

Parameter	Description
WAC Global State	Use this selection menu to either enable or disable the Web Authentication on the Switch.
Virtual IP	Enter a virtual IP address. This address is only used by WAC and is not known by any other modules of the Switch.
Redirection Path	Enter the URL of the website that authenticated users placed in the VLAN are directed to once authenticated.
RADIUS Authorization	The user can enable or disable this option to enable RADIUS Authorization or not.
HTTP(S) Port (1-65535)	Enter a HTTP port number. Port 80 is the default. <i>HTTP</i> – Specifies that the TCP port will run the WAC HTTP protocol. The default value is 80. HTTP port cannot run at TCP port 443. <i>HTTPS</i> – Specifies that the TCP port will run the WAC HTTPS protocol. The default value is 443. HTTPS cannot run at TCP port 80.
Method	Use this drop-down menu to choose the authenticator for Web-based Access Control. The user may choose: <i>Local</i> – Choose this parameter to use the local authentication method of the Switch as the authenticating method for users trying to access the network via the switch. This is, in fact, the username and password to access the Switch configured using the WAC User Settings window seen below. <i>RADIUS</i> – Choose this parameter to use a remote RADIUS server as the authenticating method for users trying to access the network via the switch. This

	RADIUS server must have already been pre-assigned by the administrator using the Authentication RADIUS Server Settings window.
Clear Redirection Path	The user can enable or disable this option to clear the redirection path.
Local Authorization	The user can enable or disable this option to enable Local Authorization or not.

Click the **Apply** button to accept the changes made for each individual section.



NOTE: A successful authentication should direct the client to the stated web page. If the client does not reach this web page, yet does not receive a **Fail!** Message, the client will already be authenticated and therefore should refresh the current browser window or attempt to open a different web page.

WAC User Settings

Users can view and set local database user accounts for Web authentication.

To view this window, click **Security > Web-based Access Control (WAC) > WAC User Settings** as shown below:

Figure 9-38 WAC User Settings window

The fields that can be configured are described below:

Parameter	Description
User Name	Enter the user name of up to 15 alphanumeric characters of the guest wishing to access the Web through this process. This field is for administrators who have selected <i>Local</i> as their Web-based authenticator.
VLAN Name	Click the button and enter a VLAN Name in this field.
VID (1-4094)	Click the button and enter a VID in this field.
Password	Enter the password the administrator has chosen for the selected user. This field is case-sensitive and must be a complete alphanumeric string. This field is for administrators who have selected <i>Local</i> as their Web-based authenticator.
Confirm Password	Retype the password entered in the previous field.

Click the **Apply** button to accept the changes made.

Click the **Delete All** button to remove all the entries listed.

Click the **Edit VLAN Name** button to re-configure the specific entry's VLAN Name.

Click the **Edit VID** button to re-configure the specific entry's VLAN ID.

Click the **Clear VLAN** button to remove the VLAN information from the specific entry.

Click the **Delete** button to remove the specific entry.

WAC Port Settings

Users can view and set port configurations for Web authentication.

To view this window, click **Security > Web-based Access Control (WAC) > WAC Port Settings** as shown below:

Port	State	Aging Time	Idle Time	Block Time
1	Disabled	1440	Infinite	60
2	Disabled	1440	Infinite	60
3	Disabled	1440	Infinite	60
4	Disabled	1440	Infinite	60
5	Disabled	1440	Infinite	60
6	Disabled	1440	Infinite	60
7	Disabled	1440	Infinite	60
8	Disabled	1440	Infinite	60
9	Disabled	1440	Infinite	60
10	Disabled	1440	Infinite	60
11	Disabled	1440	Infinite	60
12	Disabled	1440	Infinite	60

Figure 9-39 WAC Port Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Use the drop-down menus to select a range of ports to be enabled as WAC ports.
Aging Time (1-1440)	This parameter specifies the time period during which an authenticated host will remain in the authenticated state. Enter a value between 1 and 1440 minutes. Tick the Infinite check box to indicate the authenticated host will never age out on the port. The default value is 1440 minutes (24 hours).
Idle Time (1-1440)	If there is no traffic during the Idle Time parameter, the host will be moved back to the unauthenticated state. Enter a value between 1 and 1440 minutes. Tick the Infinite check box to indicate the Idle state of the authenticated host on the port will never be checked. The default value is Infinite.
State	Use this drop-down menu to enable the configured ports as WAC ports.

Block Time (0-300)

This parameter is the period of time a host will be blocked if it fails to pass authentication. Enter a value between 0 and 300 seconds. The default value is 60 seconds.

Click the **Apply** button to accept the changes made.

WAC Authentication State

Users can view and delete the hosts for Web authentication.

To view this window, click **Security > Web-based Access Control (WAC) > WAC Authentication State** as shown below:

Figure 9-40 WAC Authentication State window

The fields that can be configured are described below:

Parameter	Description
Port List	Enter a port or range of ports, and tick the appropriate check box(s), Authenticated, Authenticating, and Blocked.
Authenticated	Tick this check box to clear all authenticated users for a port.
Authenticating	Tick this check box to clear all authenticating users for a port.
Blocked	Tick this check box to clear all blocked users for a port.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Clear by Port** button to remove entry based on the port list entered.

Click the **View All Hosts** button to display all the existing entries.

Click the **Clear All Hosts** button to remove all the entries listed.

Compound Authentication

Compound Authentication settings allows for multiple authentication to be supported on the Switch.

Compound Authentication Settings

This window is used to configure Authorization Network State Settings and compound authentication methods for a port or ports on the Switch.

To view this window, click **Security > Compound Authentication > Compound Authentication Settings** as shown below:

Compound Authentication Settings Safeguard

Authorization Attributes State Enabled Disabled Apply

Authentication Server Failover Block Local Permit Apply

Compound Authentication Port Settings

From Port: 01 To Port: 01 Security Mode: None Authorized Mode: Host-based Apply

Compound Authentication Port Table

Port	Methods	Authorized Mode
1	None	Host-based
2	None	Host-based
3	None	Host-based
4	None	Host-based
5	None	Host-based
6	None	Host-based
7	None	Host-based
8	None	Host-based
9	None	Host-based
10	None	Host-based
11	None	Host-based
12	None	Host-based
13	None	Host-based
14	None	Host-based
15	None	Host-based
16	None	Host-based

Figure 9-41 Compound Authentication Settings window

The fields that can be configured are described below:

Parameter	Description
Authorization Attributes State	Click the radio buttons to enable or disable the Authorization Attributes State.
Authentication Server Failover	Click the radio buttons to configure the authentication server failover function. Block (default setting) - The client is always regarded as un-authenticated. Local - The switch will resort to using the local database to authenticate the client. If the client fails on local authentication, the client is regarded as un-authenticated, otherwise, it is authenticated. Permit - The client is always regarded as authenticated. If guest VLAN is enabled, clients will stay on the guest VLAN, otherwise, they will stay on the original VLAN.
From Port / To Port	Use the drop-down menus to select a range of ports to be enabled as

	compound authentication ports.
Security Mode	<p>The compound authentication security mode options include: <i>None</i>, <i>Any (MAC, 802.1X or WAC)</i>, <i>802.1X+IMPB</i>, <i>IMPB+WAC</i>, and <i>MAC+IMPB</i>.</p> <p><i>None</i> - all compound authentication methods are disabled.</p> <p><i>Any (MAC, 802.1X or WAC)</i> - if any of the authentication methods pass, then access will be granted. In this mode, MAC, 802.1X, and WAC can be enabled on a port at the same time. In Any (MAC, 802.1X, or WAC) mode, whether an individual security module is active on a port depends on its system state.</p> <p><i>802.1X+IMPB</i> - 802.1X will be verified first, and then IMPB will be verified. Both authentication methods need to be passed.</p> <p><i>IMPB+WAC</i> - IMPB will be verified first, and then WAC will be verified. Both authentication methods need to be passed.</p> <p><i>MAC+IMPB</i> - MAC will be verified first, and then IMPB will be verified. Both authentication methods need to be passed.</p>
Authorized Mode	<p>Toggle between <i>Host-based</i> and <i>Port-based</i>. When <i>Port-based</i> is selected, if one of the attached hosts passes the authentication, all hosts on the same port will be granted access to the network. If the user fails the authorization, this port will keep trying the next authentication method. When <i>Host-based</i> is selected, users are authenticated individually.</p>

Click the **Apply** button to accept the changes made for each individual section.

Compound Authentication Guest VLAN Settings

This window is used to assign ports to or remove ports from a guest VLAN.

To view this window, click **Security > Compound Authentication > Compound Authentication Guest VLAN Settings** as shown below:

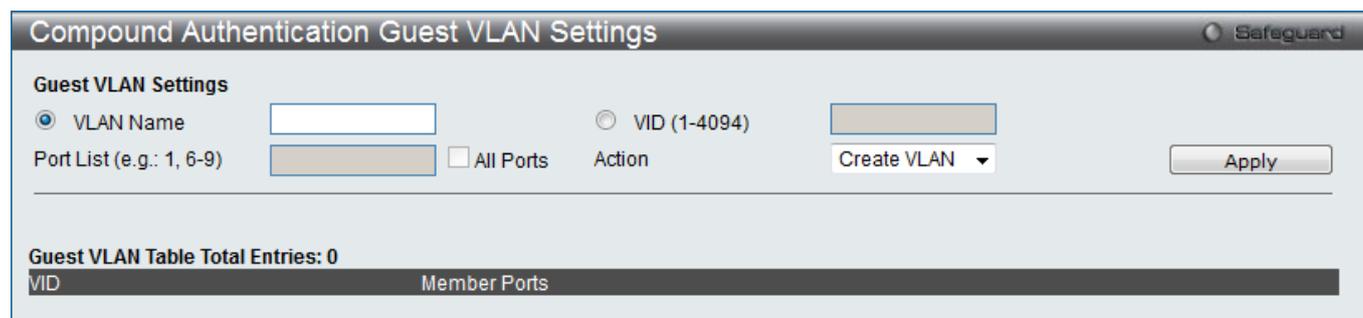


Figure 9-42 Compound Authentication Guest VLAN Settings window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	Click the button and assign a VLAN as a Guest VLAN. The VLAN must be an existing static VLAN.
VID (1-4094)	Click the button and assign a VLAN ID for a Guest VLAN. The VLAN must be an existing static VLAN before this VID can be configured.

Port List	The list of ports to be configured. Alternatively, tick the All Ports check box to set every port at once.
Action	Use the drop-down menu to choose the desired operation: <i>Create VLAN</i> , <i>Add Ports</i> , or <i>Delete Ports</i> .

Click the **Apply** button to accept the changes made.

Click the **Delete** button to remove the specific entry.

Once properly configured, the Guest VLAN and associated ports will be listed in the lower part of the window.

Port Security

Port Security Settings

A given port's (or a range of ports') dynamic MAC address learning can be locked such that the current source MAC addresses entered into the MAC address forwarding table cannot be changed once the port lock is enabled. The port can be locked by changing the **Admin State** drop-down menu to *Enabled* and clicking **Apply**.

Port Security is a security feature that prevents unauthorized computers (with source MAC addresses) unknown to the Switch prior to locking the port (or ports) from connecting to the Switch's locked ports and gaining access to the network.

To view this window, click **Security > Port Security > Port Security Settings** as shown below:

Port Security Settings Safeguard

Port Security Trap/Log Settings Enabled Disabled Apply

Port Security System Settings

System Maximum Address (1-16384) No Limit Apply

From Port To Port Admin State Lock Address Mode Max Learning Address (0-16384) Apply

Port Security Port Table

Port	Admin State	Lock Address Mode	Max Learning Address	Edit	View Details
1	Disabled	DeleteOnReset	32	Edit	View Details
2	Disabled	DeleteOnReset	32	Edit	View Details
3	Disabled	DeleteOnReset	32	Edit	View Details
4	Disabled	DeleteOnReset	32	Edit	View Details
5	Disabled	DeleteOnReset	32	Edit	View Details
6	Disabled	DeleteOnReset	32	Edit	View Details
7	Disabled	DeleteOnReset	32	Edit	View Details
8	Disabled	DeleteOnReset	32	Edit	View Details
9	Disabled	DeleteOnReset	32	Edit	View Details

Figure 9-43 Port Security Settings window

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

Port Security Trap/Log Settings	Use the radio button to enable or disable Port Security Traps and Logs on the Switch.
System Maximum Address (1-16384)	Enter the system maximum address.
From Port / To Port	Use the drop-down menus to select a range of ports to configure.
Admin State	Use the drop-down menu to enable or disable Port Security (locked MAC address table for the selected ports).
Lock Address Mode	This drop-down menu allows the option of how the MAC address table locking will be implemented on the Switch, for the selected group of ports. The options are: <i>Permanent</i> – The locked addresses will only age out after the Switch has been reset. <i>DeleteOnTimeout</i> – The locked addresses will age out after the aging timer expires. <i>DeleteOnReset</i> – The locked addresses will not age out until the Switch has been reset or rebooted.
Max Learning Address (1-16384)	Specify the maximum value of port security entries that can be learned on this port.

Click the **Apply** button to accept the changes made for each individual section.

Click the **Edit** button to re-configure the specific entry.

Click the **View Detail** button to display the information of the specific entry.

Click the **View Detail** button to see the following window.

Figure 9-44 Port Security Port-VLAN Settings window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	Click the radio button and enter a VLAN name.
VID List	Click the radio button and enter a list of VLAN ID.
Max Learning Address (0-16384)	Enter the maximum number of port security entries that can be learned on the port of this VLAN. If this parameter is set to 0, it means that no user can be authorized on the port of

this VLAN.

If the setting is lower than the number of current learned entries on the port of this VLAN, the command will be rejected. Tick the **No Limit** check box to have unlimited number of port security entries that can be learned on the port of this VLAN.

The default value is No Limit.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

Port Security VLAN Settings

This window is used to configure the maximum number of port-security entries that can be learned on a specific VLAN.

To view this window, click **Security > Port Security > Port Security VLAN Settings** as shown below:

Figure 9-45 Port Security VLAN Settings window

The fields that can be configured are described below:

Parameter	Description
VLAN Name	Click the radio button and enter the VLAN Name.
VID List	Click the radio button and enter a list of the VLAN ID.
Max Learning Address (0-16384)	Enter the maximum number of port-security entries that can be learned by this VLAN. Tick the No Limit check box to have unlimited number of port-security entries that can be learned by this VLAN.

Click the **Apply** button to accept the changes made.

Port Security Entries

This window is used to remove an entry from the port security entries learned by the Switch and entered into the forwarding database.

To view this window, click **Security > Port Security > Port Security Entries** as shown below:

Figure 9-46 Port Security Entries window

The fields that can be configured or displayed are described below:

Parameter	Description
VLAN Name	The VLAN Name of the entry in the forwarding database table that has been permanently learned by the Switch.
VID List	The VLAN ID of the entry in the forwarding database table that has been permanently learned by the Switch.
Port List	Enter the port number or list here to be used for the port security entry search. When All is selected, all the ports configured will be displayed.
MAC Address	The MAC address of the entry in the forwarding database table that has been permanently learned by the Switch.
Lock Mode	The type of MAC address in the forwarding database table.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Clear** button to clear all the entries based on the information entered.

Click the **Show All** button to display all the existing entries.

Click the **Clear All** button to remove all the entries listed.

Click the **Delete** button to remove the specific entry.

ARP Spoofing Prevention Settings

The user can configure the spoofing prevention entry to prevent spoofing of MAC for the protected gateway. When an entry is created, those ARP packets whose sender IP matches the gateway IP of an entry, but either its sender MAC field or source MAC field does not match the gateway MAC of the entry will be dropped by the system.

To view this window, click **Security > ARP Spoofing Prevention Settings** as shown below:

ARP Spoofing Prevention Settings Safeguard

Gateway IP Address: Gateway MAC Address: Ports: All Ports Apply

Delete All

Total Entries: 1

Gateway IP Address	Gateway MAC Address	Ports		
10.90.90.1	00-11-22-33-44-55	1	Edit	Delete

Figure 9-47 ARP Spoofing Prevention Settings window

The fields that can be configured are described below:

Parameter	Description
Gateway IP Address	Enter the gateway IP address to help prevent ARP Spoofing.
Gateway MAC Address	Enter the gateway MAC address to help prevent ARP Spoofing.
Ports	Enter the port numbers that this feature applies to. Alternatively the user can select All Ports to apply this feature to all the ports of the switch.

Click the **Apply** button to accept the changes made.

Click the **Delete All** button to remove all the entries listed.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

BPDU Attack Protection

This page is used to configure the BPDU protection function for the ports on the switch. In generally, there are two states in BPDU protection function. One is normal state, and another is under attack state. The under attack state have three modes: drop, block, and shutdown. A BPDU protection enabled port will enter an under attack state when it receives one STP BPDU packet. And it will take action based on the configuration. Thus, BPDU protection can only be enabled on the STP-disabled port.

BPDU protection has a higher priority than the FBPDU setting configured by configure STP command in the determination of BPDU handling. That is, when FBPDU is configured to forward STP BPDU but BPDU protection is enabled, then the port will not forward STP BPDU.

BPDU protection also has a higher priority than the BPDU tunnel port setting in determination of BPDU handling. That is, when a port is configured as BPDU tunnel port for STP, it will forward STP BPDU. But if the port is BPDU protection enabled. Then the port will not forward STP BPDU.

To view this window, click **Security > BPDU Attack Protection** as shown below:

Port	State	Mode	Status
1	Disabled	Shutdown	Normal
2	Disabled	Shutdown	Normal
3	Disabled	Shutdown	Normal
4	Disabled	Shutdown	Normal
5	Disabled	Shutdown	Normal
6	Disabled	Shutdown	Normal
7	Disabled	Shutdown	Normal
8	Disabled	Shutdown	Normal
9	Disabled	Shutdown	Normal

Figure 9-48 BPDU Attack Protection window

The fields that can be configured are described below:

Parameter	Description
BPDU Attack Protection State	Click the radio buttons to enable or disable the BPDU Attack Protection state.
Trap State	Specify when a trap will be sent. Options to choose from are None , Attack Detected , Attack Cleared or Both .
Log State	Specify when a log entry will be sent. Options to choose from are None , Attack Detected , Attack Cleared or Both .
Recover Time (60-1000000)	Enter the BPDU protection Auto-Recovery timer. The default value of the recovery timer is 60. Tick the Infinite check box for not auto recovering.
From Port / To Port	Select a range of ports to use for this configuration.
State	Use the drop-down menu to enable or disable the protection mode for a specific port.
Mode	Specify the BPDU protection mode. The default mode is shutdown. <i>Drop</i> – Drop all received BPDU packets when the port enters under attack state. <i>Block</i> – Drop all packets (include BPDU and normal packets) when the port enters under attack state. <i>Shutdown</i> – Shut down the port when the port enters under attack state.

Click the **Apply** button to accept the changes made for each individual section.

Loopback Detection Settings

The Loopback Detection (LBD) function is used to detect the loop created by a specific port. This feature is used to temporarily shut down a port on the Switch when a CTP (Configuration Testing Protocol) packet has been looped back to the Switch. When the Switch detects CTP packets received from a port or a VLAN, this signifies a loop on the network. The Switch will automatically block the port or the VLAN and send an alert to the administrator. The Loopback Detection port will restart (change to normal state) when the Loopback Detection Recover Time times out. The Loopback Detection function can be implemented on a range of ports at a time. The user may enable or disable this function using the drop-down menu.

To view this window, click **Security > Loopback Detection Settings** as shown below:

Port	Loopback Detection State	Loop Status	Loopback Detection Time	Loopback Recovered Time
1	Disabled	Normal	-	-
2	Disabled	Normal	-	-
3	Disabled	Normal	-	-
4	Disabled	Normal	-	-
5	Disabled	Normal	-	-
6	Disabled	Normal	-	-
7	Disabled	Normal	-	-
8	Disabled	Normal	-	-
9	Disabled	Normal	-	-
10	Disabled	Normal	-	-
11	Disabled	Normal	-	-
12	Disabled	Normal	-	-

Figure 9-49 Loopback Detection Settings window

The fields that can be configured are described below:

Parameter	Description
Loopback Detection State	Use the radio button to enable or disable loopback detection. The default is Disabled.
Mode	Use the drop-down menu to toggle between <i>Port-based</i> and <i>VLAN-based</i> .
Trap State	Use the drop-down menu to set the desired trap status: <i>None</i> , <i>Loop Detected</i> , <i>Loop Cleared</i> , or <i>Both</i> .
Interval (1-32767)	The time interval (in seconds) that the device will transmit all the CTP (Configuration Test Protocol) packets to detect a loop-back event. The valid range is from 1 to 32767 seconds. The default setting is 10 seconds.

Recover Time (0 or 60-1000000)	Time allowed (in seconds) for recovery when a Loopback is detected. The Loop-detect Recover Time can be set at 0 seconds, or 60 to 1000000 seconds. Entering 0 will disable the Loop-detect Recover Time. The default is 60 seconds.
From Port / To Port	Select a range of ports to use for this configuration.
State	Use the drop-down menu to toggle between <i>Enabled</i> and <i>Disabled</i> .

Click the **Apply** button to accept the changes made for each individual section.

Traffic Segmentation Settings

Traffic segmentation is used to limit traffic flow from a single or group of ports, to a group of ports. This method of segmenting the flow of traffic is similar to using VLANs to limit traffic, but is more restrictive. It provides a method of directing traffic that does not increase the overhead of the master switch CPU.

To view this window, click **Security > Traffic Segmentation Settings** as shown below:

Port	Forward Port List
1	1-12
2	1-12
3	1-12
4	1-12
5	1-12
6	1-12
7	1-12
8	1-12
9	1-12
10	1-12
11	1-12
12	1-12

Figure 9-50 Traffic Segmentation Settings window

The fields that can be configured are described below:

Parameter	Description
From Port ~ To Port	Select a list of ports to be included in the traffic segmentation setup.
Forward Portlist	Tick the appropriate port(s) to be included in the traffic segmentation setup. Click the Select All button to select all the ports for the configuration. Click the Clear All button to clear the selections made.

Click the **Apply** button to accept the changes made.

NetBIOS Filtering Settings

NetBIOS is an application programming interface, providing a set of functions that applications use to communicate across networks. NetBEUI, the NetBIOS Enhanced User Interface, was created as a data-link-layer frame structure for NetBIOS. A simple mechanism to carry NetBIOS traffic, NetBEUI has been the protocol of choice for small MS-DOS- and Windows-based workgroups. NetBIOS no longer lives strictly inside of the NetBEUI protocol. Microsoft worked to create the international standards described in RFC 1001 and RFC 1002, NetBIOS over TCP/IP (NBT).

If the network administrator wants to block the network communication on more than two computers which use NETBUEI protocol, it can use NETBIOS filtering to filter these kinds of packets.

If the user enables the NETBIOS filter, the switch will create one access profile and three access rules automatically. If the user enables the extensive NETBIOS filter, the switch will create one more access profile and one more access rule.

To view this window, click **Security > NetBIOS Filtering Settings** as shown below:

Figure 9-51 NetBIOS Filtering Settings window

The fields that can be configured are described below:

Parameter	Description
NetBIOS Filtering Ports	Select the appropriate port to include in the NetBIOS filtering configuration.
Ports	Tick the appropriate ports that will be included in the NetBIOS filtering configuration.
Extensive NetBIOS Filtering Ports	Select the appropriate port to include in the Extensive NetBIOS filtering configuration. Extensive NetBIOS is NetBIOS over 802.3. The Switch will deny the NetBIOS over 802.3 frame on these enabled ports.
Ports	Tick the appropriate ports that will be included in the Extensive NetBIOS filtering configuration.

Click the **Select All** button to select all ports for configuration.

Click the **Clear All** button to remove all the ports.

Click the **Apply** button to accept the changes made for each individual section.

DHCP Server Screening

This function allows the user to not only to restrict all DHCP Server packets but also to receive any specified DHCP server packet by any specified DHCP client, it is useful when one or more DHCP servers are present on the network and both provide DHCP services to different distinct groups of clients.

The first time the DHCP filter is enabled it will create both an access profile entry and an access rule per port entry, it will also create other access rules. These rules are used to block all DHCP server packets. In addition to a permit DHCP entry it will also create one access profile and one access rule entry the first time the DHCP client MAC address is used as the client MAC address. The Source IP address is the same as the DHCP server's IP address (UDP port number 67). These rules are used to permit the DHCP server packets with specific fields, which the user has configured.

When DHCP Server filter function is enabled all DHCP Server packets will be filtered from a specific port.

DHCP Server Screening Port Settings

The Switch supports DHCP Server Screening, a feature that denies access to rogue DHCP servers. When the DHCP server filter function is enabled, all DHCP server packets will be filtered from a specific port.

To view this window, click **Security > DHCP Server Screening > DHCP Server Screening Port Settings** as shown below:

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

Figure 9-52 DHCP Server Screening Port Settings window

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

DHCP Server Screening Trap Log State	Enable or disable this feature.
Illegal Server Log Suppress Duration	Choose an illegal server log suppress duration of 1 minute, 5 minutes, or 30 minutes.
From Port / To Port	A consecutive group of ports may be configured starting with the selected port.
State	Choose <i>Enabled</i> to enable the DHCP server screening or <i>Disabled</i> to disable it. The default is Disabled.

Click the **Apply** button to accept the changes made for each individual section.

DHCP Offer Permit Entry Settings

Users can add or delete permit entries on this page.

To view this window, click **Security > DHCP Server Screening > DHCP Offer Permit Entry Settings** as shown below:

Figure 9-53 DHCP Offer Permit Entry Settings window

The fields that can be configured are described below:

Parameter	Description
Server IP Address	The IP address of the DHCP server to be permitted.
Client's MAC Address	The MAC address of the DHCP client.
Ports	The port numbers of the filter DHCP server. Tick the All Ports check box to include all the ports on this switch for this configuration.

Click the **Apply** button to accept the changes made.

Click the **Delete** button to remove the specific entry based on the information entered.

Access Authentication Control

The TACACS / XTACACS / TACACS+ / RADIUS commands allow users to secure access to the Switch using the TACACS / XTACACS / TACACS+ / RADIUS protocols. When a user logs in to the Switch or tries to access the administrator level privilege, he or she is prompted for a password. If TACACS / XTACACS / TACACS+ / RADIUS authentication is enabled on the Switch, it will contact a TACACS / XTACACS / TACACS+ / RADIUS server to verify the user. If the user is verified, he or she is granted access to the Switch.

There are currently three versions of the TACACS security protocol, each a separate entity. The Switch's software supports the following versions of TACACS:

- **TACACS** (Terminal Access Controller Access Control System) - Provides password checking and authentication, and notification of user actions for security purposes utilizing via one or more centralized TACACS servers, utilizing the UDP protocol for packet transmission.
- **Extended TACACS (XTACACS)** - An extension of the TACACS protocol with the ability to provide more types of authentication requests and more types of response codes than TACACS. This protocol also uses UDP to transmit packets.
- **TACACS+ (Terminal Access Controller Access Control System plus)** - Provides detailed access control for authentication for network devices. TACACS+ is facilitated through Authentication commands via one or more centralized servers. The TACACS+ protocol encrypts all traffic between the Switch and the TACACS+ daemon, using the TCP protocol to ensure reliable delivery

In order for the TACACS / XTACACS / TACACS+ / RADIUS security function to work properly, a TACACS / XTACACS / TACACS+ / RADIUS server must be configured on a device other than the Switch, called an Authentication Server Host and it must include usernames and passwords for authentication. When the user is prompted by the Switch to enter usernames and passwords for authentication, the Switch contacts the TACACS / XTACACS / TACACS+ / RADIUS server to verify, and the server will respond with one of three messages:

The server verifies the username and password, and the user is granted normal user privileges on the Switch.

The server will not accept the username and password and the user is denied access to the Switch.

The server doesn't respond to the verification query. At this point, the Switch receives the timeout from the server and then moves to the next method of verification configured in the method list.

The Switch has four built-in Authentication Server Groups, one for each of the TACACS, XTACACS, TACACS+ and RADIUS protocols. These built-in Authentication Server Groups are used to authenticate users trying to access the Switch. The users will set Authentication Server Hosts in a preferable order in the built-in Authentication Server Groups and when a user tries to gain access to the Switch, the Switch will ask the first Authentication Server Hosts for authentication. If no authentication is made, the second server host in the list will be queried, and so on. The built-in Authentication Server Groups can only have hosts that are running the specified protocol. For example, the TACACS Authentication Server Groups can only have TACACS Authentication Server Hosts.

The administrator for the Switch may set up six different authentication techniques per user-defined method list (TACACS / XTACACS / TACACS+ / RADIUS / local / none) for authentication. These techniques will be listed in an order preferable, and defined by the user for normal user authentication on the Switch, and may contain up to eight authentication techniques. When a user attempts to access the Switch, the Switch will select the first technique listed for authentication. If the first technique goes through its Authentication Server Hosts and no authentication is returned, the Switch will then go to the next technique listed in the server group for authentication, until the authentication has been verified or denied, or the list is exhausted.

Users granted access to the Switch will be granted normal user privileges on the Switch. To gain access to administrator level privileges, the user must access the **Enable Admin** window and then enter a password, which was previously configured by the administrator of the Switch.



NOTE: TACACS, XTACACS and TACACS+ are separate entities and are not compatible. The Switch and the server must be configured exactly the same, using the same protocol. (For example, if the Switch is set up for TACACS authentication, so must be the host server.)

Enable Admin

Users who have logged on to the Switch on the normal user level and wish to be promoted to the administrator level can use this window. After logging on to the Switch, users will have only user level privileges. To gain access to administrator level privileges, the user will open this window and will have to enter an authentication password. Possible authentication methods for this function include TACACS/XTACACS/TACACS+/RADIUS, user defined server groups, local enable (local account on the Switch), or no authentication (none). Because XTACACS and TACACS do not support the enable function, the user must create a special account on the server host, which has the username "enable", and a password configured by the administrator that will support the "enable" function. This function becomes inoperable when the authentication policy is disabled.

To view this window, click **Security > Access Authentication Control > Enable Admin** as shown below:

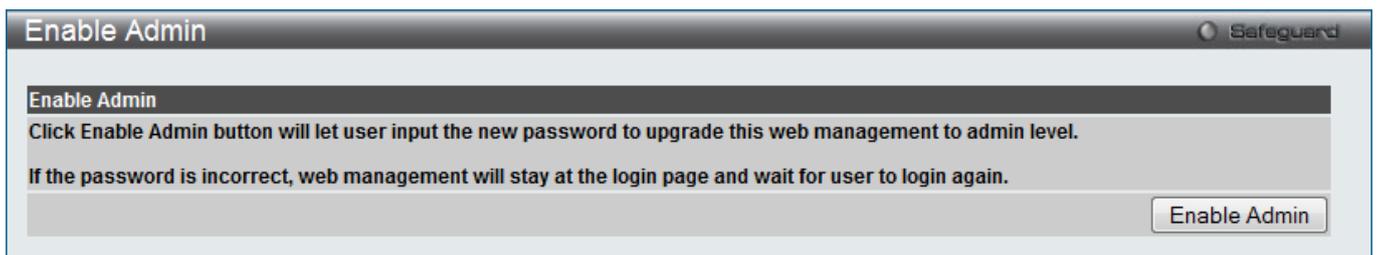


Figure 9-54 Enable Admin window

When this window appears, click the **Enable Admin** button revealing a window for the user to enter authentication (password, username), as shown below. A successful entry will promote the user to Administrator level privileges on the Switch.



Figure 9-55 Log-in Page

Authentication Policy Settings

Users can enable an administrator-defined authentication policy for users trying to access the Switch. When enabled, the device will check the Login Method List and choose a technique for user authentication upon login.

To view this window, click **Security > Access Authentication Control > Authentication Policy Settings** as shown below:

Figure 9-56 Authentication Policy Settings window

The fields that can be configured are described below:

Parameter	Description
Authentication Policy	Use the drop-down menu to enable or disable the Authentication Policy on the Switch.
Response Timeout (0-255)	Enter the time that the Switch will wait for a response of authentication from the user. The default setting is 30 seconds.
User Attempts (1-255)	Enter the maximum number of times that the Switch will accept authentication attempts. Users failing to be authenticated after the set amount of attempts will be denied access to the Switch and will be locked out of further authentication attempts. Command line interface users will have to wait 60 seconds before another authentication attempt. Telnet and web users will be disconnected from the Switch. The default setting is 3.

Click the **Apply** button to accept the changes made.

Application Authentication Settings

Users can configure Switch configuration applications (Console, Telnet, SSH, HTTP) for login at the user level and at the administration level (Enable Admin) utilizing a previously configured method list.

To view this window, click **Security > Access Authentication Control > Application Authentication Settings** as shown below:

Application	Login Method List	Enable Method List
Console	default	default
Telnet	default	default
SSH	default	default
HTTP	default	default

Figure 9-57 Application Authentication Settings window

The fields that can be configured or displayed are described below:

Parameter	Description
Application	Lists the configuration applications on the Switch. The user may configure the Login Method List and Enable Method List for authentication for users utilizing the Console

	(Command Line Interface) application, the Telnet application, SSH, and the Web (HTTP) application.
Login Method List	Use the drop-down menu to configure an application for normal login on the user level, utilizing a previously configured method list. The user may use the default Method List or other Method List configured by the user. See the Login Method Lists Settings window , in this section, for more information.
Enable Method List	Use the drop-down menu to configure an application to promote user level to admin-level users utilizing a previously configured method list. The user may use the default Method List or other Method List configured by the user. See the Enable Method Lists Settings window , in this section, for more information

Click the **Apply** button to accept the changes made.

Authentication Server Group Settings

This window is used to set up Authentication Server Groups on the Switch. A server group is a technique used to group TACACS/XTACACS/TACACS+/RADIUS server hosts into user-defined categories for authentication using method lists. The user may define the type of server group by protocol or by previously defined server group. The Switch has four built-in Authentication Server Groups that cannot be removed but can be modified. Up to eight authentication server hosts may be added to any particular group.

To view this window, click **Security > Access Authentication Control > Authentication Server Group Settings** as shown below:

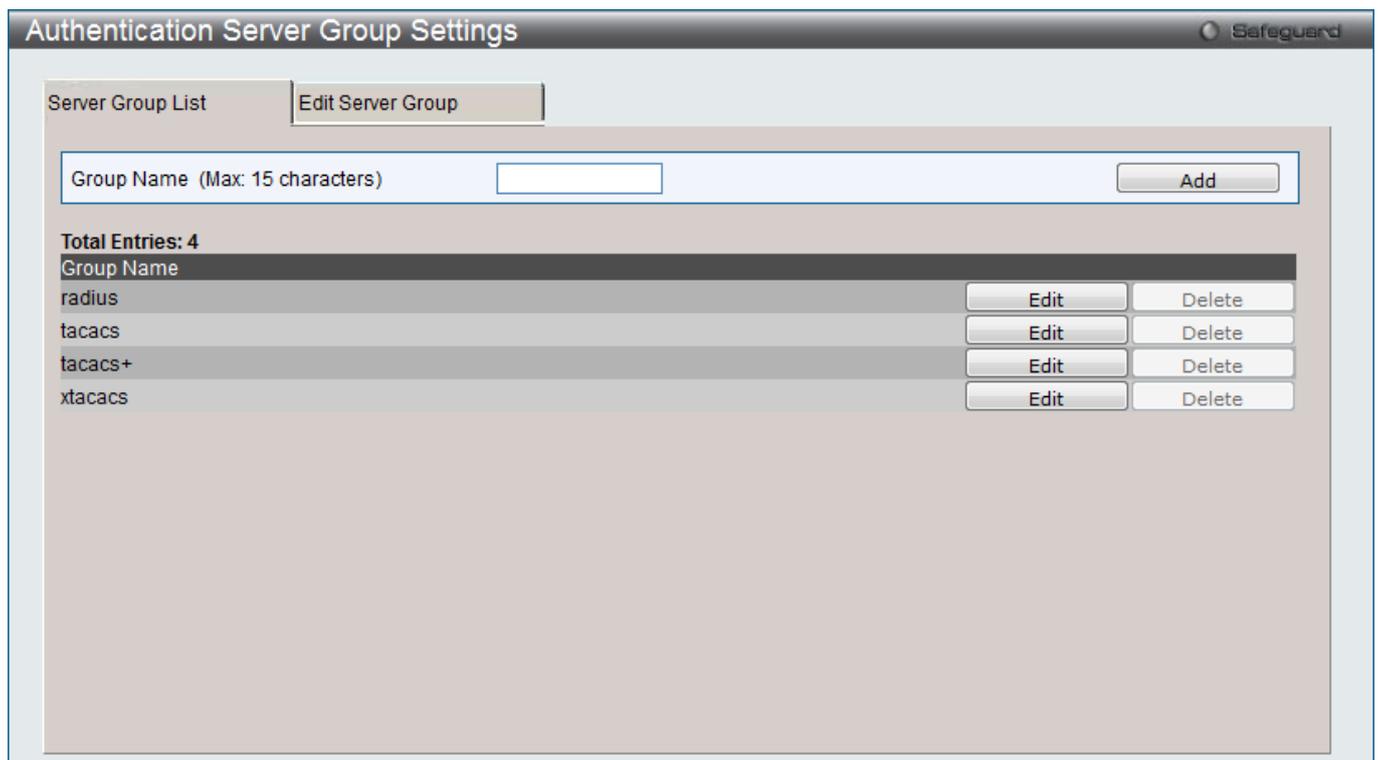


Figure 9-58 Authentication Server Group Settings – Server Group List window

This window displays the Authentication Server Groups on the Switch. The Switch has four built-in Authentication Server Groups that cannot be removed but can be modified.

The fields that can be configured are described below:

Parameter	Description
Group Name	Enter a new server group name.

Click the **Add** button to add a new entry based on the information entered.

Click the **Edit** button (or the **Edit Server Group** tab) to re-configure the specific entry.

Click the **Edit Server Group** tab to see the following window.

Figure 9-59 Authentication Server Group Settings – Edit Server Group window

The fields that can be configured are described below:

Parameter	Description
Group Name	Enter a server group name.
IP Address	Enter the IP address of the server host.
Protocol	use the drop-down menu to choose the Protocol associated with the IP address of the Authentication Server Host

Click the **Add** button to add a new entry based on the information entered.



NOTE: The user must configure Authentication Server Hosts using the Authentication Server Hosts window before adding hosts to the list. Authentication Server Hosts must be configured for their specific protocol on a remote centralized server before this function can work properly.



NOTE: The three built-in server groups can only have server hosts running the same TACACS daemon. TACACS/XTACACS/TACACS+ protocols are separate entities and are not compatible with each other.

Authentication Server Settings

User-defined Authentication Server Hosts for the TACACS / XTACACS / TACACS+ / RADIUS security protocols can be set on the Switch. When a user attempts to access the Switch with Authentication Policy enabled, the Switch will send authentication packets to a remote TACACS / XTACACS / TACACS+ / RADIUS server host on a remote host. The TACACS / XTACACS / TACACS+ / RADIUS server host will then verify or deny the request and return the appropriate message to the Switch. More than one authentication protocol can be run on the same physical server host but, remember that TACACS / XTACACS / TACACS+ / RADIUS are separate entities and are not compatible with each other. The maximum supported number of server hosts is 16.

To view this window, click **Security > Access Authentication Control > Authentication Server Settings** as shown below:

Figure 9-60 Authentication Server Settings window

The fields that can be configured are described below:

Parameter	Description
IP Address	The IP address of the remote server host to add.
Protocol	The protocol used by the server host. The user may choose one of the following: <i>TACACS</i> - Enter this parameter if the server host utilizes the TACACS protocol. <i>XTACACS</i> - Enter this parameter if the server host utilizes the XTACACS protocol. <i>TACACS+</i> - Enter this parameter if the server host utilizes the TACACS+ protocol. <i>RADIUS</i> - Enter this parameter if the server host utilizes the RADIUS protocol.
Key	Authentication key to be shared with a configured TACACS+ or RADIUS servers only. Specify an alphanumeric string up to 254 characters.
Port (1-65535)	Enter a number between 1 and 65535 to define the virtual port number of the authentication protocol on a server host. The default port number is 49 for TACACS/XTACACS/TACACS+ servers and 1812 for RADIUS servers but the user may set a unique port number for higher security.
Timeout (1-255)	Enter the time in seconds the Switch will wait for the server host to reply to an authentication request. The default value is 5 seconds.

Retransmit (1-20)

Enter the value in the retransmit field to change how many times the device will resend an authentication request when the TACACS server does not respond.

Click the **Apply** button to accept the changes made.



NOTE: More than one authentication protocol can be run on the same physical server host but, remember that TACACS/XTACACS/TACACS+ are separate entities and are not compatible with each other.

Login Method Lists Settings

User-defined or default Login Method List of authentication techniques can be configured for users logging on to the Switch. The sequence of techniques implemented in this command will affect the authentication result. For example, if a user enters a sequence of techniques, for example TACACS - XTACACS- local, the Switch will send an authentication request to the first TACACS host in the server group. If no response comes from the server host, the Switch will send an authentication request to the second TACACS host in the server group and so on, until the list is exhausted. At that point, the Switch will restart the same sequence with the following protocol listed, XTACACS. If no authentication takes place using the XTACACS list, the local account database set in the Switch is used to authenticate the user. When the local method is used, the privilege level will be dependent on the local account privilege configured on the Switch.

Successful login using any of these techniques will give the user a "User" privilege only. If the user wishes to upgrade his or her status to the administrator level, the user must use the **Enable Admin** window, in which the user must enter a previously configured password, set by the administrator.

To view this window, click **Security > Access Authentication Control > Login Method Lists Settings** as shown below:

Method List Name	Priority 1	Priority 2	Priority 3	Priority 4
default	local	----	----	----

Figure 9-61 Login Method Lists Settings window

The Switch contains one Method List that is set and cannot be removed, yet can be modified. To delete a Login Method List defined by the user, click the **Delete** button corresponding to the entry desired to be deleted. To modify a Login Method List, click its corresponding **Edit** button.

The fields that can be configured are described below:

Parameter	Description
Method List Name	Enter a method list name defined by the user of up to 15 characters.

<p>Priority 1, 2, 3, 4</p>	<p>The user may add one, or a combination of up to four of the following authentication methods to this method list:</p> <p><i>tacacs</i> - Adding this parameter will require the user to be authenticated using the TACACS protocol from a remote TACACS server.</p> <p><i>xtacacs</i> - Adding this parameter will require the user to be authenticated using the XTACACS protocol from a remote XTACACS server.</p> <p><i>tacacs+</i> - Adding this parameter will require the user to be authenticated using the TACACS+ protocol from a remote TACACS+ server.</p> <p><i>radius</i> - Adding this parameter will require the user to be authenticated using the RADIUS protocol from a remote RADIUS server.</p> <p><i>local</i> - Adding this parameter will require the user to be authenticated using the local user account database on the Switch.</p> <p><i>none</i> - Adding this parameter will require no authentication needed to access the Switch.</p>
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Click the **Apply** button to accept the changes made.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

Enable Method Lists Settings

Users can set up Method Lists to promote users with user level privileges to Administrator (Admin) level privileges using authentication methods on the Switch. Once a user acquires normal user level privileges on the Switch, he or she must be authenticated by a method on the Switch to gain administrator privileges on the Switch, which is defined by the Administrator. A maximum of eight Enable Method Lists can be implemented on the Switch, one of which is a default Enable Method List. This default Enable Method List cannot be deleted but can be configured.

The sequence of methods implemented in this command will affect the authentication result. For example, if a user enters a sequence of methods like TACACS - XTACACS - Local Enable, the Switch will send an authentication request to the first TACACS host in the server group. If no verification is found, the Switch will send an authentication request to the second TACACS host in the server group and so on, until the list is exhausted. At that point, the Switch will restart the same sequence with the following protocol listed, XTACACS. If no authentication takes place using the XTACACS list, the Local Enable password set in the Switch is used to authenticate the user.

Successful authentication using any of these methods will give the user an "Admin" privilege.



NOTE: To set the Local Enable Password, see the next section, entitled Local Enable Password.

To view this window, click **Security > Access Authentication Control > Enable method Lists Settings** as shown below:

Method List Name (Max: 15 characters)

Priority 1: Priority 2:

Priority 3: Priority 4:

Total Entries: 1

Method List Name	Priority 1	Priority 2	Priority 3	Priority 4	Edit	Delete
default	local	----	----	----	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>

Figure 9-62 Enable method Lists Settings window

To delete an Enable Method List defined by the user, click the **Delete** button corresponding to the entry desired to be deleted. To modify an Enable Method List, click its corresponding **Edit** button.

The fields that can be configured are described below:

Parameter	Description
Method List Name	Enter a method list name defined by the user of up to 15 characters.
Priority 1, 2, 3, 4	<p>The user may add one, or a combination of up to four of the following authentication methods to this method list:</p> <p><i>local_enable</i> - Adding this parameter will require the user to be authenticated using the local enable password database on the Switch. The local enable password must be set by the user in the next section entitled Local Enable Password.</p> <p><i>none</i> - Adding this parameter will require no authentication needed to access the Switch.</p> <p><i>radius</i> - Adding this parameter will require the user to be authenticated using the RADIUS protocol from a remote RADIUS server.</p> <p><i>tacacs</i> - Adding this parameter will require the user to be authenticated using the TACACS protocol from a remote TACACS server.</p> <p><i>xtacacs</i> - Adding this parameter will require the user to be authenticated using the XTACACS protocol from a remote XTACACS server.</p> <p><i>tacacs+</i> - Adding this parameter will require the user to be authenticated using the TACACS protocol from a remote TACACS server.</p>

Click the **Apply** button to accept the changes made.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

Local Enable Password Settings

Users can configure the locally enabled password for Enable Admin. When a user chooses the "local_enable" method to promote user level privileges to administrator privileges, he or she will be prompted to enter the password configured here that is locally set on the Switch.

To view this window, click **Security > Access Authentication Control > Local Enable Password Settings** as shown below:

Figure 9-63 Local Enable Password Settings window

The fields that can be configured are described below:

Parameter	Description
Old Local Enable Password	If a password was previously configured for this entry, enter it here in order to change it to a new password
New Local Enable Password	Enter the new password that you wish to set on the Switch to authenticate users attempting to access Administrator Level privileges on the Switch. The user may set a password of up to 15 characters.
Confirm Local Enable Password	Confirm the new password entered above. Entering a different password here from the one set in the New Local Enabled field will result in a fail message.

Click the **Apply** button to accept the changes made.

SSL Settings

Secure Sockets Layer, or SSL, is a security feature that will provide a secure communication path between a host and client through the use of authentication, digital signatures and encryption. These security functions are implemented through the use of a cipher suite, which is a security string that determines the exact cryptographic parameters, specific encryption algorithms and key sizes to be used for an authentication session and consists of three levels:

1. **Key Exchange:** The first part of the Cipher suite string specifies the public key algorithm to be used. This switch utilizes the Rivest Shamir Adleman (RSA) public key algorithm and the Digital Signature Algorithm (DSA), specified here as the DHE DSS Diffie-Hellman (DHE) public key algorithm. This is the first authentication process between client and host as they “exchange keys” in looking for a match and therefore authentication to be accepted to negotiate encryptions on the following level.
2. **Encryption:** The second part of the cipher suite that includes the encryption used for encrypting the messages sent between client and host. The Switch supports two types of cryptology algorithms:
 - a. Stream Ciphers – There are two types of stream ciphers on the Switch, *RC4 with 40-bit keys* and *RC4 with 128-bit keys*. These keys are used to encrypt messages and need to be consistent between client and host for optimal use.
 - b. CBC Block Ciphers – CBC refers to Cipher Block Chaining, which means that a portion of the previously encrypted block of encrypted text is used in the encryption of the current block. The Switch supports the *3DES EDE* encryption code defined by the Data Encryption Standard (DES) to create the encrypted text.
3. **Hash Algorithm:** This part of the cipher suite allows the user to choose a message digest function which will determine a Message Authentication Code. This Message Authentication Code will be encrypted with a sent message to provide integrity and prevent against replay attacks. The Switch supports two hash algorithms, MD5 (Message Digest 5) and SHA (Secure Hash Algorithm).

These three parameters are uniquely assembled in four choices on the Switch to create a three-layered encryption code for secure communication between the server and the host. The user may implement any one or combination

of the cipher suites available, yet different cipher suites will affect the security level and the performance of the secured connection. The information included in the cipher suites is not included with the Switch and requires downloading from a third source in a file form called a *certificate*. This function of the Switch cannot be executed without the presence and implementation of the certificate file and can be downloaded to the Switch by utilizing a TFTP server. The Switch supports SSLv3. Other versions of SSL may not be compatible with this Switch and may cause problems upon authentication and transfer of messages from client to host.

The SSL Settings window located on the next page will allow the user to enable SSL on the Switch and implement any one or combination of listed cipher suites on the Switch. A cipher suite is a security string that determines the exact cryptographic parameters, specific encryption algorithms and key sizes to be used for an authentication session. The Switch possesses four possible cipher suites for the SSL function, which are all enabled by default. To utilize a particular cipher suite, disable the unwanted cipher suites, leaving the desired one for authentication.

When the SSL function has been enabled, the web will become disabled. To manage the Switch through the web based management while utilizing the SSL function, the web browser must support SSL encryption and the header of the URL must begin with https://. (Ex. https://xx.xx.xx.xx) Any other method will result in an error and no access can be authorized for the web-based management.

Users can download a certificate file for the SSL function on the Switch from a TFTP server. The certificate file is a data record used for authenticating devices on the network. It contains information on the owner, keys for authentication and digital signatures. Both the server and the client must have consistent certificate files for optimal use of the SSL function. The Switch only supports certificate files with .der file extensions. Currently, the Switch comes with a certificate pre-loaded though the user may need to download more, depending on user circumstances.

To view this window, click **Security > SSL Settings** as shown below:

Figure 9-64 SSL Settings window

To set up the SSL function on the Switch, configure the parameters in the SSL Settings section described.

The fields that can be configured are described below:

Parameter	Description
SSL Status	Use the radio buttons to enable or disable the SSL status on the Switch. The default is Disabled.
Cache Timeout (60-86400)	This field will set the time between a new key exchange between a client and a host using the SSL function. A new SSL session is established every time the client and host go through a key exchange. Specifying a longer timeout will allow the SSL session to reuse the master key on future connections with that particular host, therefore speeding up the negotiation process. The default setting is 600 seconds.

Click the **Apply** button to accept the changes made.

To set up the **SSL cipher suite function** on the Switch, configure the parameters in the SSL Cipher suite Settings section described below:

Parameter	Description
RSA with RC4_128_MD5	This cipher suite combines the RSA key exchange, stream cipher RC4 encryption with 128-bit keys and the MD5 Hash Algorithm. Use the radio buttons to enable or disable this cipher suite. This field is Enabled by default.
RSA with 3DES EDE CBC SHA	This cipher suite combines the RSA key exchange, CBC Block Cipher 3DES_EDE encryption and the SHA Hash Algorithm. Use the radio buttons to enable or disable this cipher suite. This field is Enabled by default.
DHS DSS with 3DES EDE CBC SHA	This cipher suite combines the DSA Diffie Hellman key exchange, CBC Block Cipher 3DES_EDE encryption and SHA Hash Algorithm. Use the radio buttons to enable or disable this cipher suite. This field is Enabled by default.
RSA EXPORT with RC4 40 MD5	This cipher suite combines the RSA Export key exchange and stream cipher RC4 encryption with 40-bit keys. Use the radio buttons to enable or disable this cipher suite. This field is Enabled by default.

Click the **Apply** button to accept the changes made.

To download SSL certificates, configure the parameters in the SSL Certificate Download section described below.

Parameter	Description
Server IP Address	Enter the IPv4 address of the TFTP server where the certificate files are located.
Certificate File Name	Enter the path and the filename of the certificate file to download. This file must have a .der extension. (Ex. c:/cert.der)
Key File Name	Enter the path and the filename of the key file to download. This file must have a .der extension (Ex. c:/pkey.der)

Click the **Download** button to download the SSL certificate based on the information entered.



NOTE: Certain implementations concerning the function and configuration of SSL are not available on the web-based management of this Switch and need to be configured using the command line interface.



NOTE: Enabling the SSL command will disable the web-based switch management. To log on to the Switch again, the header of the URL must begin with `https://`. Entering anything else into the address field of the web browser will result in an error and no authentication will be granted.

SSH

SSH is an abbreviation of Secure Shell, which is a program allowing secure remote login and secure network services over an insecure network. It allows a secure login to remote host computers, a safe method of executing commands on a remote end node, and will provide secure encrypted and authenticated communication between two non-trusted hosts. SSH, with its array of unmatched security features is an essential tool in today's networking environment. It is a powerful guardian against numerous existing security hazards that now threaten network communications.

The steps required to use the SSH protocol for secure communication between a remote PC (the SSH client) and the Switch (the SSH server) are as follows:

- Create a user account with admin-level access using the **User Accounts** window. This is identical to creating any other admin-level User Account on the Switch, including specifying a password. This password is used to logon to the Switch, once a secure communication path has been established using the SSH protocol.
- Configure the User Account to use a specified authorization method to identify users that are allowed to establish SSH connections with the Switch using the **SSH User Authentication Mode** window. There are three choices as to the method SSH will use to authorize the user, which are Host Based, Password, and Public Key.
- Configure the encryption algorithm that SSH will use to encrypt and decrypt messages sent between the SSH client and the SSH server, using the SSH Authentication Method and Algorithm Settings window.
- Finally, enable SSH on the Switch using the SSH Configuration window.

After completing the preceding steps, a SSH Client on a remote PC can be configured to manage the Switch using a secure, in band connection.

SSH Settings

Users can configure and view settings for the SSH server.

To view this window, click **Security > SSH > SSH Settings** as shown below:

The screenshot shows the SSH Settings configuration window. At the top, the title is "SSH Settings" and there is a "Safeguard" icon. Below the title, the "SSH Server State" is set to "Disabled" (radio button selected). There is an "Apply" button to the right. Under the "SSH Global Settings" section, there are five configuration items, each with a text input field and a unit or label: "Max. Session (1-8)" with value 8; "Connection Timeout (120-600)" with value 120 and unit "sec"; "Authfail Attempts (2-20)" with value 2 and unit "times"; "Rekey Timeout" with a dropdown menu set to "Never"; and "TCP Port Number (1-65535)" with value 22. There is an "Apply" button at the bottom right of the settings section.

Figure 9-65 SSH Settings window

The fields that can be configured are described below:

Parameter	Description
SSH Server State	Use the radio buttons to enable or disable SSH on the Switch. The default is Disabled.
Max. Session (1-8)	Enter a value between 1 and 8 to set the number of users that may simultaneously access the Switch. The default setting is 8.
Connection Timeout (120-600)	Allows the user to set the connection timeout. The user may set a time between 120 and 600 seconds. The default setting is 120 seconds.
Authfail Attempts (2-20)	Allows the Administrator to set the maximum number of attempts that a user may try to log on to the SSH Server utilizing the SSH authentication. After the maximum number of attempts has been exceeded, the Switch will be disconnected and the user must reconnect to the Switch to attempt another login. The number of maximum attempts may be set between 2 and 20. The default setting is 2.
Rekey Timeout	Use the drop-down menu to set the time period that the Switch will change the security shell encryptions by using the drop-down menu. The available options are <i>Never</i> , <i>10 min</i> , <i>30 min</i> , and <i>60 min</i> . The default setting is <i>Never</i> .
TCP Port Number (1-65535)	Enter the TCP Port Number used for SSH. The default value is 22.

Click the **Apply** button to accept the changes made for each individual section.

SSH Authentication Method and Algorithm Settings

Users can configure the desired types of SSH algorithms used for authentication encryption. There are three categories of algorithms listed and specific algorithms of each may be enabled or disabled by ticking their corresponding check boxes. All algorithms are enabled by default.

To view this window, click **Security > SSH > SSH Authentication method and Algorithm Settings** as shown below:

SSH Authentication Method and Algorithm Settings Safeguard

SSH Authentication Mode Settings

Password Public Key Host-based

Encryption Algorithm

3DES-CBC AES128-CBC AES192-CBC AES256-CBC Cast128-CBC

ARC4 Blow-fish-CBC Twofish128 Twofish192 Twofish256

Data Integrity Algorithm

HMAC-MD5 HMAC-SHA1

Public Key Algorithm

HMAC-RSA HMAC-DSA

Figure 9-66 SSH Authentication Method and Algorithm Settings window

The fields that can be configured for **SSH Authentication Mode** are described below:

Parameter	Description
Password	This may be enabled or disabled to choose if the administrator wishes to use a locally configured password for authentication on the Switch. This parameter is enabled by default.
Public Key	This may be enabled or disabled to choose if the administrator wishes to use a public key configuration set on a SSH server, for authentication. This parameter is enabled by default.
Host-based	This may be enabled or disabled to choose if the administrator wishes to use a host computer for authentication. This parameter is intended for Linux users requiring SSH authentication techniques and the host computer is running the Linux operating system with a SSH program previously installed. This parameter is enabled by default.

Click the **Apply** button to accept the changes made.

The fields that can be configured for the **Encryption Algorithm** are described below:

Parameter	Description
3DES-CBC	Use the check box to enable or disable the Triple Data Encryption Standard encryption algorithm with Cipher Block Chaining. The default is enabled.
AES128-CBC	Use the check box to enable or disable the Advanced Encryption Standard AES128 encryption algorithm with Cipher Block Chaining. The default is enabled.
AES192-CBC	Use the check box to enable or disable the Advanced Encryption Standard AES192 encryption algorithm with Cipher Block Chaining. The default is enabled.
AES256-CBC	Use the check box to enable or disable the Advanced Encryption Standard AES-256 encryption algorithm with Cipher Block Chaining. The default is enabled.
Cast128-CBC	Use the check box to enable or disable the Cast128 encryption algorithm with Cipher Block Chaining. The default is enabled.
ARC4	Use the check box to enable or disable the Arcfour encryption algorithm with Cipher Block Chaining. The default is enabled.
Blow-fish CBC	Use the check box to enable or disable the Blowfish encryption algorithm with Cipher Block Chaining. The default is enabled.
Twofish128	Use the check box to enable or disable the twofish128 encryption algorithm. The default is enabled.
Twofish192	Use the check box to enable or disable the twofish192 encryption algorithm. The default is enabled.
Twofish256	Use the check box to enable or disable the twofish256 encryption algorithm. The default is enabled.

Click the **Apply** button to accept the changes made.

The fields that can be configured for the **Data Integrity Algorithm** are described below:

Parameter	Description
HMAC-MD5	Use the check box to enable or disable the HMAC (Hash for Message Authentication Code) mechanism utilizing the MD5 Message Digest encryption algorithm. The default is enabled.
HMAC-SHA1	Use the check box to enable or disable the HMAC (Hash for Message Authentication Code) mechanism utilizing the Secure Hash algorithm. The default is enabled.

Click the **Apply** button to accept the changes made.

The fields that can be configured for the **Public Key Algorithm** are described below:

Parameter	Description
HMAC-RSA	Use the check box to enable or disable the HMAC (Hash for Message Authentication Code) mechanism utilizing the RSA encryption algorithm. The default is enabled.
HMAC-DSA	Use the check box to enable or disable the HMAC (Hash for Message Authentication Code) mechanism utilizing the Digital Signature Algorithm (DSA) encryption. The default is enabled.

Click the **Apply** button to accept the changes made.

SSH User Authentication List

Users can configure parameters for users attempting to access the Switch through SSH. In the window above, the User Account “username” has been previously set using the **User Accounts** window in the **Configuration** folder. A User Account **MUST** be set in order to set the parameters for the SSH user.

To view this window, click **Security > SSH > SSH User Authentication List** as shown below:

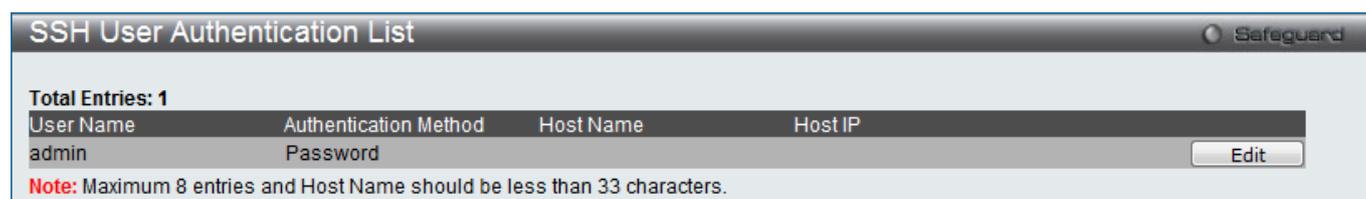


Figure 9-67 SSH User Authentication List window

The fields that can be configured or displayed are described below:

Parameter	Description
User Name	A name of no more than 15 characters to identify the SSH user. This User Name must be a previously configured user account on the Switch.
Authentication Method	The administrator may choose one of the following to set the authorization for users attempting to access the Switch. <i>Host Based</i> – This parameter should be chosen if the administrator wishes to use a remote SSH server for authentication purposes. Choosing this parameter requires

	<p>the user to input the following information to identify the SSH user.</p> <p><i>Password</i> – This parameter should be chosen if the administrator wishes to use an administrator-defined password for authentication. Upon entry of this parameter, the Switch will prompt the administrator for a password, and then to re-type the password for confirmation.</p> <p><i>Public Key</i> – This parameter should be chosen if the administrator wishes to use the public key on a SSH server for authentication.</p>
Host Name	Enter an alphanumeric string of no more than 32 characters to identify the remote SSH user. This parameter is only used in conjunction with the <i>Host Based</i> choice in the Auth. Mode field.
Host IP	Enter the corresponding IP address of the SSH user. This parameter is only used in conjunction with the <i>Host Based</i> choice in the Auth. Mode field.

Click the **Edit** button to re-configure the specific entry.

Click the **Apply** button to accept the changes made.



NOTE: To set the SSH User Authentication Mode parameters on the Switch, a User Account must be previously configured.

Trusted Host Settings

Up to four trusted host secure IP addresses or ranges may be configured and used for remote Switch management. It should be noted that if one or more trusted hosts are enabled, the Switch will immediately accept remote instructions from only the specified IP address or addresses. If you enable this feature, be sure to first enter the IP address of the station you are currently using.

To view this window, click **Security > Trusted Host Settings** as shown below:

Trusted Host
Safeguard

IPv4 Address
Net Mask (e.g.: 255.255.255.254 or 1-32)

IPv6 Address
Net Mask (1-128)

Access Interface
 SNMP
 Telnet
 SSH
 HTTP
 HTTPS
 Ping
 All

Total Entries: 1

IP Address	Access Interface	
10.0.0.0/8	SNMP Telnet SSH HTTP HTTPS Ping	<input type="button" value="Edit"/> <input type="button" value="Delete"/>

Note: Create a list of IPv4 / IPv6 addresses that can access the switch. Your local host IPv4 / IPv6 address must be one of the IPv4 / IPv6 addresses to avoid disconnection.

Figure 9-68 Trusted Host window

When the user clicks the **Edit** button, one will be able to edit the service allowed to the selected host.

The fields that can be configured are described below:

Parameter	Description
IPv4 Address	Enter an IPv4 address to add to the trusted host list.
IPv6 Address	Enter an IPv6 address to add to the trusted host list.
Net Mask	Enter a Net Mask address to add to the trusted host list.
Access Interface	Tick the check boxes to select services that will be allowed to the trusted host.

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete All** button to remove all the entries listed.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to delete the specific entry.

Safeguard Engine Settings

Periodically, malicious hosts on the network will attack the Switch by utilizing packet flooding (ARP Storm) or other methods. These attacks may increase the switch load beyond its capability. To alleviate this problem, the Safeguard Engine function was added to the Switch's software.

The Safeguard Engine can help the overall operability of the Switch by minimizing the workload of the Switch while the attack is ongoing, thus making it capable to forward essential packets over its network in a limited bandwidth. The Safeguard Engine has two operating modes that can be configured by the user, *Strict* and *Fuzzy*. In *Strict* mode, when the Switch either (a) receives too many packets to process or (b) exerts too much memory, it will enter the Exhausted mode. When in this mode, the Switch will drop all ARP and IP broadcast packets and packets from un-trusted IP addresses for a calculated time interval. Every five seconds, the Safeguard Engine will check to see if there are too many packets flooding the Switch. If the threshold has been crossed, the Switch will initially stop all ingress ARP and IP broadcast packets and packets from un-trusted IP addresses for five seconds. After another five-second checking interval arrives, the Switch will again check the ingress flow of packets. If the flooding has stopped, the Switch will again begin accepting all packets. Yet, if the checking shows that there continues to be too many packets flooding the Switch, it will stop accepting all ARP and IP broadcast packets and packets from un-trusted IP addresses for double the time of the previous stop period. This doubling of time for stopping these packets will continue until the maximum time has been reached, which is 320 seconds and every stop from this point until a return to normal ingress flow would be 320 seconds. For a better understanding, please examine the following example of the Safeguard Engine.

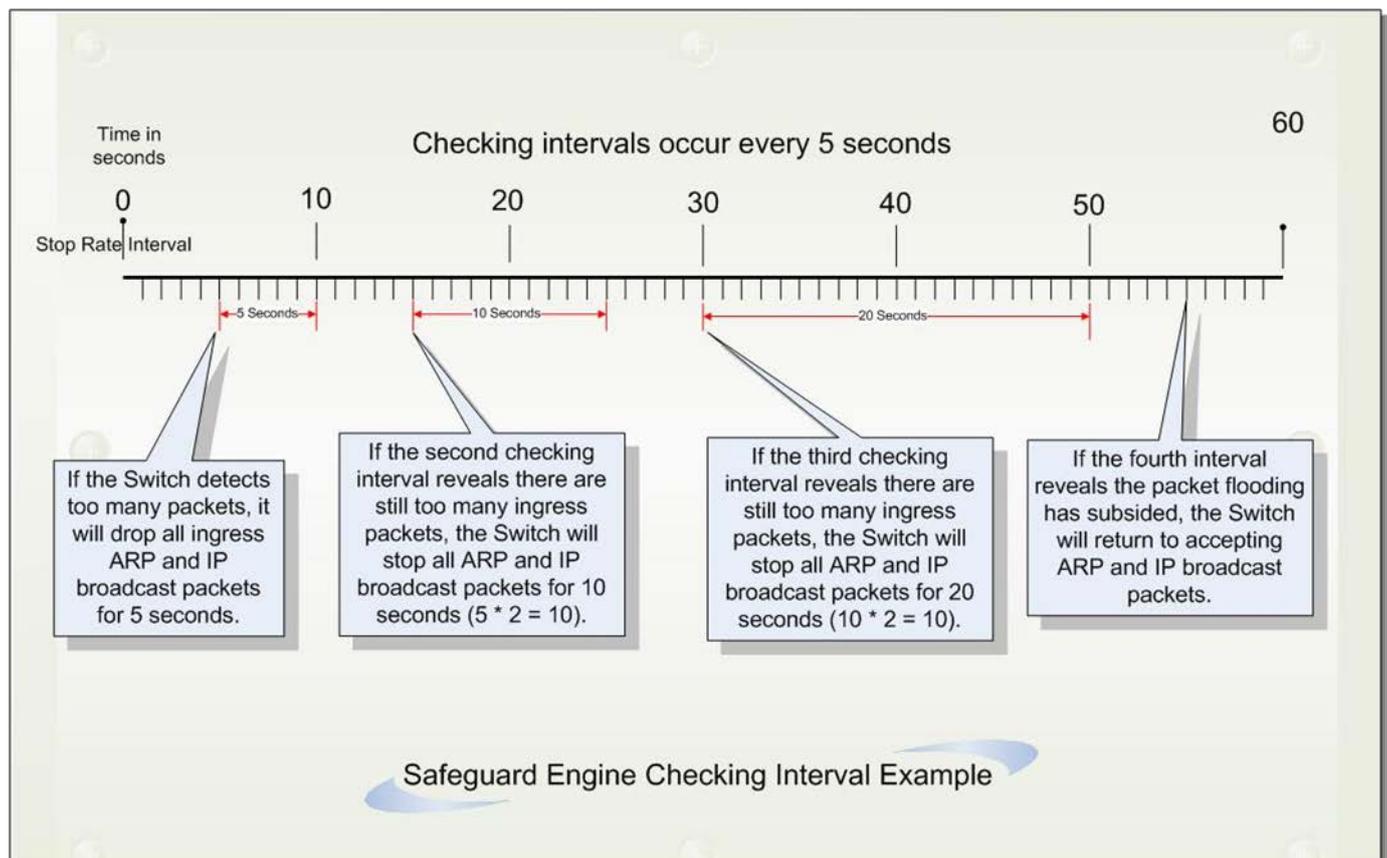


Figure 9-69 Safeguard Engine Checking Interval

For every consecutive checking interval that reveals a packet flooding issue, the Switch will double the time it will discard ingress ARP and IP broadcast packets and packets from the illegal IP addresses. In the example above, the Switch doubled the time for dropping ARP and IP broadcast packets when consecutive flooding issues were detected at 5-second intervals. (First stop = 5 seconds, second stop = 10 seconds, third stop = 20 seconds) Once the flooding is no longer detected, the wait period for dropping ARP and IP broadcast packets will return to 5 seconds and the process will resume.

In *Fuzzy* mode, once the Safeguard Engine has entered the Exhausted mode, the Safeguard Engine will decrease the packet flow by half. After returning to Normal mode, the packet flow will be increased by 25%. The switch will then return to its interval checking and dynamically adjust the packet flow to avoid overload of the Switch.



NOTICE: When Safeguard Engine is enabled, the Switch will allot bandwidth to various traffic flows (ARP, IP) using the FFP (Fast Filter Processor) metering table to control the CPU utilization and limit traffic. This may limit the speed of routing traffic over the network.

Users can enable the Safeguard Engine or configure advanced Safeguard Engine settings for the Switch.

To view this window, click **Security > Safeguard Engine Settings** as shown below:

Figure 9-70 Safeguard Engine Settings window

The fields that can be configured are described below:

Parameter	Description
Safeguard Engine State	Use the radio button to globally enable or disable Safeguard Engine settings for the Switch.
Rising Threshold (20% - 100%)	Used to configure the acceptable level of CPU utilization before the Safeguard Engine mechanism is enabled. Once the CPU utilization reaches this percentage level, the Switch will move into Exhausted mode, based on the parameters provided in this window.
Falling Threshold (20% - 100%)	Used to configure the acceptable level of CPU utilization as a percentage, where the Switch leaves the Safeguard Engine state and returns to normal mode.
Trap / Log	Use the drop-down menu to enable or disable the sending of messages to the device's SNMP agent and switch log once the Safeguard Engine has been activated by a high CPU utilization rate.
Mode	Used to select the type of Safeguard Engine to be activated by the Switch when the CPU utilization reaches a high rate. The user may select:

	<p><i>Fuzzy</i> – If selected, this function will instruct the Switch to minimize the IP and ARP traffic flow to the CPU by dynamically allotting an even bandwidth to all traffic flows.</p> <p><i>Strict</i> – If selected, this function will stop accepting all ARP packets not intended for the Switch, and will stop receiving all unnecessary broadcast IP packets, until the storm has subsided.</p> <p>The default setting is <i>Fuzzy</i> mode.</p>
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Click the **Apply** button to accept the changes made.

Chapter 10 Network Application

DHCP

DNS

SNTF

DHCP

DHCP Relay

DHCP Relay Global Settings

Users can enable and configure DHCP Relay Global Settings. The relay hops count limit allows the maximum number of hops (routers) that the DHCP messages can be relayed through to be set. The DHCP packet will be dropped when the relay hop count in the received packet is equal to or greater than this setting. The range is between 1 and 16 hops, with a default value of 4. The relay time threshold sets the minimum time (in seconds) that the Switch will wait before forwarding a BOOTREQUEST packet. If the value in the seconds' field of the packet is less than the relay time threshold, the packet will be dropped. The range is between 0 and 65,535 seconds, with a default value of 0 seconds.

To view this window, click **Network Application > DHCP > DHCP Relay > DHCP Relay Global Settings** as shown below:

Figure 10-1 DHCP Relay Global Settings window

The fields that can be configured are described below:

Parameter	Description
DHCP Relay State	This field can be toggled between <i>Enabled</i> and <i>Disabled</i> using the drop-down menu. It is used to enable or disable the DHCP Relay service on the Switch. The default is <i>Disabled</i> .
DHCP Relay Hops Count Limit (1-16)	This field allows an entry between 1 and 16 to define the maximum number of router hops DHCP messages can be forwarded. The default hop count is 4.

DHCP Relay Time Threshold (0-65535)	Allows an entry between 0 and 65535 seconds, and defines the maximum time limit for routing a DHCP packet. If a value of 0 is entered, the Switch will not process the value in the seconds' field of the DHCP packet. If a non-zero value is entered, the Switch will use that value, along with the hop count to determine whether to forward a given DHCP packet.
DHCP Relay Option 82 State	<p>This field can be toggled between <i>Enabled</i> and <i>Disabled</i> using the drop-down menu. It is used to enable or disable the DHCP Relay Agent Information Option 82 on the Switch. The default is <i>Disabled</i>.</p> <p><i>Enabled</i> –When this field is toggled to <i>Enabled</i>, the relay agent will insert and remove DHCP relay information (option 82 field) in messages between DHCP servers and clients. When the relay agent receives the DHCP request, it adds the option 82 information, and the IP address of the relay agent (if the relay agent is configured), to the packet. Once the option 82 information has been added to the packet it is sent on to the DHCP server. When the DHCP server receives the packet, if the server is capable of option 82, it can implement policies like restricting the number of IP addresses that can be assigned to a single remote ID or circuit ID. Then the DHCP server echoes the option 82 field in the DHCP reply. The DHCP server Unicast the reply back to the relay agent if the request was relayed to the server by the relay agent. The switch verifies that it originally inserted the option 82 data. Finally, the relay agent removes the option 82 field and forwards the packet to the switch port that connects to the DHCP client that sent the DHCP request.</p> <p><i>Disabled</i>- When the field is toggled to <i>Disabled</i>, the relay agent will not insert and remove DHCP relay information (option 82 field) in messages between DHCP servers and clients, and the check and policy settings will have no effect.</p>
DHCP Relay Agent Information Option 82 Check	<p>This field can be toggled between <i>Enabled</i> and <i>Disabled</i> using the drop-down menu. It is used to enable or disable the Switch's ability to check the validity of the packet's option 82 field.</p> <p><i>Enabled</i> – When the field is toggled to <i>Enabled</i>, the relay agent will check the validity of the packet's option 82 field. If the Switch receives a packet that contains the option 82 field from a DHCP client, the Switch drops the packet because it is invalid. In packets received from DHCP servers, the relay agent will drop invalid messages.</p> <p><i>Disabled</i> – When the field is toggled to <i>Disabled</i>, the relay agent will not check the validity of the packet's option 82 field.</p>
DHCP Relay Agent Information Option 82 Policy	<p>This field can be toggled between <i>Replace</i>, <i>Drop</i>, and <i>Keep</i> by using the drop-down menu. It is used to set the Switch's policy for handling packets when the DHCP Relay Agent Information Option 82 Check is set to <i>Disabled</i>. The default is <i>Replace</i>.</p> <p><i>Replace</i> – The option 82 field will be replaced if the option 82 field already exists in the packet received from the DHCP client.</p> <p><i>Drop</i> – The packet will be dropped if the option 82 field already exists in the packet received from the DHCP client.</p> <p><i>Keep</i> – The option 82 field will be retained if the option 82 field already exists in the packet received from the DHCP client.</p>
DHCP Relay Agent Information Option 82 Remote ID	Enter the DHCP Relay Agent Information Option 82 Remote ID.
DHCP Relay Option 60 State	Use the drop-down menu to enable or disable the use of the DHCP Relay Option 60 State feature.

DHCP Relay Option 61 State

Use the drop-down menu to enable or disable the use of the DHCP Relay Option 61 State feature.

Click the **Apply** button to accept the changes made for each individual section.



NOTE: If the Switch receives a packet that contains the option 82 field from a DHCP client and the information-checking feature is enabled, the Switch drops the packet because it is invalid. However, in some instances, users may configure a client with the option 82 field. In this situation, disable the information check feature so that the Switch does not drop the option 82 field from the packet. Users may configure the action that the Switch takes when it receives a packet with existing option 82 information by configuring the DHCP Agent Information Option 82 Policy.

The Implementation of DHCP Relay Agent Information Option 82

The **DHCP Relay Option 82** command configures the DHCP relay agent information option 82 setting of the Switch. The formats for the circuit ID sub-option and the remote ID sub-option are as follows:



NOTE: For the circuit ID sub-option of a standalone switch, the module field is always zero.

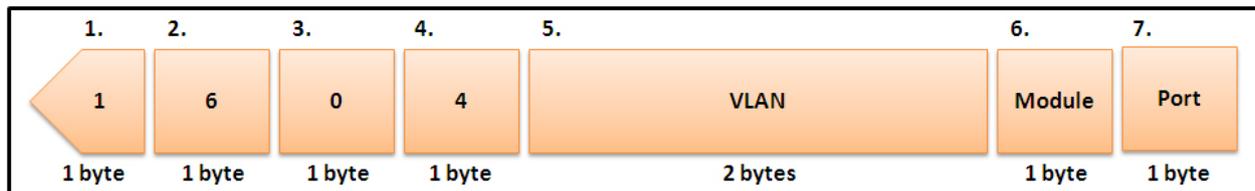
Circuit ID sub-option format:

Figure 10-2 Circuit ID Sub-option Format

- Sub-option type
- Length
- Circuit ID type
- Length
- VLAN: The incoming VLAN ID of DHCP client packet.
- Module: For a standalone switch, the Module is always 0; for a stackable switch, the Module is the Unit ID.
- Port: The incoming port number of the DHCP client packet, the port number starts from 1.

Remote ID sub-option format:

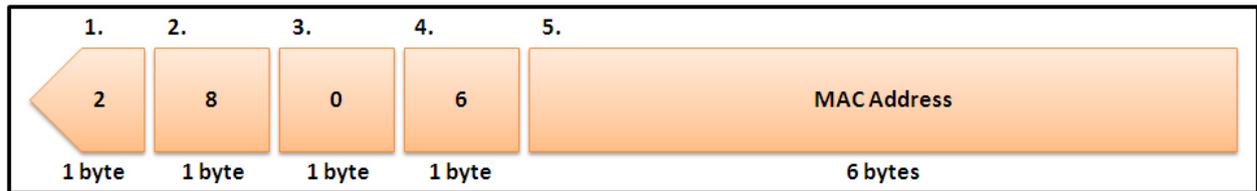


Figure 10-3 Remote ID Sub-option Format

- Sub-option type
- Length
- Remote ID type
- Length
- MAC address: The Switch's system MAC address.

DHCP Relay Interface Settings

Users can set up a server, by IP address, for relaying DHCP information to the Switch. The user may enter a previously configured IP interface on the Switch that will be connected directly to the DHCP client using this window. Properly configured settings will be displayed in the DHCP Relay Interface Table at the bottom of the window, once the user clicks the **Apply** button. The user may add up to four server IPs per IP interface on the Switch. Entries may be deleted by clicking the corresponding **Delete** button.

To view this window, click **Network Application > DHCP > DHCP Relay > DHCP Relay Interface Settings** as shown below:

The screenshot shows the DHCP Relay Interface Settings window. It includes input fields for the Interface (with a maximum of 12 characters) and the Server IP (with an example of 10.90.90.90). An Apply button is located to the right of the Server IP field. Below the input fields, it indicates 'Total Entries: 1' and displays a table with the following structure:

Interface	Server1	Server2	Server3	Server4
System	192.168.69.1	0.0.0.0	0.0.0.0	0.0.0.0

Each server IP entry in the table has a corresponding Delete button.

Figure 10-4 DHCP Relay Interface Settings window

The fields that can be configured are described below:

Parameter	Description
Interface	The IP interface on the Switch that will be connected directly to the client.
Server IP	Enter the IP address of the DHCP server. Up to four server IPs can be configured per IP Interface.

Click the **Apply** button to accept the changes made.

Click the **Delete** button to remove the specific entry.

DHCP Relay Option 60 Server Settings

On this page the user can configure the DHCP relay option 60 server parameters.

To view this window, click **Network Application > DHCP > DHCP Relay > DHCP Relay Option 60 Server Settings** as shown below:

Figure 10-5 DHCP Relay Option 60 Server Settings window

The fields that can be configured are described below:

Parameter	Description
Relay IP Address	Enter the DHCP Relay Option 60 Server Relay IP Address.
Mode	Use the drop-down menu to select the DHCP Relay Option 60 Server mode. Options to choose from are Drop and Relay .

Click the **Add** button to add a new entry based on the information entered.

Click the **Apply** button to accept the changes made.

Click the **Delete** button to remove the specific entry.

Click the **Delete All** button to remove all the entries listed.



NOTE: When there is no matching server found for the packet based on option 60, the relay servers will be determined by the default relay server setting.

DHCP Relay Option 60 Settings

This option decides whether the DHCP Relay will process the DHCP option 60 or not

To view this window, click **Network Application > DHCP > DHCP Relay > DHCP Relay Option 60 Settings** as shown below:

Figure 10-6 DHCP Relay Option 60 Settings window

The fields that can be configured are described below:

Parameter	Description
String	Enter the DHCP Relay Option 60 String value. Different strings can be specified for the same relay server, and the same string can be specified with multiple relay servers. The system will relay the packet to all the matching servers.
Server IP	Enter the DHCP Relay Option 60 Server IP address.
Match Type	Enter the DHCP Relay Option 60 Match Type value. <i>Exact Match</i> – The option 60 string in the packet must completely match with the specified string. <i>Partial Match</i> – The option 60 string in the packet only need partial match with the specified string.
IP Address	Enter the DHCP Relay Option 60 IP address.
String	Enter the DHCP Relay Option 60 String value.

Click the **Add** button to add a new entry based on the information entered.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Delete** button to remove the specific entry based on the information entered.

Click the **Show All** button to display all the existing entries.

Click the **Delete All** button to remove all the entries listed.

Click the **Delete** button to remove the specific entry.

DHCP Relay Option 61 Settings

On this page the user can configure, add and delete DHCP relay option 61 parameters.

To view this window, click **Network Application > DHCP > DHCP Relay > DHCP Relay Option 61 Settings** as shown below:

DHCP Relay Option 61 Settings Safeguard

DHCP Relay Option 61 Default Settings

DHCP Relay Option 61 Default: Drop (e.g.: 10.90.90.90) Apply

Client ID: MAC Address (e.g.: 01-11-22-33-44-55)

Relay Rule: Relay (e.g.: 10.90.90.90) Add

Client ID: MAC Address Delete

Delete All

Total Entries: 1

Client ID	Type	Relay Rule
00-11-22-33-44-55	MAC Address	192.168.69.2

Figure 10-7 DHCP Relay Option 61 Settings window

The fields that can be configured are described below:

Parameter	Description
DHCP Relay Option 61 Default	Here the user can select the DHCP Relay Option 61 default action. <i>Drop</i> – Specify to drop the packet. <i>Relay</i> – Specify to relay the packet to an IP address. Enter the IP Address of the default relay server. When there is no matching server found for the packet based on option 61, the relay servers will be determined by this default relay server setting.
Client ID	<i>MAC Address</i> – The client's client-ID which is the hardware address of client. <i>String</i> – The client's client-ID, which is specified by administrator.
Relay Rule	<i>Drop</i> – Specify to drop the packet. <i>Relay</i> – Specify to relay the packet to an IP address.
Client ID	<i>MAC Address</i> – The client's client-ID which is the hardware address of client. <i>String</i> – The client's client-ID, which is specified by administrator.

Click the **Apply** button to accept the changes made.

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete** button to remove the specific entry based on the information entered.

Click the **Delete All** button to remove all the entries listed.

DHCP Server

DHCP, or Dynamic Host Configuration Protocol, allows the switch to delegate IP addresses, subnet masks, default gateways and other IP parameters to devices that request this information. This occurs when a DHCP enabled device is booted on or attached to the locally attached network. This device is known as the DHCP client and when enabled, it will emit query messages on the network before any IP parameters are set. When the DHCP server receives this request, it returns a response to the client, containing the previously mentioned IP information that the DHCP client then utilizes and sets on its local configurations.

The user can configure many DHCP related parameters that it will utilize on its locally attached network, to control and limit the IP settings of clients desiring an automatic IP configuration, such as the lease time of the allotted IP

address, the range of IP addresses that will be allowed in its DHCP pool, the ability to exclude various IP addresses within the pool so as not to make identical entries on its network, or to assign the IP address of an important device (such as a DNS server or the IP address of the default route) to another device on the network.

Users also have the ability to bind IP addresses within the DHCP pool to specific MAC addresses in order to keep consistent the IP addresses of devices that may be important to the upkeep of the network that require a static IP address.

DHCP Server Global Settings

This window is used to configure the DHCP server global parameters.

To view this window, click **Network Application > DHCP > DHCP Server > DHCP Server Global Settings** as shown below:

Figure 10-8 DHCP Server Global Settings Window

The fields that can be configured are described below:

Parameter	Description
DHCP Server State	Click the radio buttons to enable or disable the DHCP Server State.
Ping Packets (0-10)	Enter the numbers of ping packet that the Switch will send out on the network containing the IP address to be allotted. If the ping request is not returned, the IP address is considered unique to the local network and then allotted to the requesting client. 0 means there is no ping test. The default value is 2.
Ping Timeout (10-2000)	Enter the amount of time the DHCP server must wait before timing out a ping packet. The default value is 100.

Click the **Apply** button to accept the changes made for each individual section.

DHCP Server Exclude Address Settings

The DHCP server assumes that all IP addresses in a DHCP pool subnet are available for assigning to DHCP clients. You must use this page to specify the IP address that the DHCP server should not assign to clients. This command can be used multiple times in order to define multiple groups of excluded addresses.

To view this window, click **Network Application > DHCP > DHCP Server > DHCP Server Exclude Address Settings** as shown below:

DHCP Server Exclude Address Settings Safeguard

Add DHCP Excluded Address

Begin Address End Address

Total Entries: 1

Index	Begin Address	End Address	
1	10.90.90.3	10.90.90.10	<input type="button" value="Delete"/>

Figure 10-9 DHCP Server Exclude Address Settings Window

The fields that can be configured are described below:

Parameter	Description
Begin Address	Enter the starting IP Address.
End Address	Enter the ending IP Address.

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete All** button to remove all the entries listed.

Click the **Delete** button to remove the specific entry.

DHCP Server Pool Settings

This window is used to add and delete the DHCP server pool.

To view this window, click **Network Application > DHCP > DHCP Server > DHCP Server Pool Settings** as shown below:

DHCP Server Pool Settings Safeguard

Add DHCP Pool

Pool Name (Max: 12 characters)

Total Entries: 1

Pool Name	
PName	<input type="button" value="Edit"/> <input type="button" value="Delete"/>

Figure 10-10 DHCP Server Pool Settings Window

The fields that can be configured are described below:

Parameter	Description
Pool Name	Enter the DHCP Server Pool name.

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete All** button to remove all the entries listed.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

After clicking the **Edit** button, the following page will appear:

Figure 10-11 DHCP Server Pool Settings (Edit) Window

The fields that can be configured are described below:

Parameter	Description
IP Address	Enter the network address of the pool.
Netmask	Enter the Netmask for the network address.
NetBIOS Node Type	NetBIOS node type for a Microsoft DHCP client.
Domain Name	Domain name of client. The domain name configured here will be used as the default domain name by the client.
Boot File	File name of boot image. The boot file is used to store the boot image for the client. The boot image is generally the operating system the client uses to load. If this option is input twice for the same pool, the second command will overwrite the first command. If the boot file is not specified, the boot file information will not be provided to the client.
Next Server	Enter the next server IP address.
DNS Server Address	IP address of DNS server. Specifies the IP address of a DNS server that is available to a DHCP client. Up to three IP addresses can be specified in one command line.
NetBIOS Name Server	IP address of WINS server. Windows Internet Naming Service (WINS) is a name resolution service that Microsoft DHCP clients use to correlate host names to IP addresses within a general grouping of networks. Up to three IP addresses can be specified in one command line.
Default Router	IP address of default router. Specifies the IP address of the default router for a DHCP client. Up to three IP addresses can be specified in one command line.
Pool Lease	By default, each IP address assigned by a DHCP server comes with a one-day lease, which is the amount of time that the address is valid. Tick the Infinite check box to have infinite lease. <i>Days – Days of lease.</i>

	<p><i>Hours</i> – Hours of lease.</p> <p><i>Minutes</i> – Minutes of lease</p>
--	--------------------------------------------------------------------------------

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

DHCP Server Manual Binding

An address binding is a mapping between the IP address and MAC address of a client. The IP address of a client can be assigned manually by an administrator or assigned automatically from a pool by a DHCP server. The dynamic binding entry will be created when an IP address is assigned to the client from the pool network's address.

To view this window, click **Network Application > DHCP > DHCP Server > DHCP Server Manual Binding** as shown below:

Figure 10-12 DHCP Server Manual Binding Window

The fields that can be configured are described below:

Parameter	Description
Pool Name	Enter the DHCP Server Pool name.
IP Address	IP address which will be assigned to specified client.
Hardware Address	Enter the hardware address.
Type	Either Ethernet or IEEE802 can be specified.

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete All** button to remove all the entries listed.

Click the **Delete** button to remove the specific entry.

DHCP Server Dynamic Binding

This window is used to delete the DHCP server dynamic binding table.

To view this window, click **Network Application > DHCP > DHCP Server > DHCP Server Dynamic Binding** as shown below:

Figure 10-13 DHCP Server Dynamic Binding Window

The fields that can be configured are described below:

Parameter	Description
Pool Name	Enter the DHCP Server Pool name.

Click the **Clear** button to clear the information entered in the specific entry.

Click the **Clear All** button to remove all the entries listed in the table.

DHCP Conflict IP

The DHCP server will use Ping packet to determine whether an IP address is conflict with other host before binding this IP. The IP address which has been identified conflict will be moved to the conflict IP database. The system will not attempt to bind the IP address in the conflict IP database unless the user clears it from the conflict IP database.

To view this window, click **Network Application > DHCP > DHCP Server > DHCP Conflict IP** as shown below:

Figure 10-14 DHCP Conflict IP Window

Click the **Clear All** button to remove all the entries listed in the table.

DHCP Local Relay Settings

The DHCP local relay settings allows the user to add option 82 into DHCP request packets when the DHCP client gets an IP address from the same VLAN. If the DHCP local relay settings are not configured, the Switch will flood the packets to the VLAN. In order to add option 82 into the DHCP request packets, the DHCP local relay settings and the state of the Global VLAN need to be enabled.

To view this window, click **Network Application > DHCP > DHCP Local Relay Settings** as shown below:

Figure 10-15 DHCP Local Relay Settings window

The fields that can be configured are described below:

Parameter	Description
DHCP Local Relay Global State	Enable or disable the DHCP Local Relay Global State. The default option is disabled.
VLAN Name	This is the VLAN Name that identifies the VLAN the user wishes to apply the DHCP Local Relay operation.
State	Enable or disable the configure DHCP Local Relay for VLAN state.

Click the **Apply** button to accept the changes made for each individual section.

DHCPv6 Relay

DHCPv6 Relay Global Settings

This window is used to configure the DHCPv6 relay function on the Switch.

To view this window, click **Network Application > DHCP > DHCPv6 Relay > DHCPv6 Relay Global Settings** as shown below:

Figure 10-16 DHCPv6 Relay Global Settings window

The fields that can be configured are described below:

Parameter	Description
DHCPv6 Relay State	Click the radio buttons to enable or disable the DHCPv6 relay function.
DHCPv6 Relay Hops Count (1-32)	Enter the number of relay agents that have to be relayed in this message. The default value is 4.

Click the **Apply** button to accept the changes made for each individual section.

DHCPv6 Relay Settings

This window is used to configure the DHCPv6 relay state of one or all of the specified interfaces, and add or display a destination IPv6 address to or from the switch's DHCPv6 relay table.

To view this window, click **Network Application > DHCP > DHCPv6 Relay > DHCPv6 Relay Settings** as shown below:

Figure 10-17 DHCPv6 Relay Settings window

The fields that can be configured are described below:

Parameter	Description
Interface Name	Enter the name of the IPv6 interface. Tick the All check box to select all IPv6 interfaces.
DHCPv6 Relay State	Use the drop-down menu to enable or disable the DHCPv6 relay state of the interface.
DHCPv6 Server Address	Enter the DHCPv6 server IPv6 address.

Click the **Apply** button to accept the changes made.

Click the **Add** button to add a new entry based on the information entered.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **View All** button to display all the existing entries.

Click the [Show Detail](#) link to view more details about the DHCPv6 relay entry.

After clicking the [Show Detail](#) link, the following windows will appear:

Figure 10-18 DHCPv6 Relay Settings (Show Detail) window

Click the **Delete** button to remove the specific entry.

DNS

Computer users usually prefer to use text names for computers for which they may want to open a connection. Computers themselves, require 32 bit IP addresses. Somewhere, a database of network devices' text names and their corresponding IP addresses must be maintained.

The Domain Name System (DNS) is used to map names to IP addresses throughout the Internet and has been adapted for use within intranets. For two DNS servers to communicate across different subnets, the DNS Relay of the Switch must be used. The DNS servers are identified by IP addresses.

Mapping Domain Names to Addresses

Name-to-address translation is performed by a program called a Name server. The client program is called a Name resolver. A Name resolver may need to contact several Name servers to translate a name to an address.

The Domain Name System (DNS) servers are organized in a somewhat hierarchical fashion. A single server often holds names for a single network, which is connected to a root DNS server - usually maintained by an ISP.

Domain Name Resolution

The domain name system can be used by contacting the name servers one at a time, or by asking the domain name system to do the complete name translation. The client makes a query containing the name, the type of answer required, and a code specifying whether the domain name system should do the entire name translation, or simply return the address of the next DNS server if the server receiving the query cannot resolve the name.

When a DNS server receives a query, it checks to see if the name is in its sub domain. If it is, the server translates the name and appends the answer to the query, and sends it back to the client. If the DNS server cannot translate the name, it determines what type of name resolution the client requested. A complete translation is called recursive resolution and requires the server to contact other DNS servers until the name is resolved. Iterative resolution specifies that if the DNS server cannot supply an answer, it returns the address of the next DNS server the client should contact.

Each client must be able to contact at least one DNS server, and each DNS server must be able to contact at least one root server.

The address of the machine that supplies domain name service is often supplied by a DHCP or BOOTP server, or can be entered manually and configured into the operating system at startup.

DNS Relay

DNS Relay Global Settings

This window is used to configure the DNS Relay global parameters.

To view this window, click **Network Application > DNS > DNS Relay > DNS Relay Global Settings** as shown below:

DNS Relay Global Settings

DNS Relay State: Disabled

Primary Name Server: 0.0.0.0 (e.g.: 172.18.211.10)

Secondary Name Server: 0.0.0.0 (e.g.: 172.18.211.10)

DNS Relay Cache State: Disabled

DNS Relay Static Table State: Disabled

Apply

Figure 10-19 DNS Relay Global Settings Window

The fields that can be configured are described below:

Parameter	Description
DNS Relay State	Use the drop-down menu to enable or disable the DNS relay state.
Primary Name Server	Enter the primary DNS server IP address.
Secondary Name Server	Enter the secondary DNS server IP address.
DNS Relay Cache State	Use the drop-down menu to enable or disable the DNS relay cache state.
DNS Relay Static Table State	Use the drop-down menu to enable or disable the DNS relay static table state.

Click the **Apply** button to accept the changes made.

DNS Relay Static Settings

This window is used to add or delete static entries into the switch's DNS resolution table.

To view this window, click **Network Application > DNS > DNS Relay > DNS Relay Static Settings** as shown below:

DNS Relay Static Settings

Add DNS Relay Static

Domain Name: [] (Max: 32 characters) IP Address: [] (e.g.: 172.18.211.10) Add

Total Entries: 1

Domain Name	IP Address	
dname	172.18.211.10	Delete

Figure 10-20 DNS Relay Static Settings Window

The fields that can be configured are described below:

Parameter	Description
Domain Name	Enter the domain name.
IP Address	Enter the DNS Relay IP Address.

Click the **Add** button to add a new entry based on the information entered.

Click the **Delete** button to remove the specific entry.

SNTP

The Simple Network Time Protocol (SNTP) is a protocol for synchronizing computer clocks through the Internet. It provides comprehensive mechanisms to access national time and frequency dissemination services, organize the SNTP subnet of servers and clients, and adjust the system clock in each participant.

SNTP Settings

Users can configure the time settings for the Switch.

To view this window, click **Network Application > SNTP > SNTP Settings** as shown below:

Figure 10-21 SNTP Settings window

The fields that can be configured are described below:

Parameter	Description
SNTP State	Use this radio button to enable or disable SNTP.
Current Time	Displays the Current Time.
Time Source	Displays the time source for the system.
SNTP First Server	The IP address of the primary server from which the SNTP information will be taken.
SNTP Second Server	The IP address of the secondary server from which the SNTP information will be taken.
SNTP Poll Interval In Seconds (30-99999)	The interval, in seconds, between requests for updated SNTP information.

Click the **Apply** button to accept the changes made.

Time Zone Settings

Users can configure time zones and Daylight Savings Time settings for SNTP.

To view this window, click **Network Application > SNTP > Time Zone Settings** as shown below:

Figure 10-22 Time Zone Settings window

The fields that can be configured are described below:

Parameter	Description
Daylight Saving Time State	Use this drop-down menu to enable or disable the DST Settings.
Daylight Saving Time Offset In Minutes	Use this drop-down menu to specify the amount of time that will constitute your local DST offset – 30, 60, 90, or 120 minutes.
Time Zone Offset From GMT In +/- HH:MM	Use these drop-down menus to specify your local time zone's offset from Greenwich Mean Time (GMT.)

Parameter	Description
DST Repeating Settings	Using repeating mode will enable DST seasonal time adjustment. Repeating mode requires that the DST beginning and ending date be specified using a formula. For example, specify to begin DST on Saturday during the second week of April and end DST on Sunday during the last week of October.
From: Which Week Of	Enter the week of the month that DST will start.

The Month	
From: Day Of Week	Enter the day of the week that DST will start on.
From: Month	Enter the month DST will start on.
From: Time In HH MM	Enter the time of day that DST will start on.
To: Which Week Of The Month	Enter the week of the month the DST will end.
To: Day Of Week	Enter the day of the week that DST will end.
To: Month	Enter the month that DST will end.
To: Time In HH MM	Enter the time DST will end.

Parameter	Description
DST Annual Settings	Using annual mode will enable DST seasonal time adjustment. Annual mode requires that the DST beginning and ending date be specified concisely. For example, specify to begin DST on April 3 and end DST on October 14.
From: Month	Enter the month DST will start on, each year.
From: Day	Enter the day of the month DST will start on, each year.
From: Time In HH MM	Enter the time of day DST will start on, each year.
To: Month	Enter the month DST will end on, each year.
To: Day	Enter the day of the month DST will end on, each year.
To: Time In HH MM	Enter the time of day that DST will end on, each year.

Click the **Apply** button to accept the changes made.

Chapter 11 OAM

CFM

Ethernet OAM

Cable Diagnostics

CFM

CFM Settings

On this page the user can configure the CFM parameters.

To view this window, click **OAM > CFM > CFM Settings**, as shown below:

CFM Settings Safeguard

CFM Global Settings

CFM State Enabled Disabled

All MPs Reply LTRs Enabled Disabled

CFM MD Settings

MD MD Index Level 0 MIP None SenderID TLV None

Note: MD should be less than 22 characters

Total Entries: 1

Level	MD Index	MD Name	MIP Creation	SenderID TLV	Edit	Delete	Add MA
0	1	md	None	None			

Figure 11-1 CFM Settings Window

The fields that can be configured are described below:

Parameter	Description
CFM State	Click the radio buttons to enable or disable the CFM feature.
All MPs Reply LTRs	Click the radio buttons to enable or disable all MPs to reply LTRs.
MD	Enter the maintenance domain name.
MD Index	Enter the maintenance domain index used.
Level	Use the drop-down menu to select the maintenance domain level.
MIP	This is the control creations of MIPs. <i>None</i> – Don't create MIPs. This is the default value. <i>Auto</i> – MIPs can always be created on any ports in this MD, if that port is not configured with a MEP of this MD. For the intermediate switch in a MA, the setting must

	<p>be auto in order for the MIPs to be created on this device.</p> <p><i>Explicit</i> – MIPs can be created on any ports in this MD, only if the next existent lower level has a MEP configured on that port, and that port is not configured with a MEP of this MD.</p>
SenderID TLV	<p>This is the control transmission of the SenderID TLV.</p> <p><i>None</i> – Don't transmit sender ID TLV. This is the default value.</p> <p><i>Chassis</i> – Transmit sender ID TLV with chassis ID information.</p> <p><i>Manage</i> – Transmit sender ID TLV with managed address information.</p> <p><i>Chassis Manage</i> – Transmit sender ID TLV with chassis ID information and manage address information.</p>

Click the **Apply** button to accept the changes made for each individual section.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.



NOTE: The MD Name value should not be more than 22 characters.

To add a maintenance association (MA), click the **Add MA** button.

Click the **Add MA** button to see the following window

Figure 11-2 CFM MA Settings Window

The fields that can be configured are described below:

Parameter	Description
MA	Enter the maintenance association name.
MA Index	Enter the maintenance association index.
VID	VLAN Identifier. Different MA must be associated with different VLANs.

Click the **Add** button to add a new entry based on the information entered.

Click the <<**Back** button to discard the changes made and return to the previous page.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

Click the **MIP Port Table** button to view the CFM MIP Table.

Click the **Add MEP** button to add a Maintenance End Point entry.

After click in the **Edit** button the following window appears:

Figure 11-3 CFM MA Settings (Edit) Window

The fields that can be configured are described below:

Parameter	Description
MIP	<p>This is the control creation of MIPs.</p> <p><i>None</i> - Don't create MIPs.</p> <p><i>Auto</i> - MIPs can always be created on any ports in this MA, if that port is not configured with a MEP of that MA.</p> <p><i>Explicit</i> - MIP can be created on any ports in this MA, only if the next existent lower level has a MEP configured on that port, and that port is not configured with a MEP of this MA.</p> <p><i>Defer</i> - Inherit the setting configured for the maintenance domain that this MA is associated with. This is the default value.</p> <p>NOTE: In CFM hardware mode, the default value is None.</p>
SenderID	<p>This is the control transmission of the sender ID TLV.</p> <p><i>None</i> - Don't transmit sender ID TLV. This is the default value.</p> <p><i>Chassis</i> - Transmit sender ID TLV with chassis ID information.</p> <p><i>Manage</i> - Transmit sender ID TLV with manage address information.</p> <p><i>Chassis Manage</i> - Transmit sender ID TLV with chassis ID information and manage address information.</p> <p><i>Defer</i> - Inherit the setting configured for the maintenance domain that this MA is associated with. This is the default value.</p> <p>NOTE: In CFM hardware mode, the default value is None.</p>
CCM	<p>This is the CCM interval.</p>

	<p>3.3ms - 3.3 milliseconds. This only works in CFM hardware mode.</p> <p>10ms - 10 milliseconds. This only works in CFM hardware mode.</p> <p>100ms - 100 milliseconds. Not recommended. For test purpose.</p> <p>1sec - One second.</p> <p>10sec - Ten seconds. This is the default value.</p> <p>1min - One minute.</p> <p>10min - Ten minutes.</p>
MEP ID(s)	<p>This is to specify the MEP IDs contained in the maintenance association. The range of the MEP ID is 1-8191.</p> <p><i>Add</i> - Add MEP ID(s).</p> <p><i>Delete</i> - Delete MEP ID(s).</p> <p>By default, there is no MEP ID in a newly created maintenance association.</p>

Click the **Apply** button to accept the changes made.

After clicking the **MIP Port Table** button, the following page will appear:

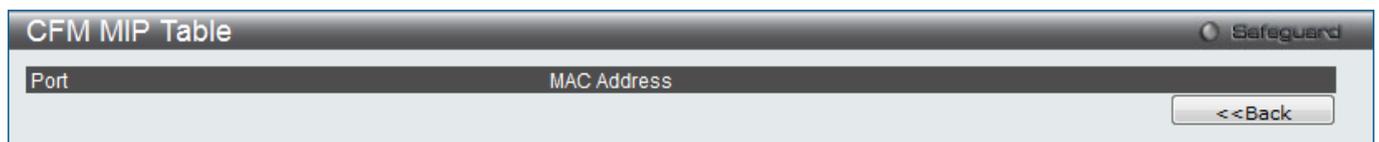


Figure 11-4 CFM MIP Port Table Window

Click the **<<Back** button to return to the previous page.

After clicking the **Add MEP** button, the following page will appear:

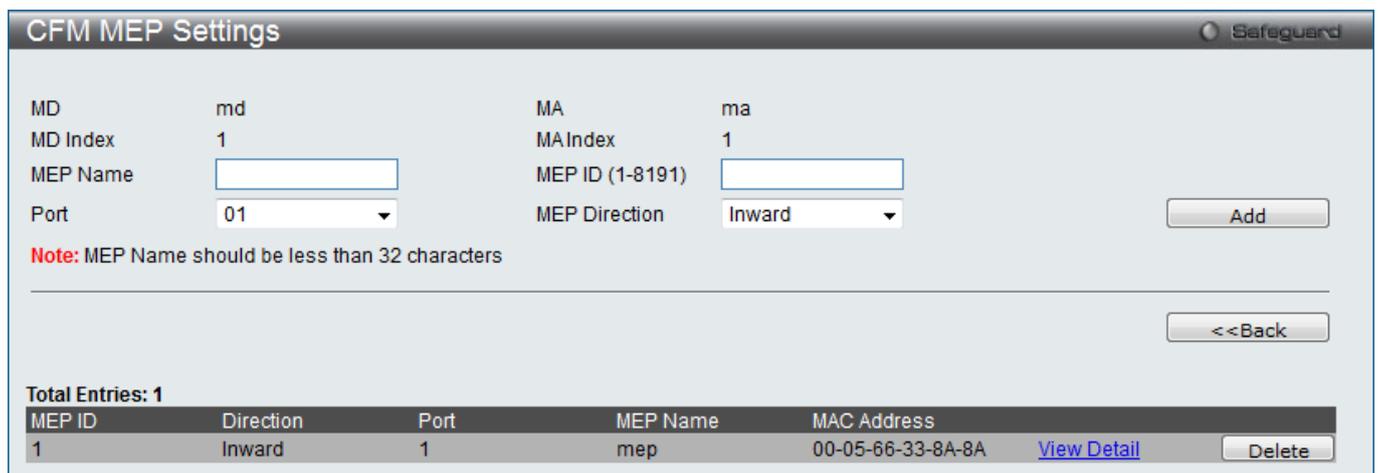


Figure 11-5 CFM MEP Settings (Add) Window

The fields that can be configured are described below:

Parameter	Description
MEP Name	Enter an MEP name. It is unique among all MEPs configured on the device.

MEP ID (1-8191)	Enter an MEP ID configured in the MA's MEP ID list.
Port	Use the drop-down menu to select a port. This port should be a member of the MA's associated VLAN. In CFM hardware mode, this port should be a tagged member of the MA's associated VLAN.
MEP Direction	This is the MEP direction. <i>Inward</i> - Inward facing (up) MEP. <i>Outward</i> - Outward facing (down) MEP. NOTE: Only <i>Outward</i> is available when <i>Hardware</i> mode is selected in CFM MA Settings window.

Click the **Add** button to add a new entry based on the information entered.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the [View Detail](#) link to view more information regarding the specific entry.

Click the **Delete** button to remove the specific entry.



NOTE: The MEP Name value should not be more than 32 characters.

After clicking the [View Detail](#) link, the following page will appear:

CFM MEP Information Safeguard

MD : md	MA : ma
MD Index : 1	MA Index : 1
MEP Name : mep	MEPID : 1
Port : 1	Direction : Inward
CFM Port Status : Disabled	MAC Address : 00-05-66-33-8A-8A
Highest Fault : None	Out of Sequence CCMS : 0 Received
Cross Connect CCMS : 0 Received	Error CCMS : 0 Received
Normal CCMS : 0 Received	Port Status CCMS : 0 Received
If Status CCMS : 0 Received	CCMS Transmitted : 0
In Order LBRs : 0 Received	Out of Order LBRs : 0 Received
Next LTM Trans ID : 0	Unexpected LTRs : 0 Received
LBMs Transmitted : 0	MEP State : Disabled
CCM State : Disabled	PDU Priority : 7
Fault Alarm : Disabled	Alarm Time (250-1000) : 250 centisecond((1/100)s)
Alarm Reset Time (250-1000) : 1000 centisecond((1/100)s)	AIS State : Disabled
AIS Period : 1 Second	AIS Client Level : Invalid
AIS Status : Not Detected	LCK State : Disabled
LCK Period : 1 Second	LCK Client Level : Invalid
LCK Status : Not Detected	AIS PDUs : 0 Received
AIS PDUs Transmitted : 0	LCK PDUs : 0 Received
LCK PDUs Transmitted : 0	

Remote MEP(s)

MEPID	MAC Address	Status	RDI	Port Status	Interface Status	LCK	Detect Time
-------	-------------	--------	-----	-------------	------------------	-----	-------------

Figure 11-6 CFM MEP Information Window

Click the **Edit** button to re-configure the specific entry.

Click the **<<Back** button to discard the changes made and return to the previous page.

After clicking the **Edit** button, the following page will appear:

Parameter	Value	Parameter	Value
MD	md	MA	ma
MD Index	1	MA Index	1
MEP Name	mep	MEPID	1
Port	1	Direction	Inward
CFM Port Status	Disabled	MAC Address	00-05-66-33-8A-8A
Highest Fault	None	Out of Sequence CCMs	0 Received
Cross Connect CCMs	0 Received	Error CCMs	0 Received
Normal CCMs	0 Received	Port Status CCMs	0 Received
If Status CCMs	0 Received	CCMs Transmitted	0
In Order LBRs	0 Received	Out of Order LBRs	0 Received
Next LTM Trans ID	0	Unexpected LTRs	0 Received
LBMs Transmitted	0	MEP State	Disabled
CCM State	Disabled	PDU Priority	7
Fault Alarm	All	Alarm Time (250-1000)	250 centisecond((1/100)s)
Alarm Reset Time (250-1000)	1000 centisecond((1/100)s)	AIS State	Disabled
AIS Period	1 Second	AIS Client Level	Invalid
AIS Status	Not Detected	LCK State	Disabled
LCK Period	1 Second	LCK Client Level	Invalid
LCK Status	Not Detected	AIS PDUs	0 Received
AIS PDUs Transmitted	0	LCK PDUs	0 Received
LCK PDUs Transmitted	0		

Buttons: Apply, Edit AIS, Edit LCK, <<Back

Remote MEP(s)

MEPID	MAC Address	Status	RDI	Port Status	Interface Status	LCK	Detect Time
-------	-------------	--------	-----	-------------	------------------	-----	-------------

Figure 11-7 CFM MEP Information (Edit) Window

The fields that can be configured are described below:

Parameter	Description
MEP State	This is the MEP administrative state. <i>Enable</i> - MEP is enabled. <i>Disable</i> - MEP is disabled. This is the default value.
CCM State	This is the CCM transmission state. <i>Enable</i> - CCM transmission enabled. <i>Disable</i> - CCM transmission disabled. This is the default value.
PDU Priority	The 802.1p priority is set in the CCMs and the LTMs messages transmitted by the MEP. The default value is 7.
Fault Alarm	This is the control types of the fault alarms sent by the MEP. <i>All</i> - All types of fault alarms will be sent. <i>MAC Status</i> - Only the fault alarms whose priority is equal to or higher than "Some Remote MEP MAC Status Error" are sent. <i>Remote CCM</i> - Only the fault alarms whose priority is equal to or higher than "Some Remote MEP Down" are sent. <i>Errors CCM</i> - Only the fault alarms whose priority is equal to or higher than "Error CCM Received" are sent. <i>Xcon CCM</i> - Only the fault alarms whose priority is equal to or higher than "Cross-connect CCM Received" are sent.

	<i>None</i> - No fault alarm is sent. This is the default value.
Alarm Time	This is the time that a defect must exceed before the fault alarm can be sent. The unit is in centiseconds, the range is 250-1000. The default value is 250.
Alarm Reset Time	This is the dormant duration time before a defect is triggered before the fault can be re-alarmed. The unit is in centiseconds, the range is 250-1000. The default value is 1000.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

Click the **Edit AIS** button to configure the AIS settings.

Click the **Edit LCK** button to configure the LCK settings.

After clicking the **Edit AIS** button, the following window will appear:

Figure 11-8 CFM Extension AIS (Edit) Window

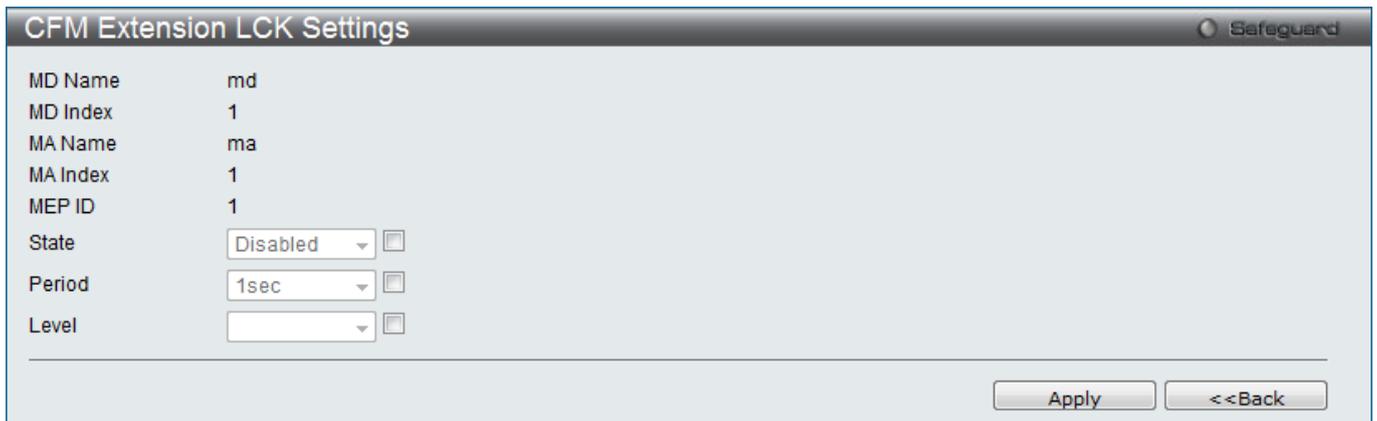
The fields that can be configured are described below:

Parameter	Description
State	Tick the check box and use the drop-down menu to enable or disable the AIS function.
Period	Tick the check box and use the drop-down menu to select the transmitting interval of AIS PDU.
Level	Tick the check box and use the drop-down menu to select the client level ID to which the MEP sends AIS PDU. The default client MD level is MD level at which the most immediate client layer MIPs and MEPs exist. Options to choose from are values between 0 and 7.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

After click the **Edit LCK** button, the following window will appear:



The screenshot shows the 'CFM Extension LCK Settings' window. It contains the following fields:

- MD Name: md
- MD Index: 1
- MA Name: ma
- MA Index: 1
- MEP ID: 1
- State: Disabled (with a check box)
- Period: 1sec (with a check box)
- Level: (empty dropdown with a check box)

At the bottom right, there are two buttons: 'Apply' and '<<Back'.

Figure 11-9 CFM Extension LCK Settings (Edit) Window

The fields that can be configured are described below:

Parameter	Description
State	Tick the check box and use the drop-down menu to enable or disable the LCK function.
Period	Tick the check box and use the drop-down menu to select the transmitting interval of LCK PDU.
Level	Tick the check box and use the drop-down menu to select the client level ID to which the MEP sends LCK PDU. The default client MD level is MD level at which the most immediate client layer MIPs and MEPs exist. Options to choose from are values between 0 and 7.

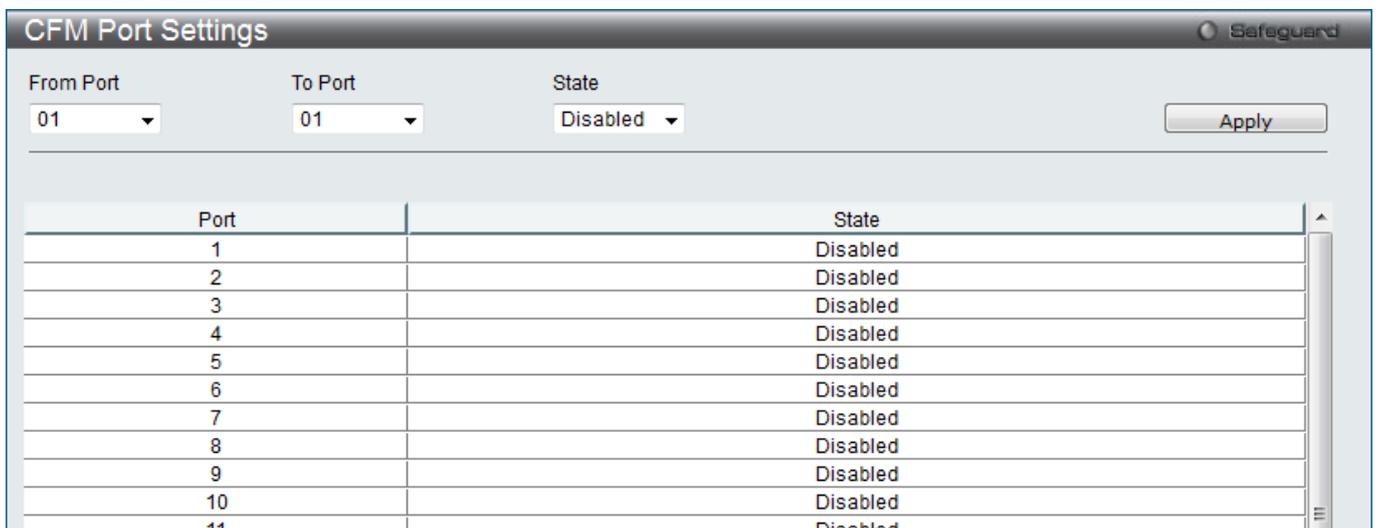
Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

CFM Port Settings

This window is used to configure the CFM port state.

To view this window, click **OAM > CFM > CFM Port Settings**, as shown below:



The screenshot shows the 'CFM Port Settings' window. It features three dropdown menus at the top: 'From Port' (01), 'To Port' (01), and 'State' (Disabled). An 'Apply' button is located to the right of these menus. Below the menus is a table with two columns: 'Port' and 'State'.

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

Figure 11-10 CFM Port Settings Window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Use the drop-down menu to select a range of ports used for this configuration.
State	Use the drop-down menu to enable or disable the state of specific port regarding the CFM configuration.

Click the **Apply** button to accept the changes made.

CFM Loopback Settings

This window is used to CFM loopback settings.

To view this window, click **OAM > CFM > CFM Loopback Settings**, as shown below:

Figure 11-11 CFM Loopback Settings Window

The fields that can be configured are described below:

Parameter	Description
MEP Name	Select and enter the Maintenance End Point name used.
MEP ID	Select and enter the Maintenance End Point ID used.
MD Name	Select and enter the Maintenance Domain name used.
MD Index	Select and enter the Maintenance Domain index used.
MA Name	Select and enter the Maintenance Association name used.

MA Index	Select and enter the Maintenance Association index used.
Remote MEP ID	Select and enter the Remote Maintenance End Point ID used.
MAC Address	Enter the destination MAC address used here.
LBM's Number (1-65535)	Number of LBMs to be sent. The default value is 4.
LBM Payload Length	The payload length of LBM to be sent. The default is 0.
LBM Payload Pattern	An arbitrary amount of data to be included in a Data TLV, along with an indication whether the Data TLV is to be included.
LBMs Priority	The 802.1p priority to be set in the transmitted LBMs. If not specified, it uses the same priority as CCMs and LTM's sent by the MA.

Click the **Apply** button to accept the changes made.

CFM Linktrace Settings

This window is used to configure the CFM linktrace settings.

To view this window, click **OAM > CFM > CFM Linktrace Settings**, as shown below:

Figure 11-12 CFM Linktrace Settings Window

The fields that can be configured are described below:

Parameter	Description
Remote MEP ID	Select and enter the Remote Maintenance End Point ID used.
MEP Name	Select and enter the Maintenance End Point name used.

MEP ID	Select and enter the Maintenance End Point ID used.
MD Name	Select and enter the Maintenance Domain name used.
MD Index	Select and enter the Maintenance Domain index used.
TTL	Link-trace message TTL value. The default value is 64.
MAC Address	Here the user can enter the destination MAC address.
MA Name	Select and enter the Maintenance Association name used.
MA Index	Select and enter the Maintenance Association index used.
PDU Priority	The 802.1p priority to be set in the transmitted LTM. If not specified, it uses the same priority as CCMs sent by the MA.

Click the **Apply** button to accept the changes made.

Click the **Find** button to locate a specific entry based on the information entered.

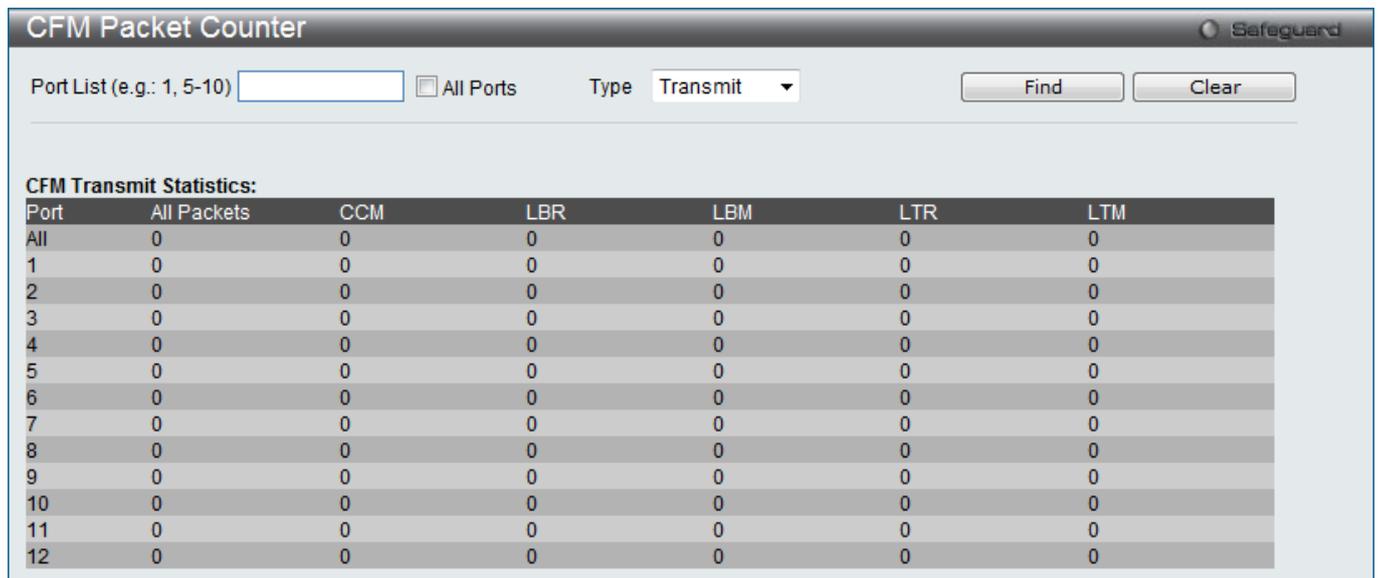
Click the **Delete** button to remove the specific entry based on the information entered.

Click the **Delete All** button to remove all the entries listed.

CFM Packet Counter

This window is used to display the CFM packet counter information. This window does not count CCM packet statistics of the MEPs in CFM hardware mode.

To view this window, click **OAM > CFM > CFM Packet Counter**, as shown below:



The screenshot shows the 'CFM Packet Counter' window with a search bar for 'Port List (e.g.: 1, 5-10)', an 'All Ports' checkbox, a 'Type' dropdown set to 'Transmit', and 'Find' and 'Clear' buttons. Below is a table titled 'CFM Transmit Statistics:' with columns for Port, All Packets, CCM, LBR, LBM, LTR, and LTM. All values in the table are 0.

Port	All Packets	CCM	LBR	LBM	LTR	LTM
All	0	0	0	0	0	0
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0

Figure 11-13 CFM Packet Counter Window

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

Port List	Enter a port or range of ports to display. Tick the All Ports check box to display all ports.
Type	<i>Transmit</i> – Selecting this option will display all the CFM packets transmitted. <i>Receive</i> – Selecting this option will display all the CFM packets received. <i>CCM</i> – Selecting this option will display all the CFM packets transmitted and received.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Clear** button to clear all the information entered in the fields.

CFM Fault Table

This window is used to display the CFM fault information.

To view this window, click **OAM > CFM > CFM Fault Table**, as shown below:

Figure 11-14 CFM Fault Table Window

The fields that can be configured are described below:

Parameter	Description
MD Name	Select and enter the Maintenance Domain name used.
MD Index	Select and enter the Maintenance Domain index used.
MA Name	Select and enter the Maintenance Association name used.
MA Index	Select and enter the Maintenance Association index used.

Click the **Find** button to locate a specific entry based on the information entered.

CFM MP Table

This window is used to display the CFM MP information.

To view this window, click **OAM > CFM > CFM MP Table**, as shown below:

MD Name	MA Name	MEPID	Level	Direction	VID
md	ma	1	0	Inward	1

Figure 11-15 CFM MP Table Window

The fields that can be configured are described below:

Parameter	Description
Port	Use the drop-down menu to select the unit ID and the port number to view.
Level	Enter the level to view.
Direction	Use the drop-down menu to select the direction to view. <i>Inward</i> - Inward facing (up) MP. <i>Outward</i> - Outward facing (down) MP.
VID	Enter the VLAN ID to view.

Click the **Find** button to locate a specific entry based on the information entered.

Ethernet OAM

Ethernet OAM Settings

This window is used to configure the Ethernet OAM settings.

To view this window, click **OAM > Ethernet OAM > Ethernet OAM Settings**, as shown below:

Ethernet OAM Settings

Ethernet OAM Settings

From Port: 01 To Port: 01 Mode: Active State: Disabled Remote Loopback: None Received Remote Loopback: Ignore

Ethernet OAM Table

Port 1

Local Client	
OAM	Disabled
Mode	Active
Max OAMPDU	1518 Bytes
Remote Loopback	Supported
Unidirection	Supported
Link Monitoring	Supported
Variable Request	Not Supported
PDU Revision	0
Operation Status	Disable
Loopback Status	No Loopback

Port 2

Local Client	
OAM	Disabled
Mode	Active
Max OAMPDU	1518 Bytes
Remote Loopback	Supported
Unidirection	Supported
Link Monitoring	Supported
Variable Request	Not Supported

Figure 11-16 Ethernet OAM Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select a range of ports you wish to configure.
Mode	Use the drop-down menu to select to operate in either <i>Active</i> or <i>Passive</i> . The default mode is Active.
State	Use the drop-down menu to enable or disable the OAM function.
Remote Loopback	Use the drop-down menu to select Ethernet OAM remote loopback. <i>None</i> – Select to disable the remote loopback. <i>Start</i> – Select to request the peer to change to the remote loopback mode. <i>Stop</i> - Select to request the peer to change to the normal operation mode.
Received Remote Loopback	Use the drop-down menu to configure the client to process or to ignore the received Ethernet OAM remote loopback command. <i>Process</i> – Select to process the received Ethernet OAM remote loopback command. <i>Ignore</i> - Select to ignore the received Ethernet OAM remote loopback command.

Click the **Apply** button to accept the changes made for each individual section.

Ethernet OAM Configuration Settings

This window is used to configure Ethernet OAM configuration settings.

To view this window, click **OAM > Ethernet OAM > Ethernet OAM Configuration Settings**, as shown below:

Ethernet OAM Configuration Table	
Port 1	
OAM	Disabled
Mode	Active
Dying Gasp	Enabled
Critical Event	Enabled
Remote Loopback OAMPDU	Not Processed
Symbol Error	
Notify State	Enabled
Window	1000 Milliseconds
Threshold	1 Error Symbol
Frame Error	
Notify State	Enabled
Window	1000 Milliseconds
Threshold	1 Error Frame
Frame Period Error	
Notify State	Enabled
Window	1488100 Frames
Threshold	1 Error Frame
Frame Seconds Error	
Notify State	Enabled
Window	60000 Milliseconds
Threshold	1 Error Seconds

Figure 11-17 Ethernet OAM Configuration Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Select a range of ports you wish to configure.
Link Event	Use the drop-down menu to select the link events, <i>Link Monitor</i> or <i>Critical Link Event</i> .
Link Monitor	Use the drop-down menu to select link monitor. Available options are <i>Error Symbol</i> , <i>Error Frame</i> , <i>Error Frame Period</i> , and <i>Error Frame Seconds</i> .
Critical Link Event	Use the drop-down menu to select between <i>Dying Gasp</i> and <i>Critical Event</i> .
Threshold	Enter the number of error frame or symbol in the period is required to be equal to or greater than in order for the event to be generated.
Window	Enter the period of error frame or symbol in milliseconds summary event.
Notify	Select whether to enable or disable notification here.

Click the **Apply** button to accept the changes made for each individual section.

Ethernet OAM Event Log

The window is used to show ports Ethernet OAM event log information.

To view this window, click **OAM > Ethernet OAM > Ethernet OAM Event Log**, as shown below:

Ethernet OAM Event Log Safeguard

Port: 01 Find

Port List (e.g.: 1, 4-6) All Ports Clear

Local Event Statistics

Error Symbol Event	0
Error Frame Event	0
Error Frame Period Event	0
Error Frame Seconds Event	0
Dying Gasp	0
Critical Event	0

Remote Event Statistics

Error Symbol Event	0
Error Frame Event	0
Error Frame Period Event	0
Error Frame Seconds Event	0
Dying Gasp	0
Critical Event	0

Total Entries: 0

Index	Type	Location	Time Stamp	Value	Window	Threshold	Accumulated errors
-------	------	----------	------------	-------	--------	-----------	--------------------

Figure 11-18 Ethernet OAM Event Log window

The fields that can be configured are described below:

Parameter	Description
Port	Use the drop-down menu to select the unit ID and the port number to view.
Port List	Enter a list of ports. Tick the All Ports check box to select all ports.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **Clear** button to clear all the information entered in the fields.

Ethernet OAM Statistics

The window is used to show ports Ethernet OAM statistics information.

To view this window, click **OAM > Ethernet OAM > Ethernet OAM Statistics**, as shown below:

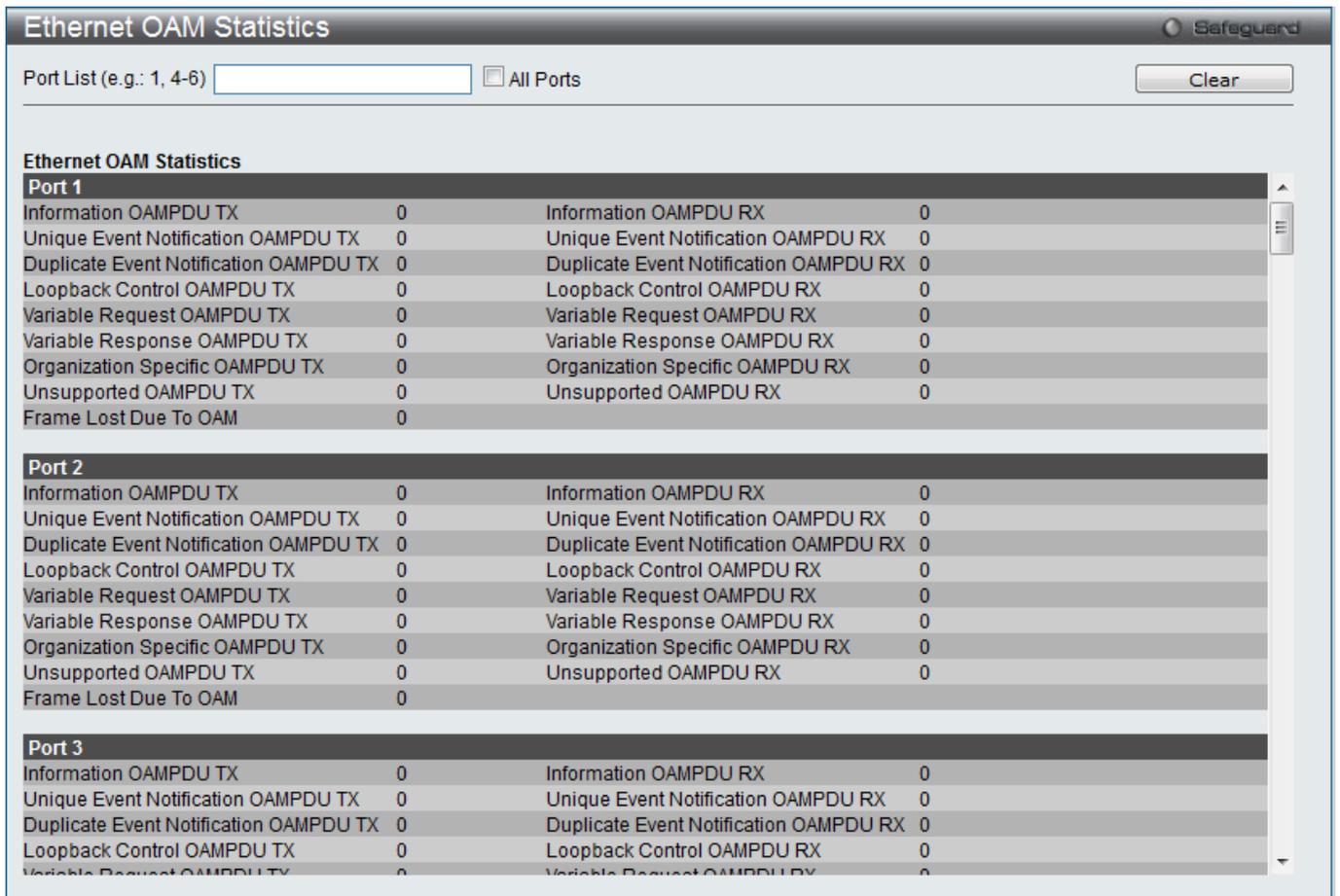


Figure 11-19 Ethernet OAM Statistics window

The fields that can be configured are described below:

Parameter	Description
Port List	Enter a list of ports. Tick the All Ports check box to select all ports.

Click the **Clear** button to clear all the information entered in the fields.

DULD Settings

The Switch features a D-Link Unidirectional Link Detection (DULD) module. The unidirectional link detection provides a mechanism that can be used to detect unidirectional link for Ethernet switches whose PHYs do not support unidirectional OAM operation. This function is established based on OAM, so OAM should be enabled before starting detection.

To view this window, click **OAM > DULD Settings**, as shown below:

DULD Settings
Safeguard

From Port
01

To Port
01

Admin State
Disabled

Mode
Shutdown

Discovery Time (5-65535)
5 sec

Apply

Port	Admin State	Oper Status	Mode	Link Status	Discovery Time (sec)
1	Disabled	Disabled	Normal	Unknown	5
2	Disabled	Disabled	Normal	Unknown	5
3	Disabled	Disabled	Normal	Unknown	5
4	Disabled	Disabled	Normal	Unknown	5
5	Disabled	Disabled	Normal	Unknown	5
6	Disabled	Disabled	Normal	Unknown	5
7	Disabled	Disabled	Normal	Unknown	5
8	Disabled	Disabled	Normal	Unknown	5
9	Disabled	Disabled	Normal	Unknown	5
10	Disabled	Disabled	Normal	Unknown	5
11	Disabled	Disabled	Normal	Unknown	5
12	Disabled	Disabled	Normal	Unknown	5

Figure 11-20 DULD Settings Window

The fields that can be configured are described below:

Parameter	Description
From Port ~ To Port	Specifies the list of ports that will be used for this configuration.
Admin State	Enable or disable the administration state. This indicates these ports unidirectional link detection status. The default state is disabled.
Mode	Specifies the mode the unidirectional link detection will be set to. <i>Shutdown</i> - If any unidirectional link is detected, disable the port and log an event. <i>Normal</i> - Only log an event when a unidirectional link is detected.
Discovery Time	Enter the port neighbor discovery time between 5 and 65535 seconds. If the discovery is timed out, the unidirectional link detection will start. The default discovery time is 5 seconds

Click the **Apply** button to accept the changes made.

Cable Diagnostics

The cable diagnostics feature is designed primarily for administrators or customer service representatives to verify and test copper cables; it can rapidly determine the quality of the cables and the types of error.

To view this window, click **OAM > Cable Diagnostics** as shown below:

Port 01 Test

Port	Type	Link Status	Test Result	Cable Length (M)
1	GE	Link Up	OK	-

The cable diagnostics feature is designed primarily for administrators or customer service representatives to verify and test copper cables; it can rapidly determine the quality of the cables and the types of error.

Note:

1. If cable length is displayed as "NA" it means the cable length is "Not Available". This is due to the port being unable to obtain cable length, either because its link partner is powered-off, or the cables used are broken and/or bad in quality.
2. The maximum cable length is limited to 120 meters.
3. For GE ports, the accuracy is +/-5 meters when the length of cable used is more than 5 meters.
4. It also measures cable fault and identifies the fault in length according to the distance from this switch.

Figure 11-21 Cable Diagnostics window

To view the cable diagnostics for a particular port, use the drop-down menu to choose the port and click **Test**. The information will be displayed in this window.



NOTE: The available cable diagnosis length is from 5 to 120 meters.



NOTE: The deviation of cable length detection is +/- 5M for GE ports.

Fault messages:

- *Open* - This pair is left open.
- *Short* - Two lines of this pair is shorted.
- *CrossTalk* - Lines of this pair is short with lines in other pairs.
- *Unknown* - The diagnosis does not obtain the cable status, please try again.
- *NA* - No cable was found, maybe it's because cable is out of diagnosis specification or the quality is too bad.

Chapter 12 Monitoring

Utilization

Statistics

Mirror

sFlow

Ping

Trace Route

Device Environment

External Alarm Settings

Device Status

Utilization

CPU Utilization

This window is used to display the percentage of the CPU being used, expressed as an integer percentage and calculated as a simple average by time interval.

To view this window, click **Monitoring > Utilization > CPU Utilization** as shown below:

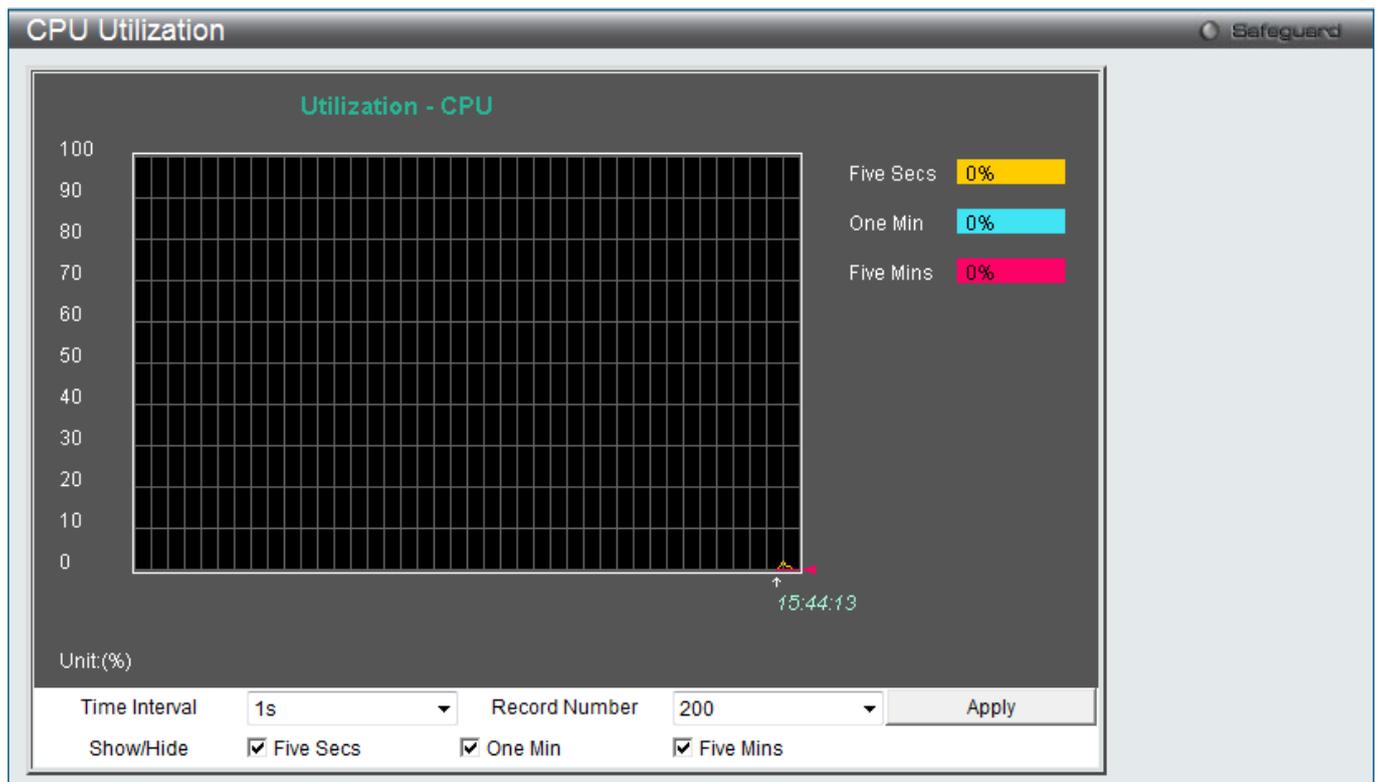


Figure 12-1 CPU Utilization window

To view the CPU utilization by port, use the real-time graphic of the Switch and/or switch stack at the top of the web page by simply clicking on a port. The window will automatically refresh with new updated statistics.

The fields that can be configured are described below:

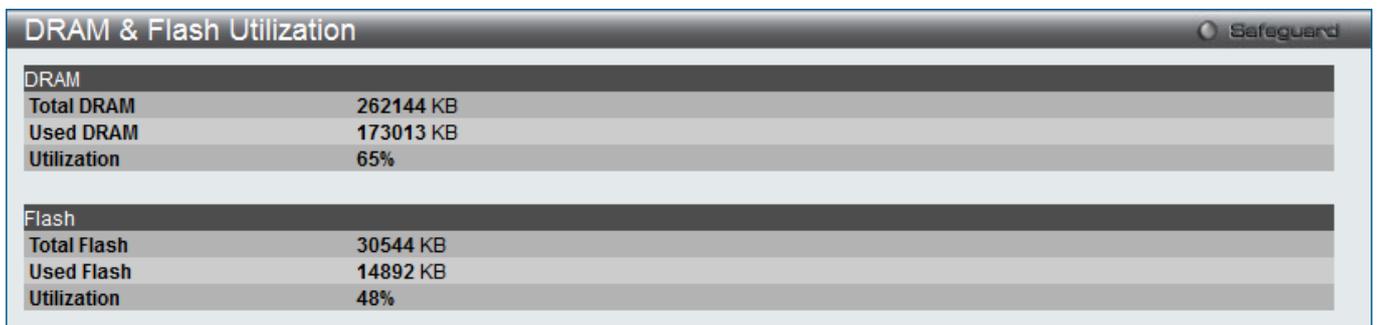
Parameter	Description
Time Interval	Select the desired setting between <i>1s</i> and <i>60s</i> , where "s" stands for seconds. The default value is one second.
Record Number	Select number of times the Switch will be polled between <i>20</i> and <i>200</i> . The default value is <i>200</i> .
Show/Hide	Check whether or not to display Five Seconds, One Minute, and Five Minutes.

Click the **Apply** button to accept the changes made.

DRAM & Flash Utilization

This window is used to display information regarding the DRAM and Flash utilization.

To view this window, click **Monitoring > Utilization > DRAM & Flash Utilization** as shown below:



DRAM & Flash Utilization		Safeguard
DRAM		
Total DRAM	262144 KB	
Used DRAM	173013 KB	
Utilization	65%	
Flash		
Total Flash	30544 KB	
Used Flash	14892 KB	
Utilization	48%	

Figure 12-2 DRAM & Flash Utilization window

Port Utilization

This window is used to display the percentage of the total available bandwidth being used on the port.

To view this window, click **Monitoring > Utilization > Port Utilization** as shown below:

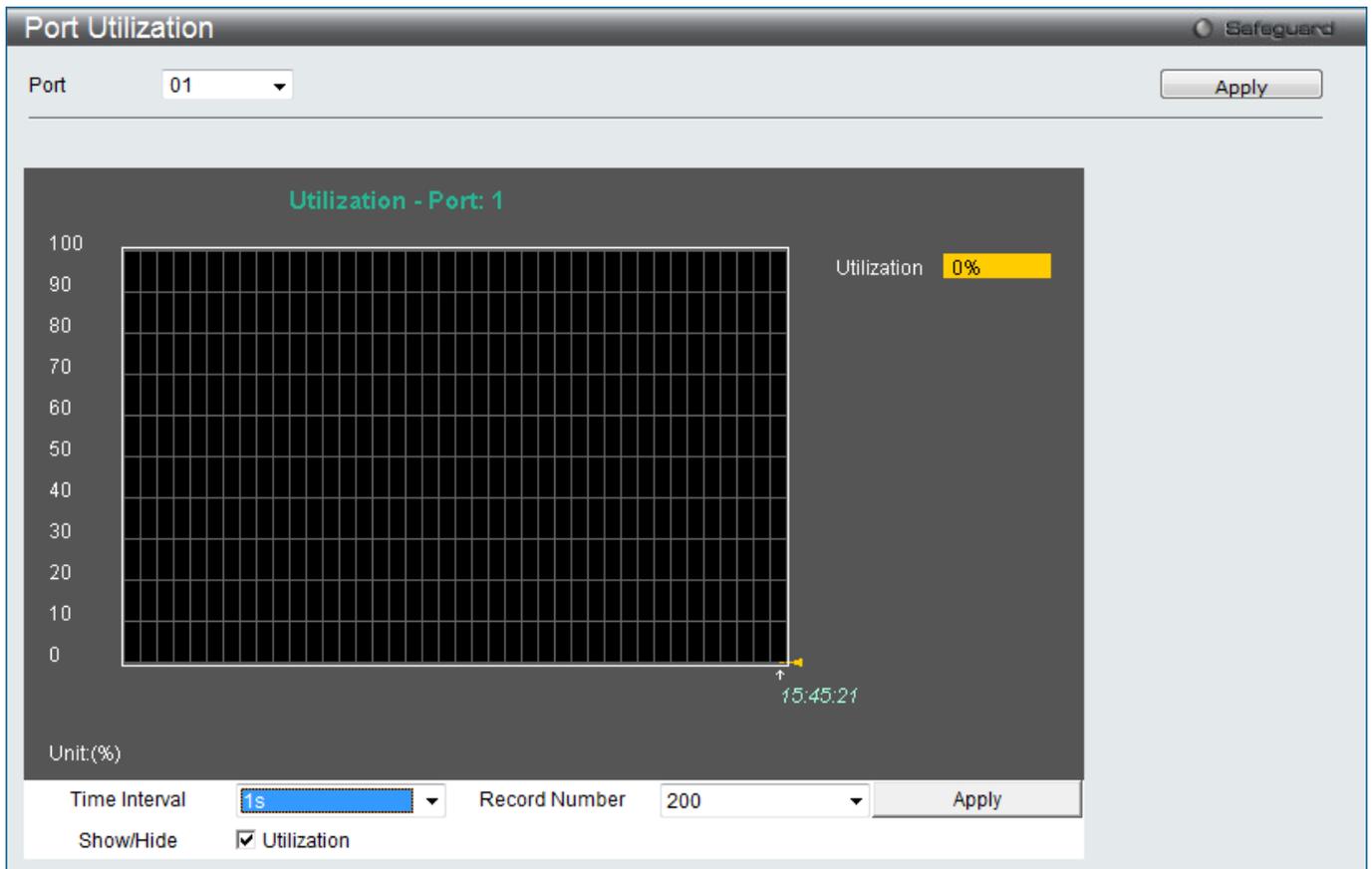


Figure 12-3 Port Utilization window

The fields that can be configured are described below:

Parameter	Description
Port	Use the drop-down menu to choose the port that will display statistics.
Time Interval	Select the desired setting between <i>1s</i> and <i>60s</i> , where "s" stands for seconds. The default value is one second.
Record Number	Select number of times the Switch will be polled between <i>20</i> and <i>200</i> . The default value is <i>200</i> .
Show/Hide	Check whether or not to display Port Util.

Click the **Apply** button to accept the changes made for each individual section.

Statistics

Port Statistics

Packets

The Web manager allows various packet statistics to be viewed as either a line graph or a table. Six windows are offered.

Received (RX)

To select a port to view these statistics for, select the port by using the Port drop-down menu. The user may also use the real-time graphic of the Switch at the top of the web page by simply clicking on a port.

To view this window, click **Monitoring > Statistics > Port Statistics > Packets > Received (RX)** as shown below:

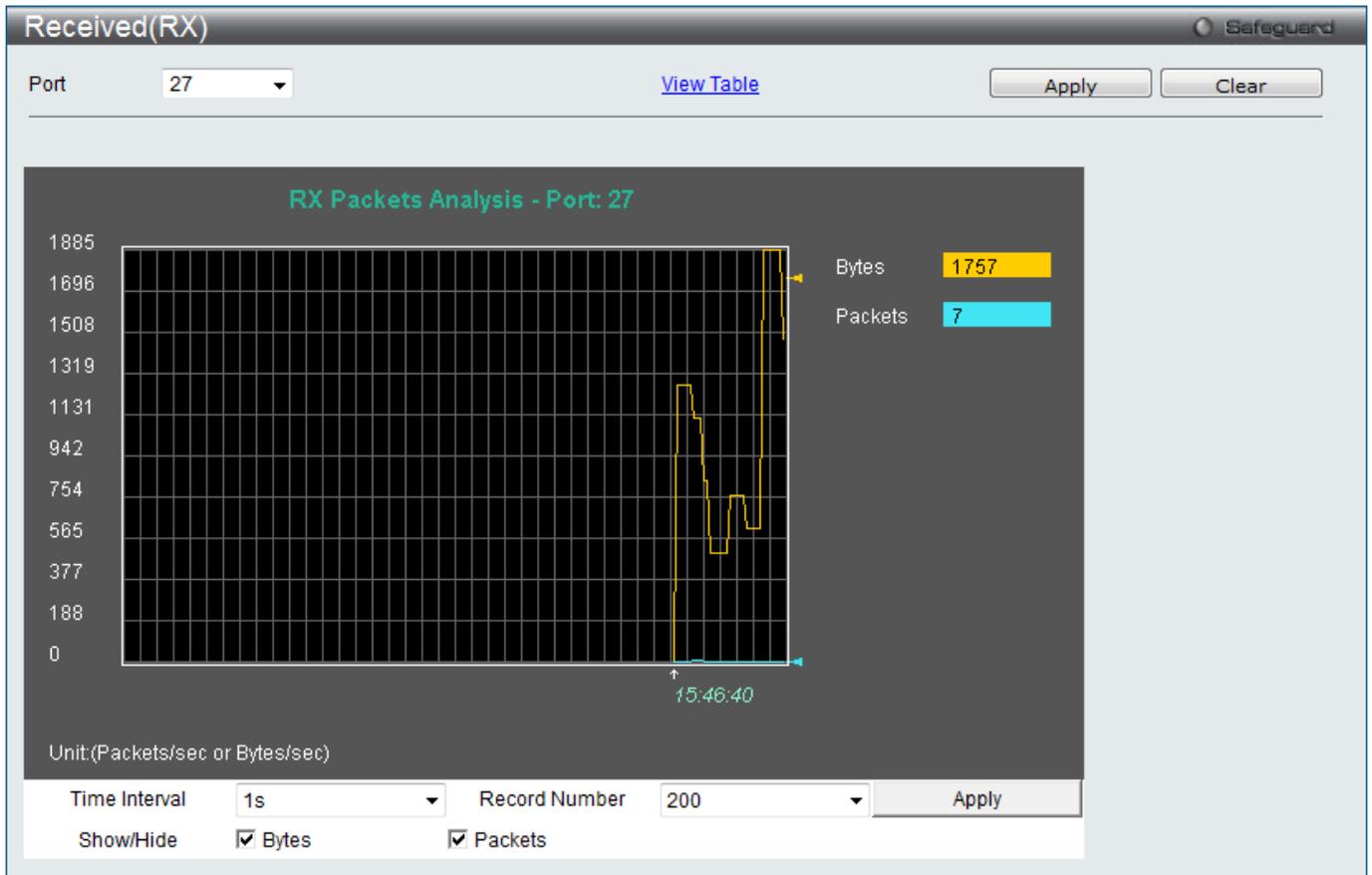


Figure 12-4 Received (RX) window (for Bytes and Packets)

Click the [View Table](#) link to display the information in a table rather than a line graph.



Figure 12-5 RX Packets Analysis Table window

The fields that can be configured are described below:

Parameter	Description
Port	Use the drop-down menu to choose the port that will display statistics.
Time Interval	Select the desired setting between <i>1s</i> and <i>60s</i> , where "s" stands for seconds. The default value is one second.
Record Number	Select number of times the Switch will be polled between <i>20</i> and <i>200</i> . The default value is <i>200</i> .
Bytes	Counts the number of bytes received on the port.
Packets	Counts the number of packets received on the port.
Unicast	Counts the total number of good packets that were received by a unicast address.
Multicast	Counts the total number of good packets that were received by a multicast address.
Broadcast	Counts the total number of good packets that were received by a broadcast address.
Show/Hide	Check whether to display Bytes and Packets.

Click the **Apply** button to accept the changes made for each individual section.

Click the **Clear** button to clear all statistics counters on this window.

Click the [View Table](#) link to display the information in a table rather than a line graph.

Click the [View Graphic](#) link to display the information in a line graph rather than a table.

UMB_Cast (RX)

To select a port to view these statistics for, select the port by using the Port drop-down menu. The user may also use the real-time graphic of the Switch at the top of the web page by simply clicking on a port.

To view this window, click **Monitoring > Statistics > Port Statistics > Packets > UMB_Cast (RX)** as shown below:

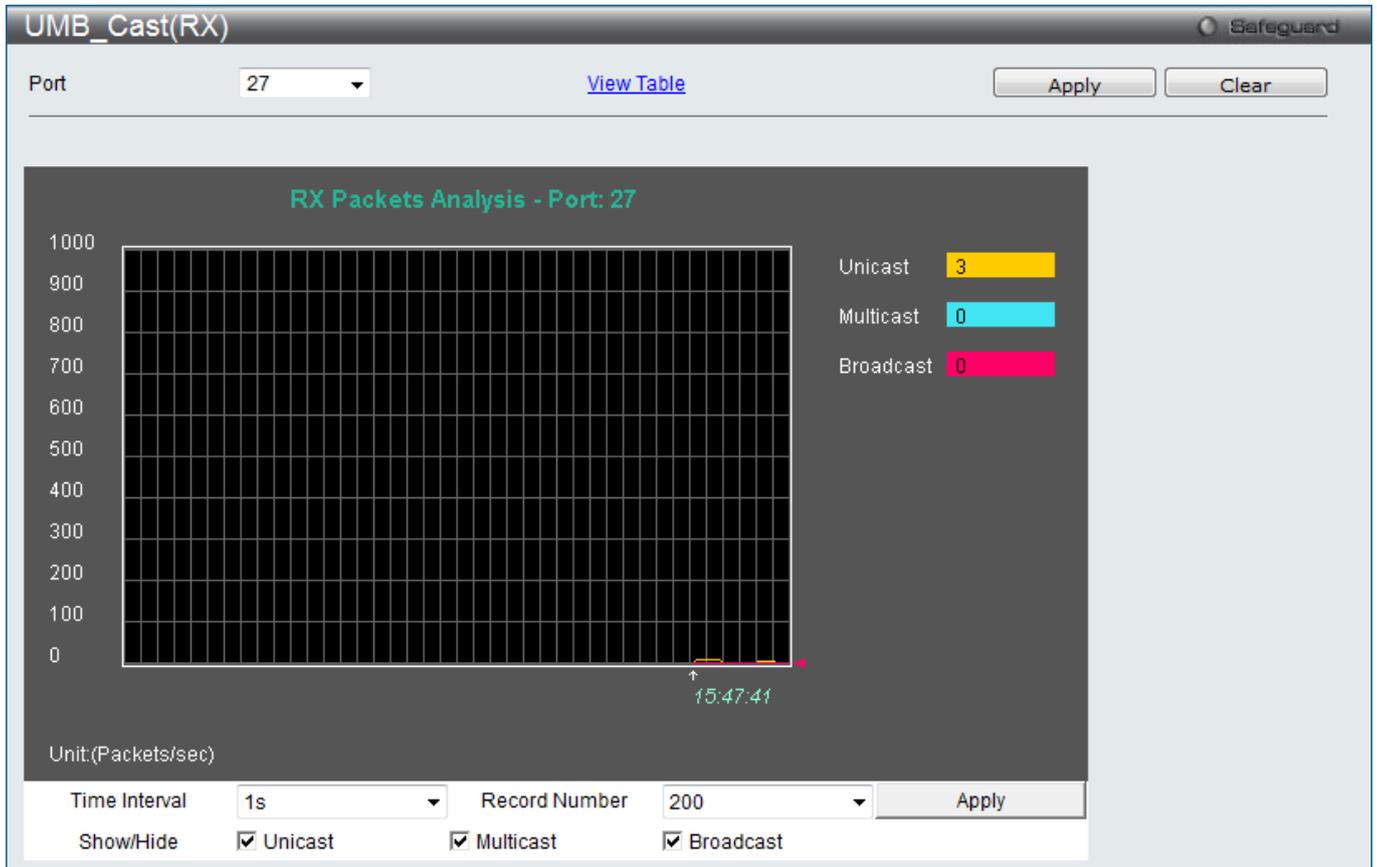


Figure 12-6 UMB_cast (RX) window (for Unicast, Multicast, and Broadcast Packets)

Click the [View Table](#) link to display the information in a table rather than a line graph.

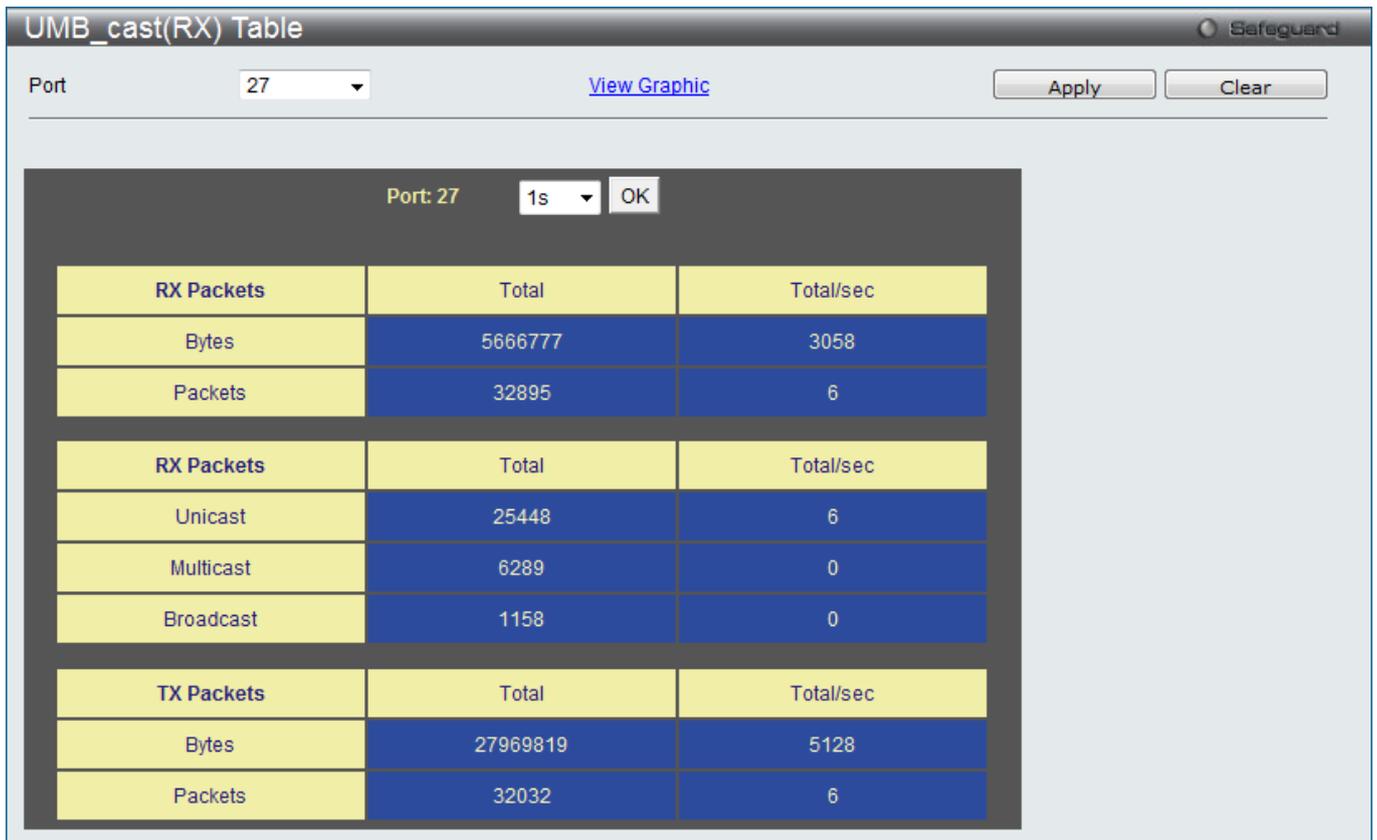


Figure 12-7 RX Packets Analysis window (table for Unicast, Multicast, and Broadcast Packets)

The fields that can be configured are described below:

Parameter	Description
Port	Use the drop-down menu to choose the port that will display statistics.
Time Interval	Select the desired setting between <i>1s</i> and <i>60s</i> , where "s" stands for seconds. The default value is one second.
Record Number	Select number of times the Switch will be polled between <i>20</i> and <i>200</i> . The default value is <i>200</i> .
Unicast	Counts the total number of good packets that were received by a unicast address.
Multicast	Counts the total number of good packets that were received by a multicast address.
Broadcast	Counts the total number of good packets that were received by a broadcast address.
Show/Hide	Check whether or not to display Multicast, Broadcast, and Unicast Packets.

Click the **Apply** button to accept the changes made for each individual section.

Click the **Clear** button to clear all statistics counters on this window.

Click the [View Table](#) link to display the information in a table rather than a line graph.

Click the [View Graphic](#) link to display the information in a line graph rather than a table.

Transmitted (TX)

To select a port to view these statistics for, select the port by using the Port drop-down menu. The user may also use the real-time graphic of the Switch at the top of the web page by simply clicking on a port.

To view this window, click **Monitoring > Statistics > Port Statistics > Packets > Transmitted (TX)** as shown below:

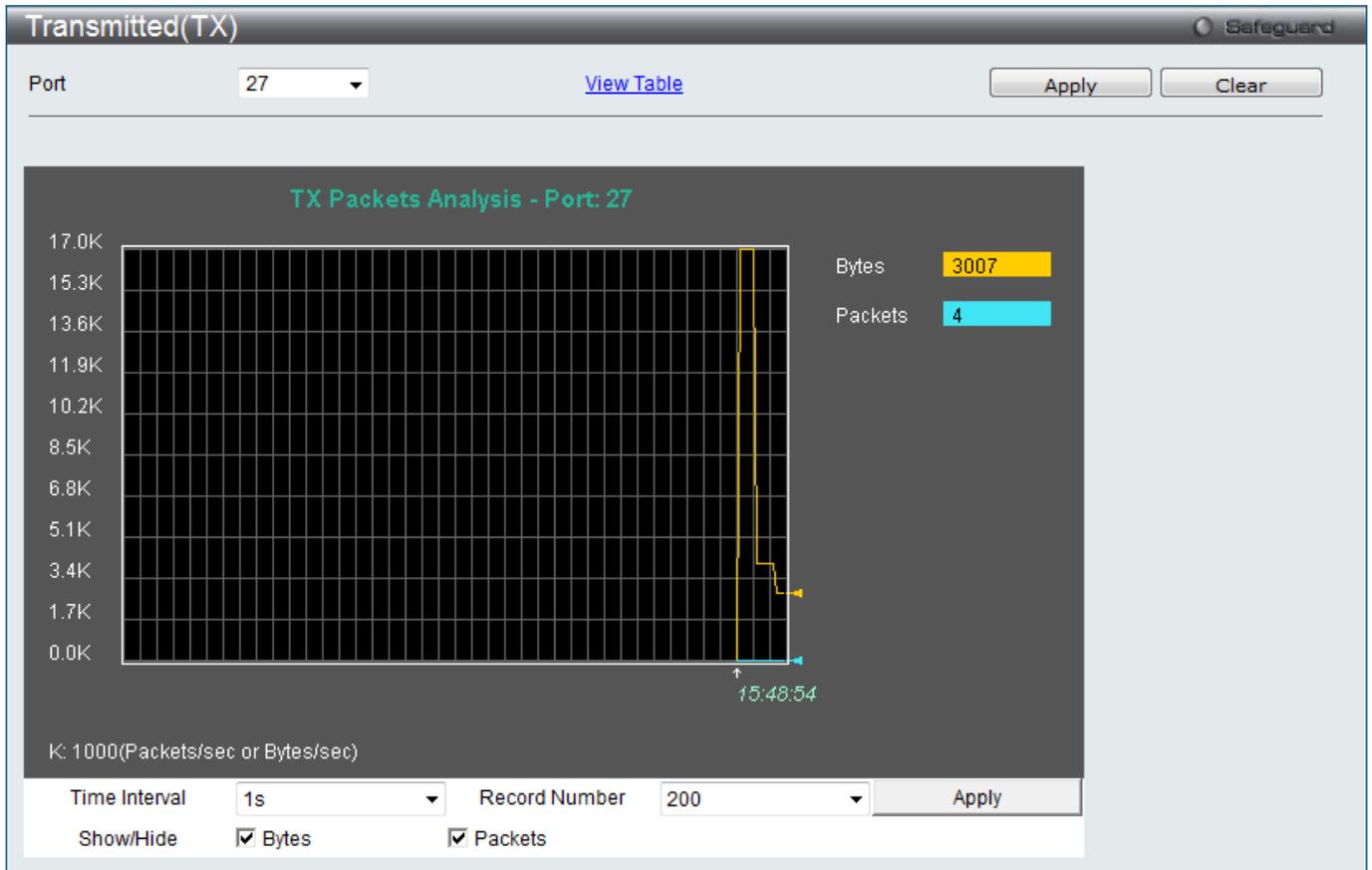


Figure 12-8 Transmitted (TX) window (for Bytes and Packets)

Click the [View Table](#) link to display the information in a table rather than a line graph.



Figure 12-9 TX Packets Analysis window (table for Bytes and Packets)

The fields that can be configured are described below:

Parameter	Description
Port	Use the drop-down menu to choose the port that will display statistics.
Time Interval	Select the desired setting between 1s and 60s, where "s" stands for seconds. The default value is one second.
Record Number	Select number of times the Switch will be polled between 20 and 200. The default value is 200.
Bytes	Counts the number of bytes successfully sent on the port.
Packets	Counts the number of packets successfully sent on the port.
Unicast	Counts the total number of good packets that were transmitted by a unicast address.
Multicast	Counts the total number of good packets that were transmitted by a multicast address.
Broadcast	Counts the total number of good packets that were transmitted by a broadcast address.
Show/Hide	Check whether or not to display Bytes and Packets.

Click the **Apply** button to accept the changes made for each individual section.

Click the **Clear** button to clear all statistics counters on this window.

Click the [View Table](#) link to display the information in a table rather than a line graph.

Click the [View Graphic](#) link to display the information in a line graph rather than a table.

Errors

The Web manager allows port error statistics compiled by the Switch's management agent to be viewed as either a line graph or a table. Four windows are offered.

Received (RX)

To select a port to view these statistics for, select the port by using the Port drop-down menu. The user may also use the real-time graphic of the Switch at the top of the web page by simply clicking on a port.

To view this window, click **Monitoring > Statistics > Port Statistics > Errors > Received (RX)** as shown below:

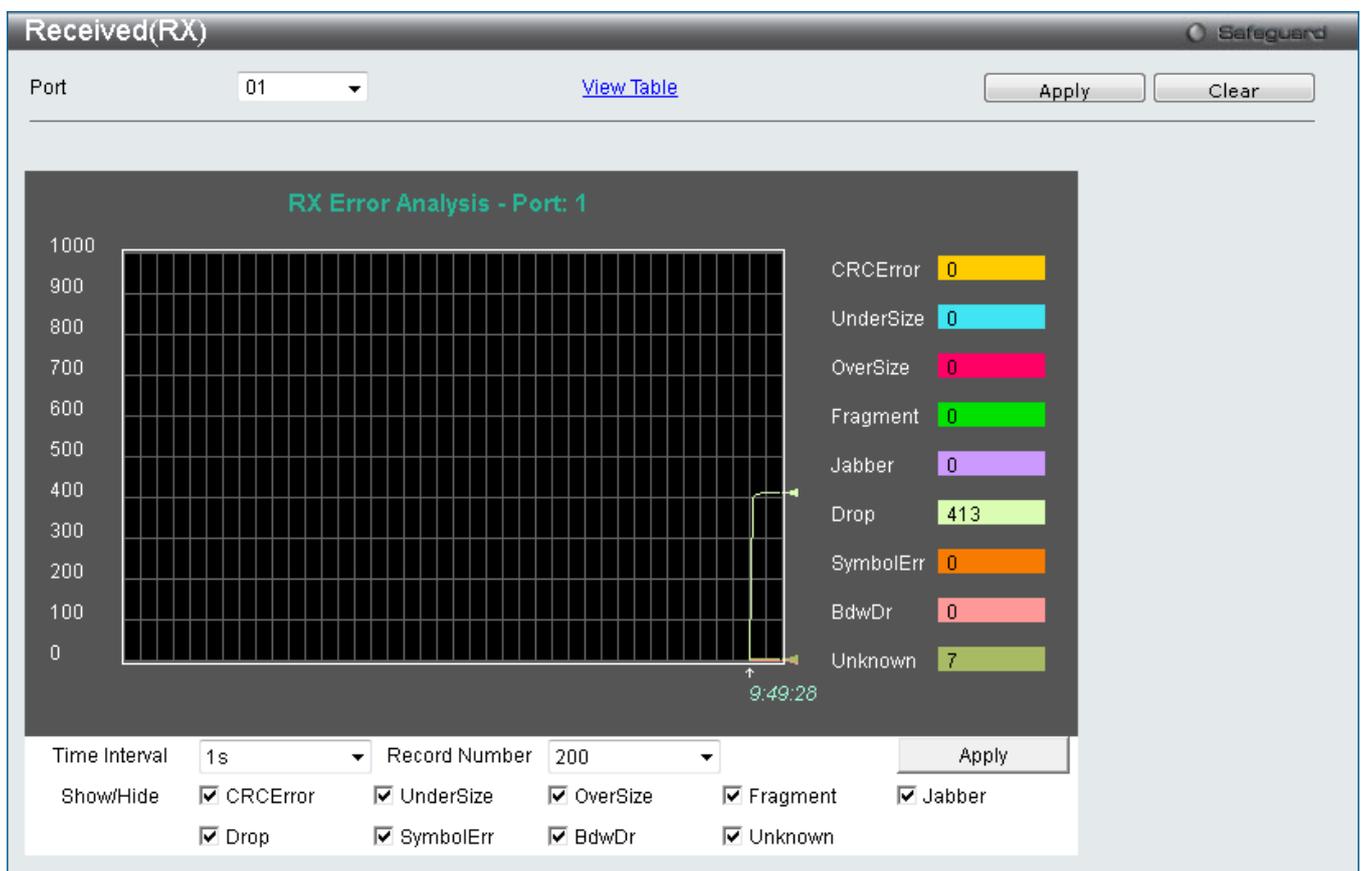


Figure 12-10 Received (RX) window (for errors)

Click the [View Table](#) link to display the information in a table rather than a line graph.



Figure 12-11 RX Error Analysis window (table)

The fields that can be configured are described below:

Parameter	Description
Port	Use the drop-down menu to choose the port that will display statistics.
Time Interval	Select the desired setting between 1s and 60s, where "s" stands for seconds. The default value is one second.
Record Number	Select number of times the Switch will be polled between 20 and 200. The default value is 200.
CRCError	Counts otherwise valid packets that did not end on a byte (octet) boundary.
UnderSize	The number of packets detected that are less than the minimum permitted packets size of 64 bytes and have a good CRC. Undersize packets usually indicate collision fragments, a normal network occurrence.
OverSize	Counts valid packets received that were longer than 1518 octets and less than the MAX_PKT_LEN. Internally, MAX_PKT_LEN is equal to 1536.
Fragment	The number of packets less than 64 bytes with either bad framing or an invalid CRC. These are normally the result of collisions.
Jabber	Counts invalid packets received that were longer than 1518 octets and less than the MAX_PKT_LEN. Internally, MAX_PKT_LEN is equal to 1536.
Drop	The number of packets that are dropped by this port since the last Switch reboot.
SymbolErr	Specifies the number of symbol errors in the period that is required to be equal to or

	greater than in order for the event to be generated
BandwidthDrop	Counts the number of packets received that have errors received in the symbol on the physical labor.
Show/Hide	Check whether or not to display CRCError, UnderSize, OverSize, Fragment, Jabber, Drop, and SymbolErr errors.

Click the **Apply** button to accept the changes made for each individual section.

Click the **Clear** button to clear all statistics counters on this window.

Click the [View Table](#) link to display the information in a table rather than a line graph.

Click the [View Graphic](#) link to display the information in a line graph rather than a table.

Transmitted (TX)

To select a port to view these statistics for, select the port by using the Port drop-down menu. The user may also use the real-time graphic of the Switch at the top of the web page by simply clicking on a port.

To view this window, click **Monitoring > Statistics > Port Statistics > Errors > Transmitted (TX)** as shown below:

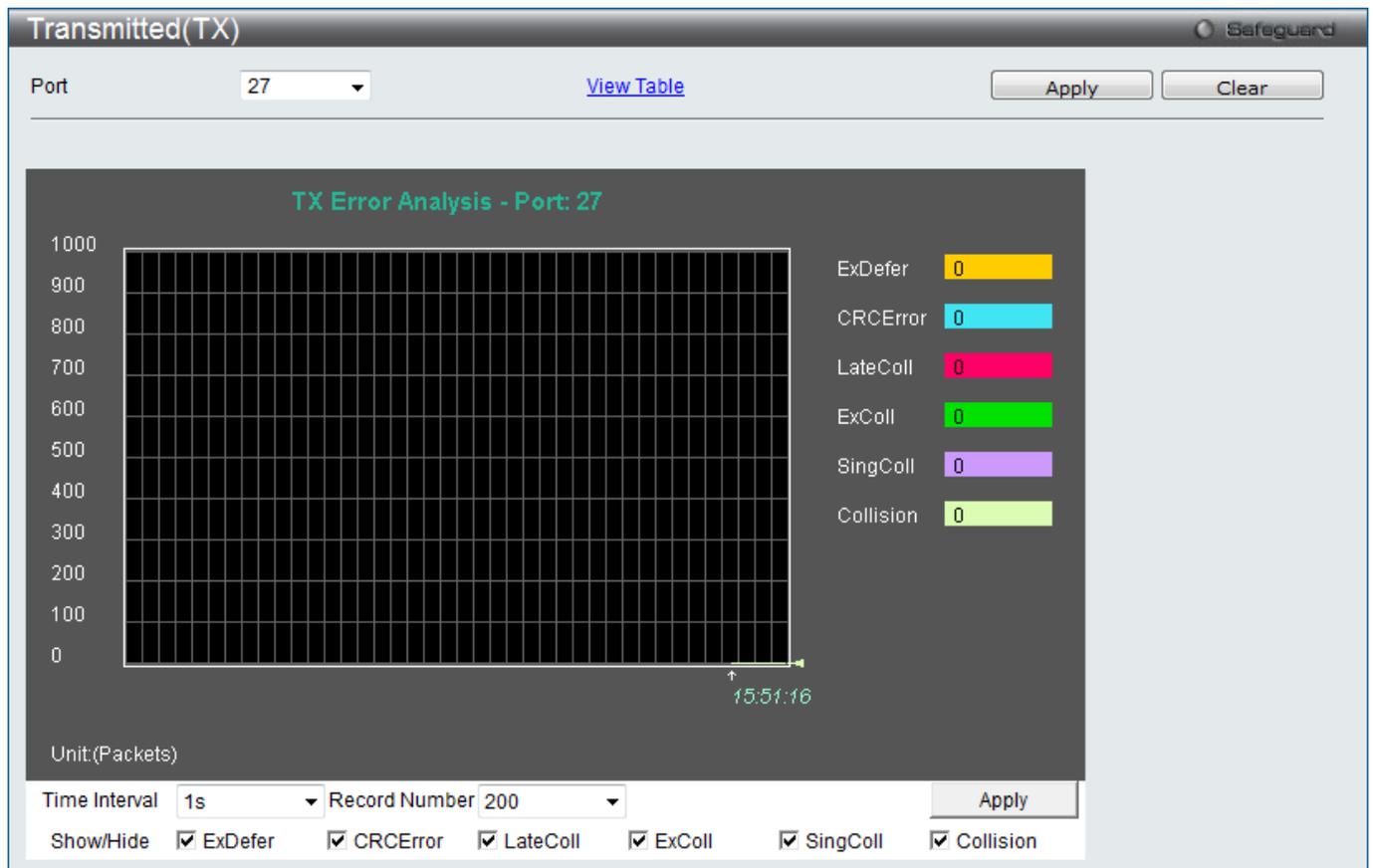


Figure 12-12 Transmitted (TX) window (for errors)

Click the [View Table](#) link to display the information in a table rather than a line graph.



Figure 12-13 TX Error Analysis window (table)

The fields that can be configured are described below:

Parameter	Description
Port	Use the drop-down menu to choose the port that will display statistics.
Time Interval	Select the desired setting between 1s and 60s, where "s" stands for seconds. The default value is one second.
Record Number	Select number of times the Switch will be polled between 20 and 200. The default value is 200.
ExDefer	Counts the number of packets for which the first transmission attempt on a particular interface was delayed because the medium was busy.
CRC Error	Counts otherwise valid packets that did not end on a byte (octet) boundary.
LateColl	Counts the number of times that a collision is detected later than 512 bit-times into the transmission of a packet.
ExColl	Excessive Collisions. The number of packets for which transmission failed due to excessive collisions.
SingColl	Single Collision Frames. The number of successfully transmitted packets for which transmission is inhibited by more than one collision.
Collision	An estimate of the total number of collisions on this network segment.
Show/Hide	Check whether or not to display ExDefer, CRCError, LateColl, ExColl, SingColl, and Collision errors.

Click the **Apply** button to accept the changes made for each individual section.

Click the **Clear** button to clear all statistics counters on this window.

Click the [View Table](#) link to display the information in a table rather than a line graph.

Click the [View Graphic](#) link to display the information in a line graph rather than a table.

Packet Size

Users can display packets received by the Switch, arranged in six groups and classed by size, as either a line graph or a table. Two windows are offered. To select a port to view these statistics for, select the port by using the Port drop-down menu. The user may also use the real-time graphic of the Switch at the top of the web page by simply clicking on a port.

To view this window, click **Monitoring > Statistics > Packet Size** as shown below:

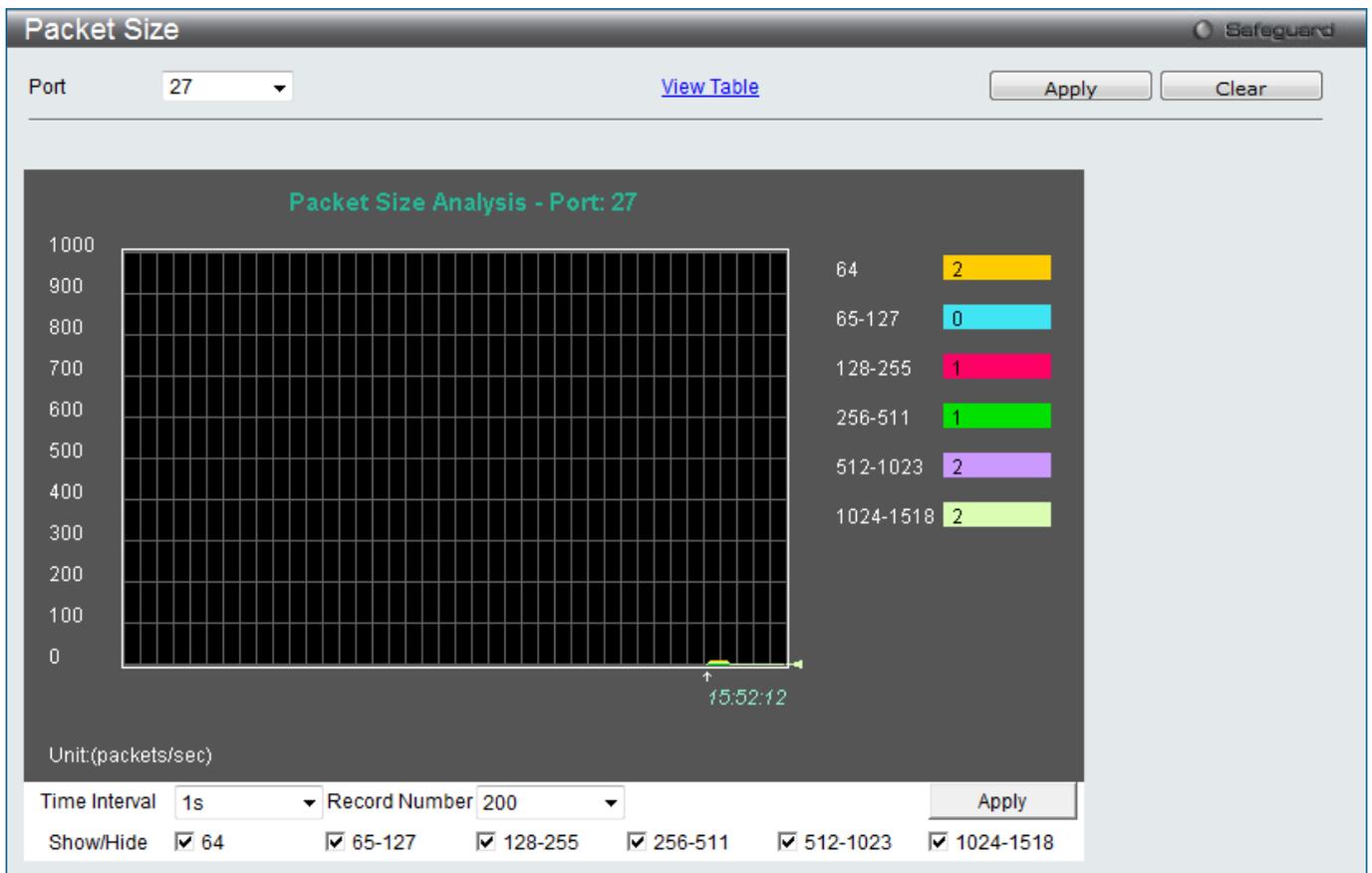


Figure 12-14 Packet Size window

Click the [View Table](#) link to display the information in a table rather than a line graph.

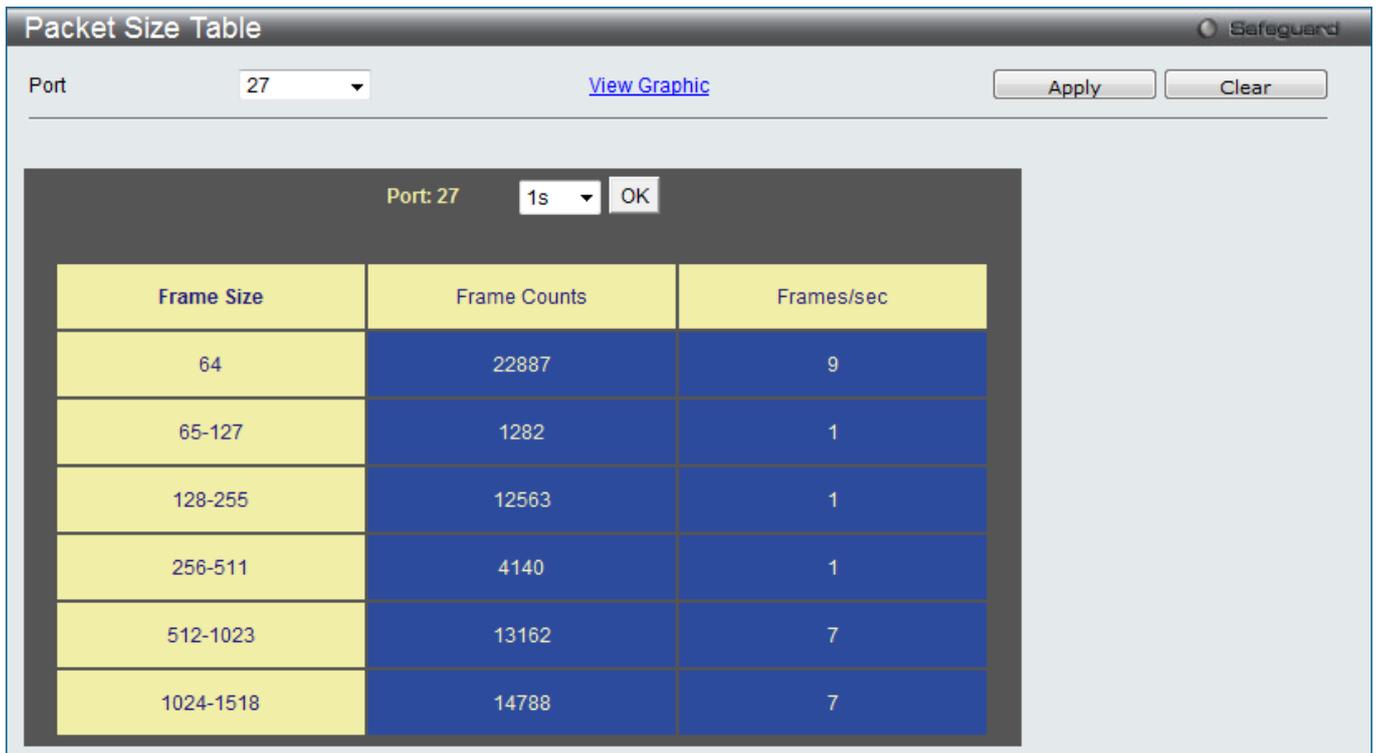


Figure 12-15 RX Size Analysis window (table)

The fields that can be configured are described below:

Parameter	Description
Port	Use the drop-down menu to choose the port that will display statistics.
Time Interval	Select the desired setting between <i>1s</i> and <i>60s</i> , where "s" stands for seconds. The default value is one second.
Record Number	Select number of times the Switch will be polled between <i>20</i> and <i>200</i> . The default value is 200.
64	The total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).
65-127	The total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).
128-255	The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).
256-511	The total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).
512-1023	The total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).
1024-1518	The total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).

Show/Hide	Check whether or not to display 64, 65-127, 128-255, 256-511, 512-1023, and 1024-1518 packets received.
------------------	---------------------------------------------------------------------------------------------------------

Click the **Apply** button to accept the changes made for each individual section.

Click the **Clear** button to clear all statistics counters on this window.

Click the [View Table](#) link to display the information in a table rather than a line graph.

Click the [View Graphic](#) link to display the information in a line graph rather than a table.

VLAN Counter Statistics

On this page the user can view VLAN counter statistics.

To view this window, click **Monitoring > Statistics > VLAN Counter Statistics**, as shown below:

Figure 12-16 VLAN Counter Statistics Window

The fields that can be configured are described below:

Parameter	Description
VID List	Here the user can enter a VID list to view.
VLAN Name	Here the user can enter VLAN Name to view.
Port List	Here the user can enter the appropriate port(s) to view.

Click the **Clear** button to clear all the information entered in the fields.

Click the **Find** button to locate a specific entry based on the information entered.

Click the **View All** button to display all the existing entries.

Click the **Clear All** button to remove all the entries listed in the table.

Historical Counter & Utilization

Historical Counter

On this page the user can view information regarding the historical counter.

To view this window, click **Monitoring > Statistics > Historical Counter & Utilization > Historical Counter**, as shown below:

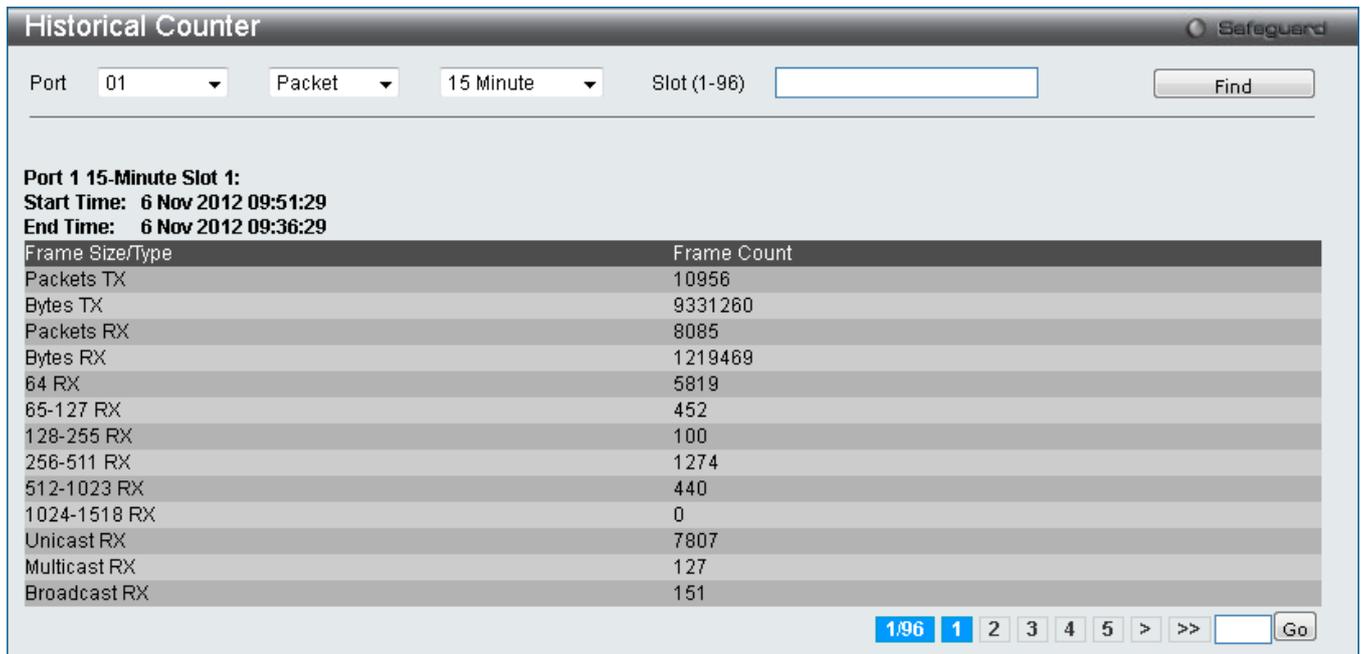


Figure 12-17 Historical Counter Window

The fields that can be configured are described below:

Parameter	Description
Port	Here the user can select the appropriate port to view.
Packet	Selecting this option will display a frame count based on the packets send and received.
Error	Selecting this option will display a frame count based on the packet errors send and received.
Time	Here the user can select the time slot of how much information should be displayed based on the given time elapsed. Options to choose from are 15 Minute and 1 Day .
Slot	Here the user can enter the slot number.

Click the **Find** button to locate a specific entry based on the information entered.

Enter a page number and click the **Go** button to navigate to a specific page when multiple pages exist.

Historical Utilization

On this page the user can view information regarding the historical utilization.

To view this window, click **Monitoring > Statistics > Historical Counter & Utilization > Historical Utilization**, as shown below:

Historical Utilization		Safeguard
CPU	15 Minute	Slot (1-96) <input type="text"/>
<input type="button" value="Find"/>		
CPU Utilization		
15-Minute Slot 1 (6 Nov 2012 09:51:58 - 6 Nov 2012 09:36:58):		9 %
15-Minute Slot 2 (6 Nov 2012 09:36:58 - 6 Nov 2012 09:21:58):		9 %
15-Minute Slot 3 (6 Nov 2012 09:21:58 - 6 Nov 2012 09:06:58):		0 %
15-Minute Slot 4 (6 Nov 2012 09:06:58 - 6 Nov 2012 08:51:58):		0 %
15-Minute Slot 5 (6 Nov 2012 08:51:58 - 6 Nov 2012 08:36:58):		0 %
15-Minute Slot 6 (6 Nov 2012 08:36:58 - 6 Nov 2012 08:21:58):		0 %
15-Minute Slot 7 (6 Nov 2012 08:21:58 - 6 Nov 2012 08:06:58):		0 %
15-Minute Slot 8 (6 Nov 2012 08:06:58 - 6 Nov 2012 07:51:58):		0 %
15-Minute Slot 9 (6 Nov 2012 07:51:58 - 6 Nov 2012 07:36:58):		0 %
15-Minute Slot 10 (6 Nov 2012 07:36:58 - 6 Nov 2012 07:21:58):		0 %
15-Minute Slot 11 (6 Nov 2012 07:21:58 - 6 Nov 2012 07:06:58):		0 %
15-Minute Slot 12 (6 Nov 2012 07:06:58 - 6 Nov 2012 06:51:58):		0 %
15-Minute Slot 13 (6 Nov 2012 06:51:58 - 6 Nov 2012 06:36:58):		0 %
15-Minute Slot 14 (6 Nov 2012 06:36:58 - 6 Nov 2012 06:21:58):		0 %
15-Minute Slot 15 (6 Nov 2012 06:21:58 - 6 Nov 2012 06:06:58):		0 %
15-Minute Slot 16 (6 Nov 2012 06:06:58 - 6 Nov 2012 05:51:58):		0 %
15-Minute Slot 17 (6 Nov 2012 05:51:58 - 6 Nov 2012 05:36:58):		0 %
15-Minute Slot 18 (6 Nov 2012 05:36:58 - 6 Nov 2012 05:21:58):		0 %
15-Minute Slot 19 (6 Nov 2012 05:21:58 - 6 Nov 2012 05:06:58):		0 %
15-Minute Slot 20 (6 Nov 2012 05:06:58 - 6 Nov 2012 04:51:58):		0 %
15-Minute Slot 21 (6 Nov 2012 04:51:58 - 6 Nov 2012 04:36:58):		0 %
15-Minute Slot 22 (6 Nov 2012 04:36:58 - 6 Nov 2012 04:21:58):		0 %
15-Minute Slot 23 (6 Nov 2012 04:21:58 - 6 Nov 2012 04:06:58):		0 %
15-Minute Slot 24 (6 Nov 2012 04:06:58 - 6 Nov 2012 03:51:58):		0 %
15-Minute Slot 25 (6 Nov 2012 03:51:58 - 6 Nov 2012 03:36:58):		0 %
15-Minute Slot 26 (6 Nov 2012 03:36:58 - 6 Nov 2012 03:21:58):		0 %
15-Minute Slot 27 (6 Nov 2012 03:21:58 - 6 Nov 2012 03:06:58):		0 %
15-Minute Slot 28 (6 Nov 2012 03:06:58 - 6 Nov 2012 02:51:58):		0 %
15-Minute Slot 29 (6 Nov 2012 02:51:58 - 6 Nov 2012 02:36:58):		0 %
15-Minute Slot 30 (6 Nov 2012 02:36:58 - 6 Nov 2012 02:21:58):		0 %
15-Minute Slot 31 (6 Nov 2012 02:21:58 - 6 Nov 2012 02:06:58):		0 %

Figure 12-18 Historical Utilization Window (CPU)

Click the **Find** button to locate a specific entry based on the information entered.

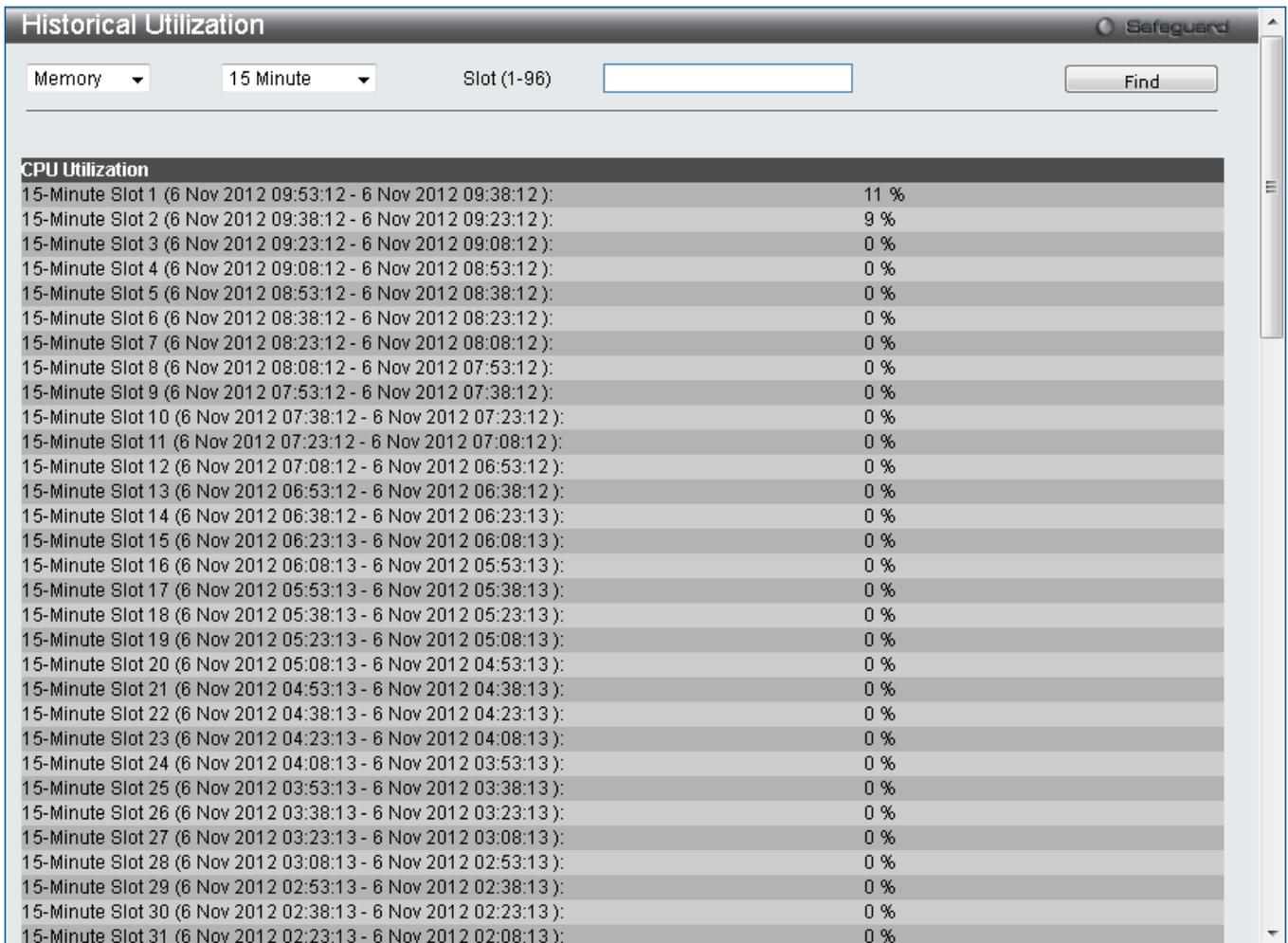


Figure 12-19 Historical Utilization Window (Memory)

Click the **Find** button to locate a specific entry based on the information entered.

Mirror

The Switch allows you to copy frames transmitted and received on a port and redirect the copies to another port. You can attach a monitoring device to the mirroring port, such as a sniffer or an RMON probe, to view details about the packets passing through the first port. This is useful for network monitoring and troubleshooting purposes.

Port Mirror Settings

To view this window, click **Monitoring > Mirror > Port Mirror Settings** as shown below:

Figure 12-20 Port Mirror Settings window

The fields that can be configured are described below:

Parameter	Description
State	Click the radio buttons to enable or disable the Port Mirroring feature.
Target Port	Select the Target port used for this configuration.
Source Ports	Select the Source port(s) used for this configuration. These options are available when selecting the source port(s), Transmit Only (TX), Receive Only (RX), or Both .

Click the **Apply** button to accept the changes made for each individual section.



NOTE: You cannot mirror a fast port onto a slower port. For example, if you try to mirror the traffic from a 100 Mbps port onto a 10 Mbps port, this can cause throughput problems. The port you are copying frames from should always support an equal or lower speed than the port to which you are sending the copies. Please note a target port and a source port cannot be the same port.

RSPAN Settings

This page controls the RSPAN function. The purpose of the RSPAN function is to mirror packets to a remote switch. A packet travels from the switch where the monitored packet is received, passing through the intermediate switch, and then to the switch where the sniffer is attached. The first switch is also named the source switch.

To make the RSPAN function work, the RSPAN VLAN source setting must be configured on the source switch. For the intermediate and the last switch, the RSPAN VLAN redirect setting must be configured.



NOTE: RSPAN VLAN mirroring will only work when RSPAN is enabled (when one RSPAN VLAN has been configured with a source port). The RSPAN redirect function will work when RSPAN is enabled and at least one RSPAN VLAN has been configured with redirect ports.

To view this window, click **Monitoring > Mirror > RSPAN Settings** as shown below:

Figure 12-21 RSPAN Settings window

The fields that can be configured are described below:

Parameter	Description
RSPAN State	Click the radio buttons to enable or disable the RSPAN feature.
VLAN Name	Create the RSPAN VLAN by VLAN name.
VID (1-4094)	Create the RSPAN VLAN by VLAN ID.

Click the **Apply** button to accept the changes made.

Click the **Add** button to add a new entry based on the information entered.

Click the **Modify** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

After clicking the **Modify** button, the following page will appear:

Figure 12-22 RSPAN Settings – Modify window

The fields that can be configured are described below:

Parameter	Description
Source Ports	If the ports are not specified by option, the source of RSPAN will come from the source specified by the mirror command or the flow-based source specified by an ACL. If no parameter is specified for source, it deletes the configured source parameters.

	Select RX , TX or Both to specify in which direction the packets will be monitored. Click Add or Delete to add or delete source ports.
Redirect Port List	Specify the output port list for the RSPAN VLAN packets. If the redirect port is a Link Aggregation port, the Link Aggregation behavior will apply to the RSPAN packets. Click Add or Delete to add or delete redirect ports.

Click the **Apply** button to accept the changes made.

Click the **<<Back** button to discard the changes made and return to the previous page.

sFlow

sFlow (RFC3176) is a technology for monitoring traffic in data networks containing switches and routers. The sFlow monitoring system consists of an sFlow Agent (embedded in a switch or router or in a standalone probe) and a central sFlow Collector. The architecture and sampling techniques used in the sFlow monitoring system were designed for providing continuous site-wide (and enterprise-wide) traffic monitoring of high speed switched and routed networks.

sFlow Global Settings

This window is used to enable or disable the sFlow feature.

To view this window, click **Monitoring > sFlow > sFlow Global Settings** as shown below:

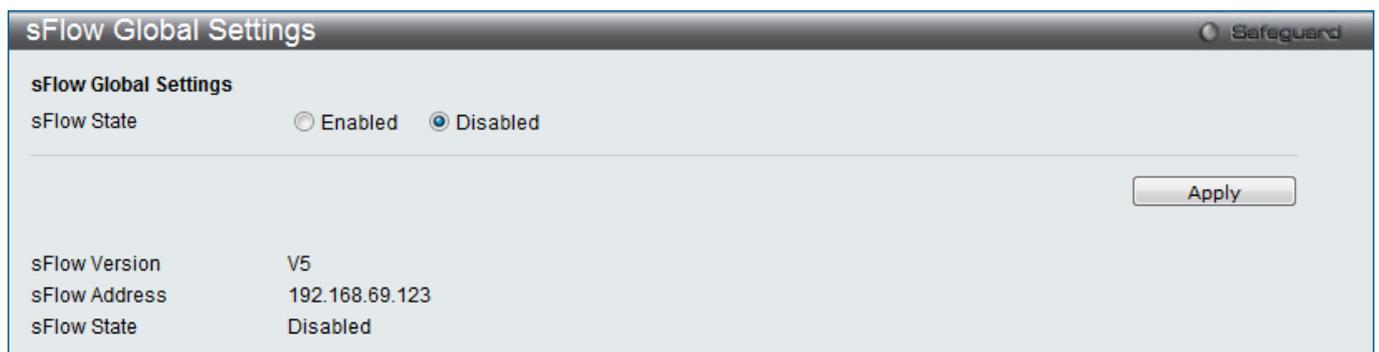


Figure 12-23 sFlow Global Settings window

The fields that can be configured are described below:

Parameter	Description
sFlow State	Click the radio buttons to enable or disable the sFlow feature.

Click the **Apply** button to accept the changes made.

sFlow Analyzer Server Settings

The Switch can support 4 different Analyzer Servers at the same time and each sampler or poller can select a collector to send the samples. We can send different samples from different samplers or pollers to different collectors.

To view this window, click **Monitoring > sFlow > sFlow Analyzer Server Settings** as shown below:

sFlow Analyzer Server Settings
Safeguard

Analyzer Server ID (1-4)	<input type="text"/>	Owner Name	<input type="text"/>
Timeout (1-2000000)	<input type="text" value="400"/> <input type="checkbox"/> Infinite	Collector Address	<input type="text" value="0.0.0.0"/>
Collector Port (1-65535)	<input type="text" value="6343"/>	Max Datagram Size (300-1400)	<input type="text" value="1400"/> <input type="button" value="Apply"/>

Total Entries: 1

Server ID	Owner	Timeout	CCT	Collector Address	Collector Port	Max Datagram Size	
1	ona...	400	400	0.0.0.0	6343	1400	<input type="button" value="Edit"/> <input type="button" value="Delete"/>

CCT means Current Countdown Time

Figure 12-24 sFlow Analyzer Server Settings window

The fields that can be configured are described below:

Parameter	Description
Analyzer Server ID (1-4)	The analyzer server ID specifies the ID of a server analyzer where the packet will be forwarded.
Owner Name	The entity making use of this sFlow analyzer server. When owner is set or modified, the timeout value will become 400 automatically.
Timeout (1-2000000)	The length of time before the server times out. When the analyzer server times out, all of the flow samplers and counter pollers associated with this analyzer server will be deleted. If not specified, its default value is 400. Tick the Infinite check box to have unlimited time.
Collector Address	The IP address of the analyzer server. If not specified or set a 0 address, the entry will be inactive.
Collector Port (1-65535)	The destination UDP port for sending the sFlow datagrams. If not specified, the default value is 6343.
Max Datagram Size (300-1400)	The maximum number of data bytes that can be packed in a single sample datagram. If not specified, the default value is 1400.

Click the **Apply** button to accept the changes made.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

sFlow Flow Sampler Settings

On this page the user can configure the sFlow flow sampler parameters. By configuring the sampling function for a port, a sample packet received by this port will be encapsulated and forwarded to the analyzer server at the specified interval.

To view this window, click **Monitoring > sFlow > sFlow Flow Sampler Settings** as shown below:



NOTE: If the user wants the change the analyze server ID, he needs to delete the flow sampler and creates a new one.

From Port	To Port	Analyzer Server ID (1-4)	Rate (0-65535)	MAX Header Size (18-256)
01	01			

Total Entries: 1

Port	Analyzer Server ID	Configuration Rate	Active Rate	MAX Header Size	Edit	Delete
1	1	65535	65535	256		

Figure 12-25 sFlow Flow Sampler Settings window

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Use the drop-down menus to specify the list of ports to be configured.
Analyzer Server ID	The analyzer server ID specifies the ID of a server analyzer where the packet will be forwarded.
Rate	The sampling rate for packet Rx sampling. The configured rate value multiplied by 256 is the actual rate. For example, if the rate is 20, the actual rate 5120. One packet will be sampled from every 5120 packets. If set to 0, the sampler is disabled. If the rate is not specified, its default value is 0.
MAX Header Size	The maximum number of leading bytes in the packet which has been sampled that will be encapsulated and forwarded to the server. If not specified, the default value is 128.

Click the **Apply** button to accept the changes made.

Click the **Delete All** button to remove all the entries listed.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

sFlow Counter Poller Settings

On this page the user can configure the sFlow counter poller parameters. If the user wants to change the analyzer server ID, he needs to delete the counter poller and create a new one.

To view this window, click **Monitoring > sFlow > sFlow Counter Poller Settings** as shown below:

sFlow Counter Poller Settings Safeguard

From Port: 01 To Port: 01 Analyzer Server ID (1-4): Interval (20-120): Disabled Apply

Delete All

Total Entries: 1

Port	Analyzer Server ID	Polling Interval (sec)	Edit	Delete
1	1	20		

Figure 12-26 sFlow Counter Poller Settings

The fields that can be configured are described below:

Parameter	Description
From Port / To Port	Use the drop-down menus to specify the list of ports to be configured.
Analyzer Server ID (1-4)	The analyzer server ID specifies the ID of a server analyzer where the packet will be forwarded.
Interval (20-120)	The maximum number of seconds between successive samples of the counters. Tick the Disabled check box to disable the interval.

Click the **Apply** button to accept the changes made.

Click the **Delete All** button to remove all the entries listed.

Click the **Edit** button to re-configure the specific entry.

Click the **Delete** button to remove the specific entry.

Ping Test

Ping is a small program that sends ICMP Echo packets to the IP address you specify. The destination node then responds to or “echoes” the packets sent from the Switch. This is very useful to verify connectivity between the Switch and other nodes on the network.

To view this window, click **Monitoring > Ping Test** as shown below:

Ping Test Safeguard

IPv4 Ping Test
Enter the IP address of the device or station you want to ping, then click **Start**.

Target IP Address:

Repeat Pinging for: Infinite times
 (1-255 times)

Size: (1-6000)

Timeout: (1-99 sec)

Start

IPv6 Ping Test
Enter the IP address of the device or station you want to ping, then click **Start**.

Target IP Address:

Interface Name:

Repeat Pinging for: Infinite times
 (1-255 times)

Size: (1-6000)

Timeout: (1-10 sec)

Start

Figure 12-27 Ping Test window

The user may click the Infinite times radio button, in the Repeat Pinging for field, which will tell the ping program to keep sending ICMP Echo packets to the specified IP address until the program is stopped. The user may opt to choose a specific number of times to ping the Target IP Address by clicking its radio button and entering a number between 1 and 255.

The fields that can be configured are described below:

Parameter	Description
Target IP Address	Click the radio button and enter an IP address to be pinged.
Repeat Pinging for	Enter the number of times desired to attempt to Ping either the IPv4 address or the IPv6 address configured in this window. Users may enter a number of times between 1 and 255.
Timeout	Select a timeout period between 1 and 99 seconds for this Ping message to reach its destination. If the packet fails to find the IP address in this specified time, the Ping packet will be dropped.
Interface Name	For IPv6 only, enter the Interface name used here.
Size	Enter a value between 1 and 6000. The default is 100.

Click the **Start** button to initiate the Ping Test.

After clicking the **Start** button, the following page will appear:

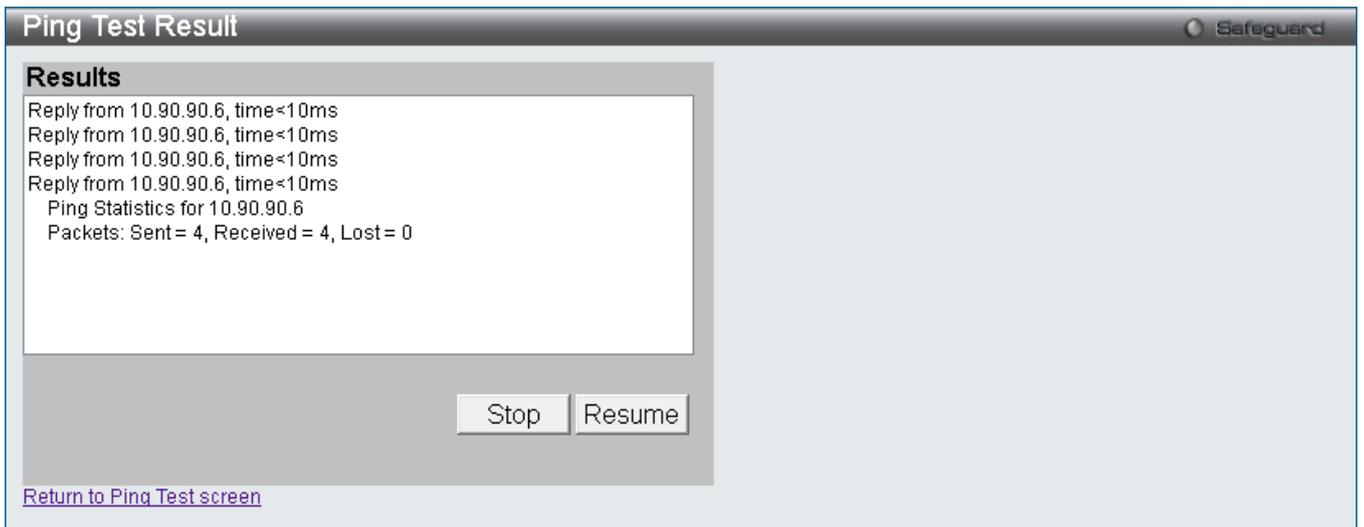


Figure 12-28 Ping Test Result window

Click the **Stop** button to halt the Ping Test.

Click the **Resume** button to resume the Ping Test.

Trace Route

The trace route page allows the user to trace a route between the switch and a given host on the network.

To view this window, click **Monitoring > Trace Route** as shown below:

Figure 12-29 Trace Route window

IPv4 Trace Route:

The fields that can be configured are described below:

Parameter	Description
-----------	-------------

IPv4 Address	Enter the IPv4 address of the destination station.
TTL (1-60)	The time to live value of the trace route request. This is the maximum number of routers that a trace route packet can pass. The trace route option will cross while seeking the network path between two devices. The range for the TTL is 1 to 60 hops.
Port (30000-64900)	The port number. The value range is from 30000 to 64900.
Timeout (1-65535)	Defines the timeout period while waiting for a response from the remote device. A value of 1 to 65535 seconds can be specified. The default is 5 seconds.
Probe (1-9)	The number of probing. The range is from 1 to 9. If unspecified, the default value is 1.

Click the **Start** button to initiate the Trace Route.

After clicking the **Start** button, the following page will appear:

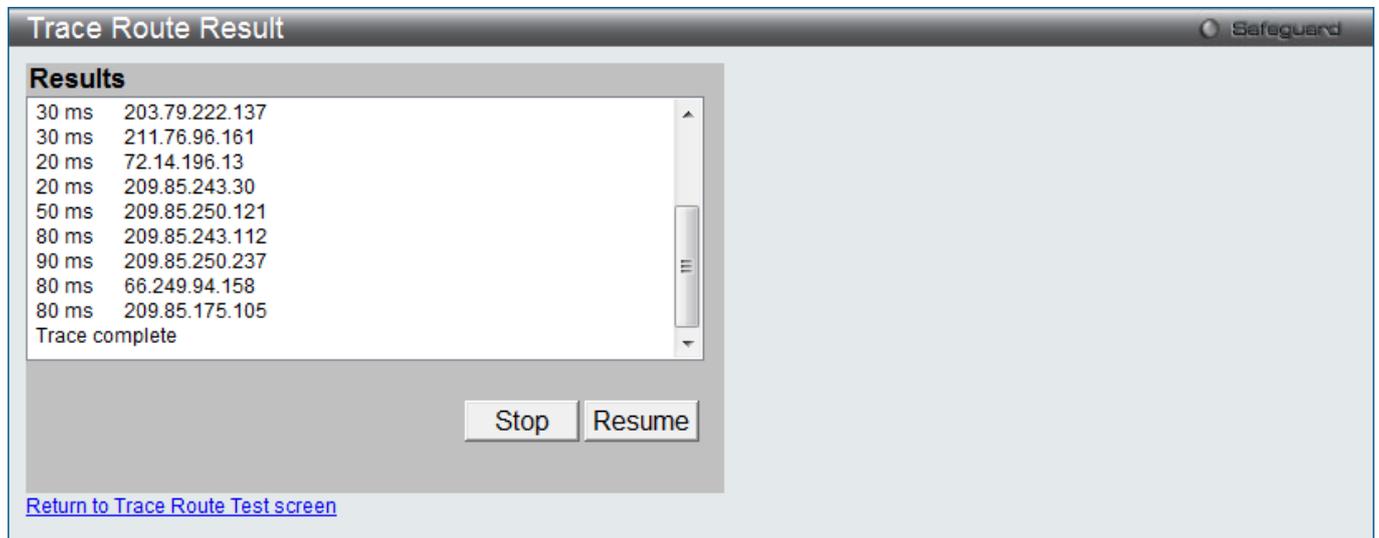


Figure 12-30 Trace Route Result window

Click the **Stop** button to halt the Trace Route. Click the **Resume** button to resume the Trace Route.

IPv6 Trace Route:

The fields that can be configured are described below:

Parameter	Description
IPv6 Address	Enter the IPv6 address of the destination station.
TTL (1-60)	The time to live value of the trace route request. This is the maximum number of routers that a trace route packet can pass. The trace route option will cross while seeking the network path between two devices. The range for the TTL is 1 to 60 hops.
Port (30000-64900)	The port number. The value range is from 30000 to 64900.

Timeout (1-65535)	Defines the timeout period while waiting for a response from the remote device. A value of 1 to 65535 seconds can be specified. The default is 5 seconds.
Probe (1-9)	The number of probing. The range is from 1 to 9. If unspecified, the default value is 1.

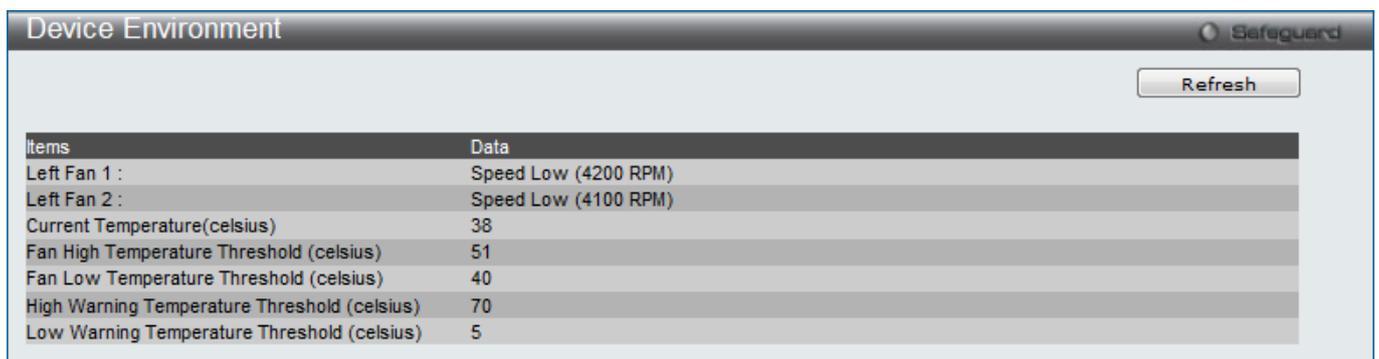
Click the **Start** button to initiate the Trace Route.

Peripheral

Device Environment

The device environment feature displays the Switch internal temperature status.

To view this window, click **Monitoring > Peripheral > Device Environment** as shown below:



Items	Data
Left Fan 1 :	Speed Low (4200 RPM)
Left Fan 2 :	Speed Low (4100 RPM)
Current Temperature(celsius)	38
Fan High Temperature Threshold (celsius)	51
Fan Low Temperature Threshold (celsius)	40
High Warning Temperature Threshold (celsius)	70
Low Warning Temperature Threshold (celsius)	5

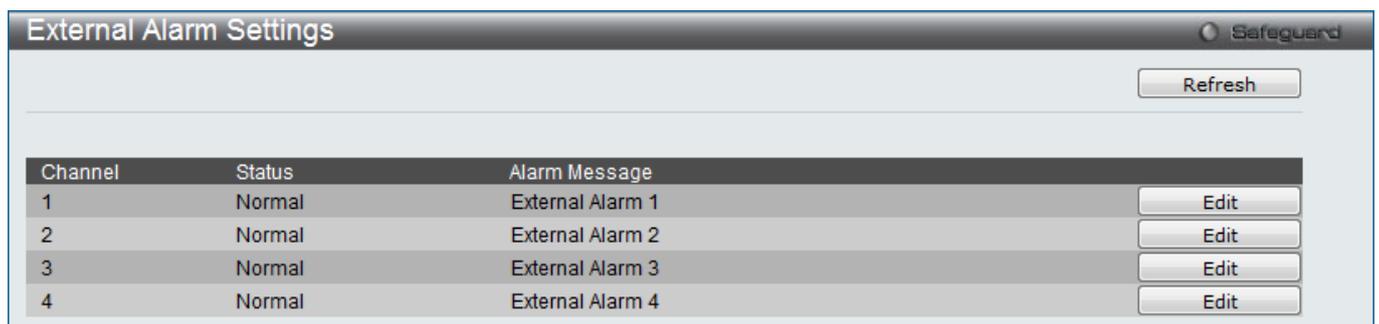
Figure 12-31 Device Environment Window

Click the **Refresh** button to refresh the display table.

External Alarm Settings

On this page, the user can view the external alarm settings information.

To view this window, click **Monitoring > Peripheral > External Alarm Settings**, as shown below:



Channel	Status	Alarm Message	
1	Normal	External Alarm 1	Edit
2	Normal	External Alarm 2	Edit
3	Normal	External Alarm 3	Edit
4	Normal	External Alarm 4	Edit

Figure 12-32 External Alarm Settings window

Click the **Refresh** button to refresh the display table so that new entries will appear.

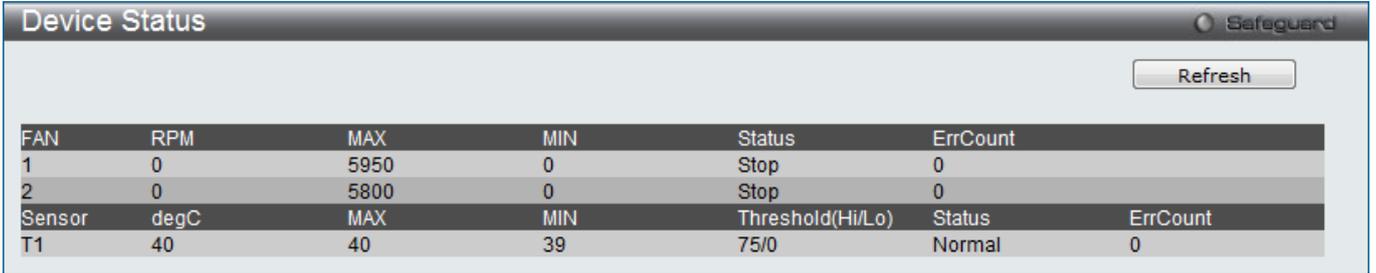
Click the **Edit** button to change the **Alarm Message** description.

Click the **Apply** button to apply the changes made.

Device Status

On this page, the user can view the device status information.

To view this window, click **Monitoring > Peripheral > Device Status**, as shown below:



FAN	RPM	MAX	MIN	Status	ErrCount	
1	0	5950	0	Stop	0	
2	0	5800	0	Stop	0	
Sensor	degC	MAX	MIN	Threshold(Hi/Lo)	Status	ErrCount
T1	40	40	39	75/0	Normal	0

Figure 12-33 Device Status Window

Click the **Refresh** button to refresh the display table so that new entries will appear.

Chapter 13 Save and Tools

Save Configuration ID 1

Save Configuration ID 2

Save Log

Save All

Configuration File Backup & Restore

Upload Log File

Reset

Download Firmware

Reboot System

Save Configuration ID 1

To view this window, click **Save > Save Configuration ID 1**, as shown below.

On this page the user can choose to save the configuration ID 1. Once this option is selected, the Switch will proceed with the save.

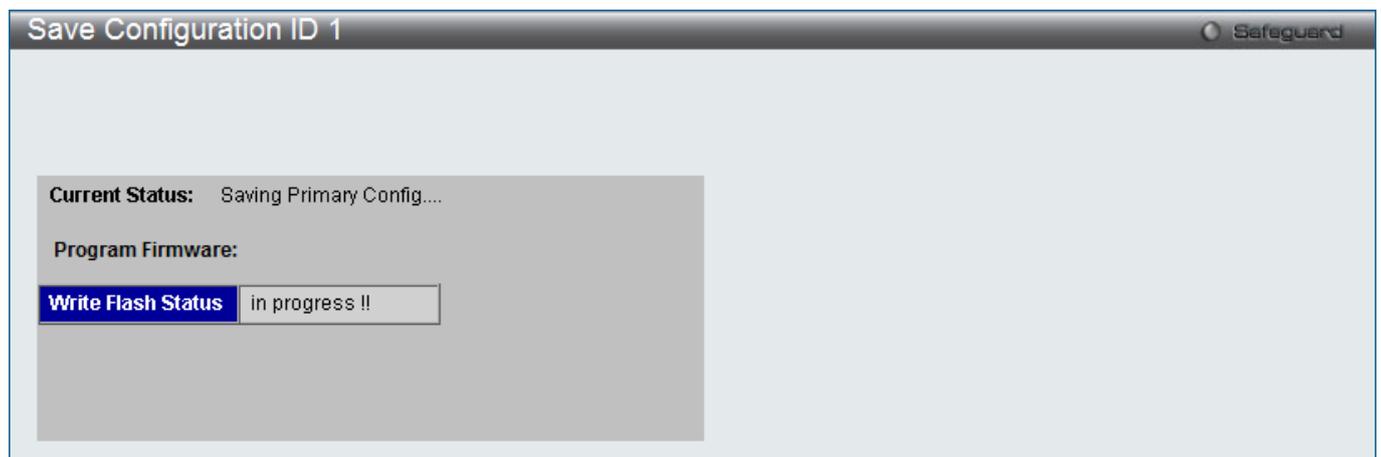


Figure 13-1 Save Configuration ID 1 (during) window

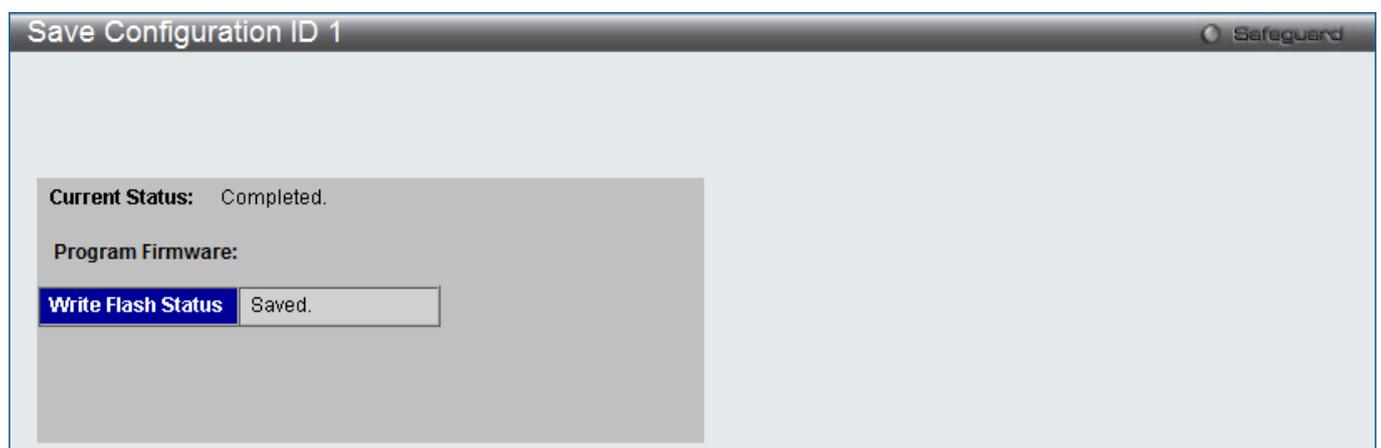


Figure 13-2 Save Configuration ID 1 (finished) window

Save Configuration ID 2

To view this window, click **Save > Save Configuration ID 2**, as shown below.

On this page the user can choose to save the configuration ID 2. Once this option is selected, the Switch will proceed with the save.

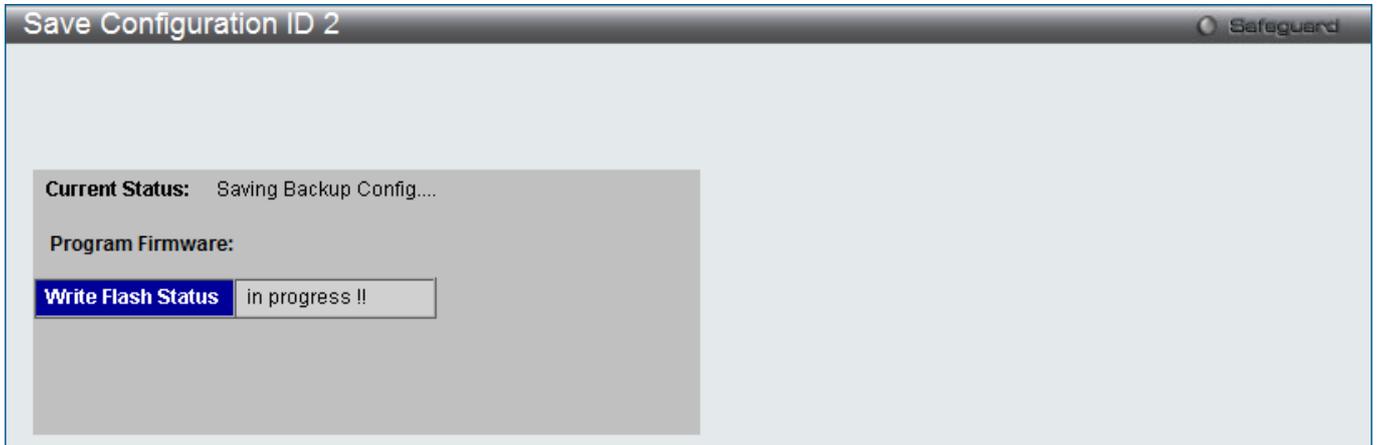


Figure 13-3 Save Configuration ID 2 (during) window

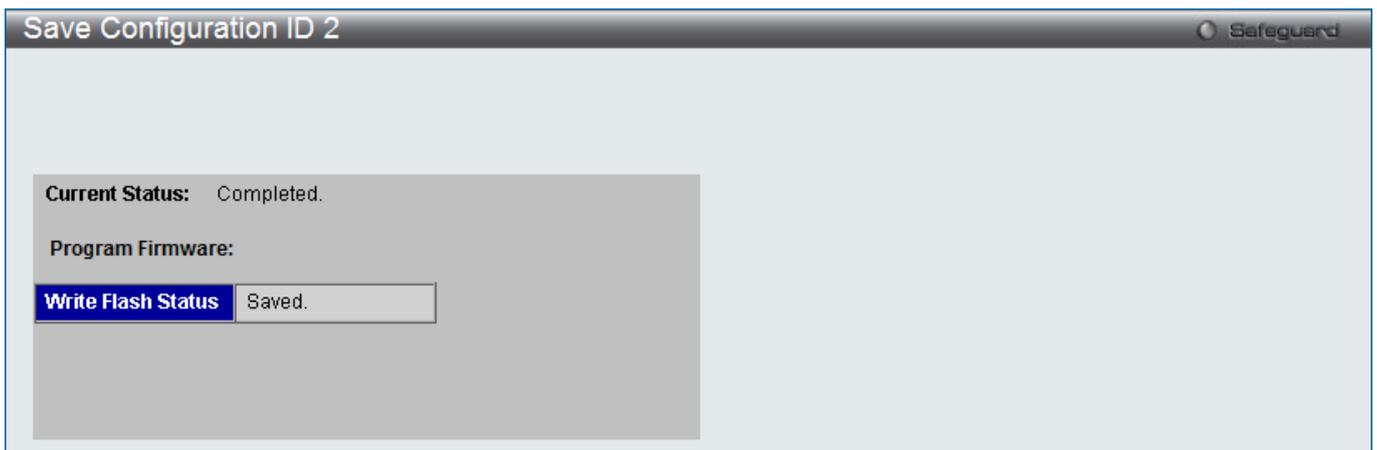


Figure 13-4 Save Configuration ID 2 (finished) window

Save Log

To view this window, click **Save > Save Log**, as shown below.

On this page the user can choose to save the log. Once this option is selected, the Switch will proceed with the save.



Figure 13-5 Save Log (during) window



Figure 13-6 Save Log (finished) window

Save All

To view this window, click **Save > Save All**, as shown below.

On this page the user can choose to save the log and both configurations at the same time. Once this option is selected, the Switch will proceed with the save.



Figure 13-7 Save All (during) window

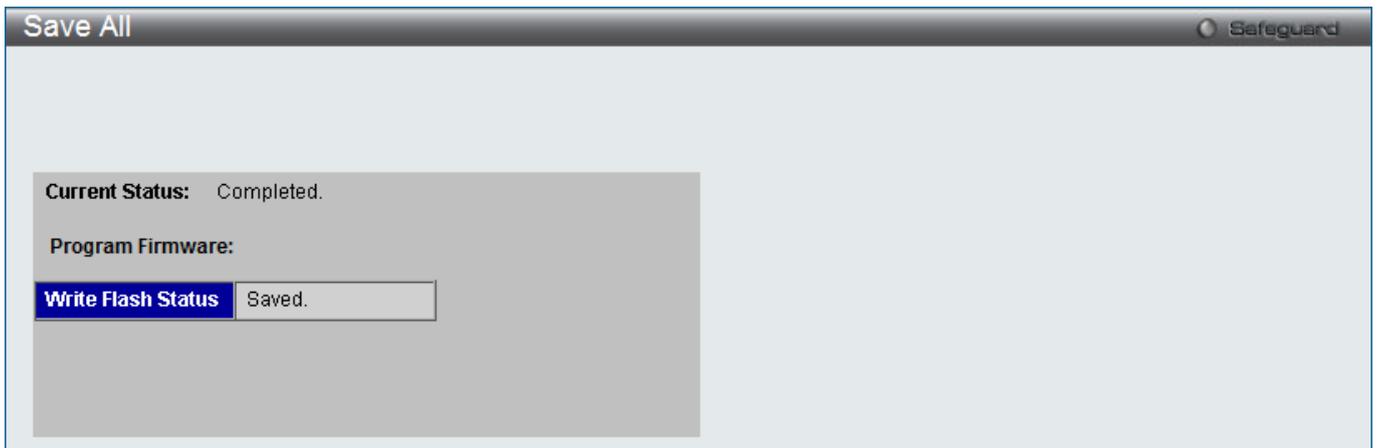


Figure 13-8 Save All (finished) window

Configuration File Backup & Restore

The following window is used to backup and restore the configuration file of the Switch.

To view this window, click **Tools > Configuration File Backup & Restore**, as shown below.

Configuration File Backup & Restore

TFTP:

TFTP Server IP : IPv4 IPv6

File :

Configuration ID : 1(Boot Up) ▼

Restore Backup

HTTP:

Source File: Browse...

Configuration ID : 1(Boot Up) ▼

Restore Backup

FTP:

FTP Server IP :

User Name :

Password :

TCP Port (1-65535) :

File:

Configuration ID : 1(Boot Up) ▼

Restore Backup

Figure 13-9 Configuration File Backup & Restore Window

The fields that can be configured, in the **TFTP** section are described below:

Parameter	Description
TFTP Server IP	Enter the TFTP server IP address used.

	IPv4	Click the radio button to enter the TFTP server IPv4 address used.
	IPv6	Click the radio button to enter the TFTP server IPv6 address used.
File	Enter the location and name of the Source File.	
Configuration ID	Specifies the configuration ID that will be used.	

Click the **Restore** button to initiate the upload of the configuration file to the Switch.

Click the **Backup** button to initiate the download of the configuration file from the Switch.

The fields that can be configured, in the **HTTP** section, are described below:

Parameter	Description
Source File	Enter the location and name of the Source File, or click the Browse button to navigate to the configuration file for the download.
Configuration ID	Specifies the configuration ID that will be used.

Click the **Restore** button to initiate the upload of the configuration file to the Switch.

Click the **Backup** button to initiate the download of the configuration file from the Switch.

The fields that can be configured, in the **FTP** section, are described below:

Parameter	Description
FTP Server IP	Here the user can enter the FTP Server IP Address used.
User Name	Here the user can enter the appropriate Username used.
Password	Here the user can enter the appropriate Password used.
TCP Port (1-65535)	Here the user can enter the TCP Port number used.
File	Enter the location and name of the Source File.
Configuration ID	Specifies the configuration ID that will be used.

Click the **Restore** button to initiate the upload of the configuration file to the Switch.

Click the **Backup** button to initiate the download of the configuration file from the Switch.

Upload Log File

The following window is used to upload the log and attack log file from the Switch.

To view this window, click **Tools > Upload Log File**, as shown below.

Figure 13-10 Upload Log File Window

The fields that can be configured are described below:

Parameter	Description	
TFTP Server IP	Enter the TFTP server IP address used.	
	IPv4	Click the radio button to enter the TFTP server IPv4 address used.
	IPv6	Click the radio button to enter the TFTP server IPv6 address used.
File	Enter the location and name of the Destination File.	
Log Type	Select the type of log to be transferred. Selecting the Common Log option here will upload the common log entries. Selecting the Attack Log option here will upload the log concerning attacks.	

The fields that can be configured, in the **FTP** section, are described below:

Parameter	Description
FTP Server IP	Here the user can enter the FTP Server IP Address used.
User Name	Here the user can enter the appropriate Username used.
Password	Here the user can enter the appropriate Password used.
TCP Port (1-65535)	Here the user can enter the TCP Port number used.
File	Enter the location and name of the Destination File.

Click **Upload** to initiate the log upload.

Click **Upload Attack Log** to initiate the attack log upload.

Reset

The reset function has several options when resetting the Switch. Some of the current configuration parameters can be retained while resetting all other configuration parameters to their factory defaults.



NOTE: Only the reset system option will enter the factory default parameters into the Switch's non-volatile RAM, and then restart the Switch. All other options enter the factory defaults into the current configuration, but do not save this configuration. Reset system will return the Switch's configuration to the state it was when it left the factory

Reset gives the option of retaining the Switch's user accounts and history log while resetting all other configuration parameters to their factory defaults. If the Switch is reset using this window, and **Save Changes** is not executed, the Switch will return to the last saved configuration when rebooted.

Option	Description
<input checked="" type="radio"/> Reset	Proceed with system reset except IP address, log, user account and banner.
<input type="radio"/> Reset Config	Switch will be reset to factory defaults.
<input type="radio"/> Reset System	Switch will be reset to factory defaults and reboot.

Figure 13-11 Reset System Window

The fields that can be configured are described below:

Parameter	Description
Reset	Selecting this option will factory reset the Switch but not the IP address, log, user accounts and banner.
Reset Config	Selecting this option will factory reset the Switch but not perform a Reboot.
Reset System	Selecting this option will factory reset the Switch and perform a Reboot.

Click the **Apply** button to initiate the reset action.

Download Firmware

The following window is used to download firmware to the Switch.

To view this window, click **Tools > Download Firmware**, as shown below.

Figure 13-12 Download Firmware Window

The fields that can be configured, in the **TFTP** section, are described below:

Parameter	Description	
TFTP Server IP	Enter the TFTP server IP address used.	
	IPv4	Click the radio button to enter the TFTP server IPv4 address used.
	IPv6	Click the radio button to enter the TFTP server IPv6 address used.
File	Enter the location and name of the Source File.	
Image ID	Specifies the firmware image ID that will be used.	

Click **Download** to initiate the download.

The fields that can be configured, in the **HTTP** section, are described below:

Parameter	Description
Source File	Enter the location and name of the Source File or click the Browse button to navigate to the firmware file for the download.
Image ID	Specifies the firmware image ID that will be used.

Click **Download** to initiate the download.

The fields that can be configured, in the **FTP** section, are described below:

Parameter	Description
FTP Server IP	Here the user can enter the FTP Server IP Address used.
User Name	Here the user can enter the appropriate Username used.
Password	Here the user can enter the appropriate Password used.
TCP Port (1-65535)	Here the user can enter the TCP Port number used.
Source File	Enter the location and name of the Source File.

Click **Download** to initiate the download.

Reboot System

The following window is used to restart the Switch.

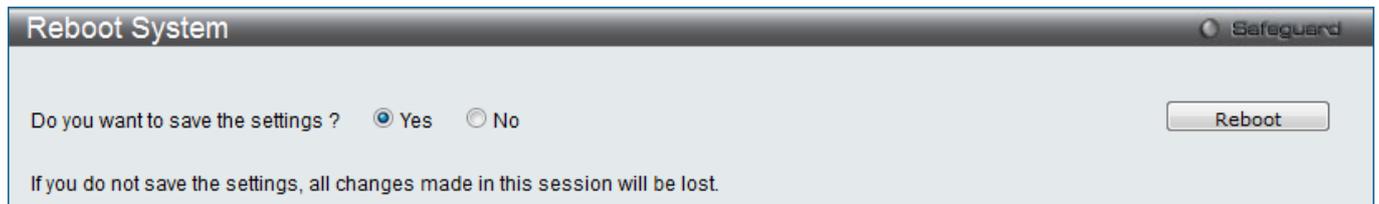


Figure 13-13 Reboot System Window

Selecting the **Yes** radio button will instruct the Switch to save the current configuration to non-volatile RAM before restarting the Switch.

Selecting the **No** radio button instructs the Switch not to save the current configuration before restarting the Switch. All of the configuration information entered from the last time **Save Changes** was executed will be lost.

Click the **Reboot** button to restart the Switch.

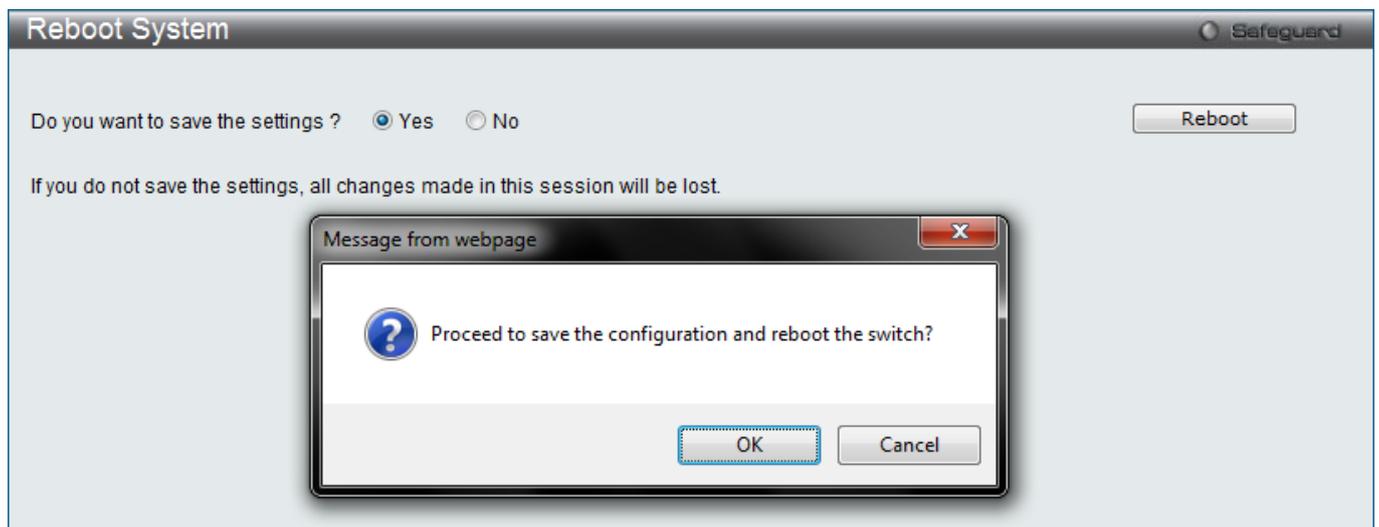


Figure 13-14 Reboot System Window (Confirmation)

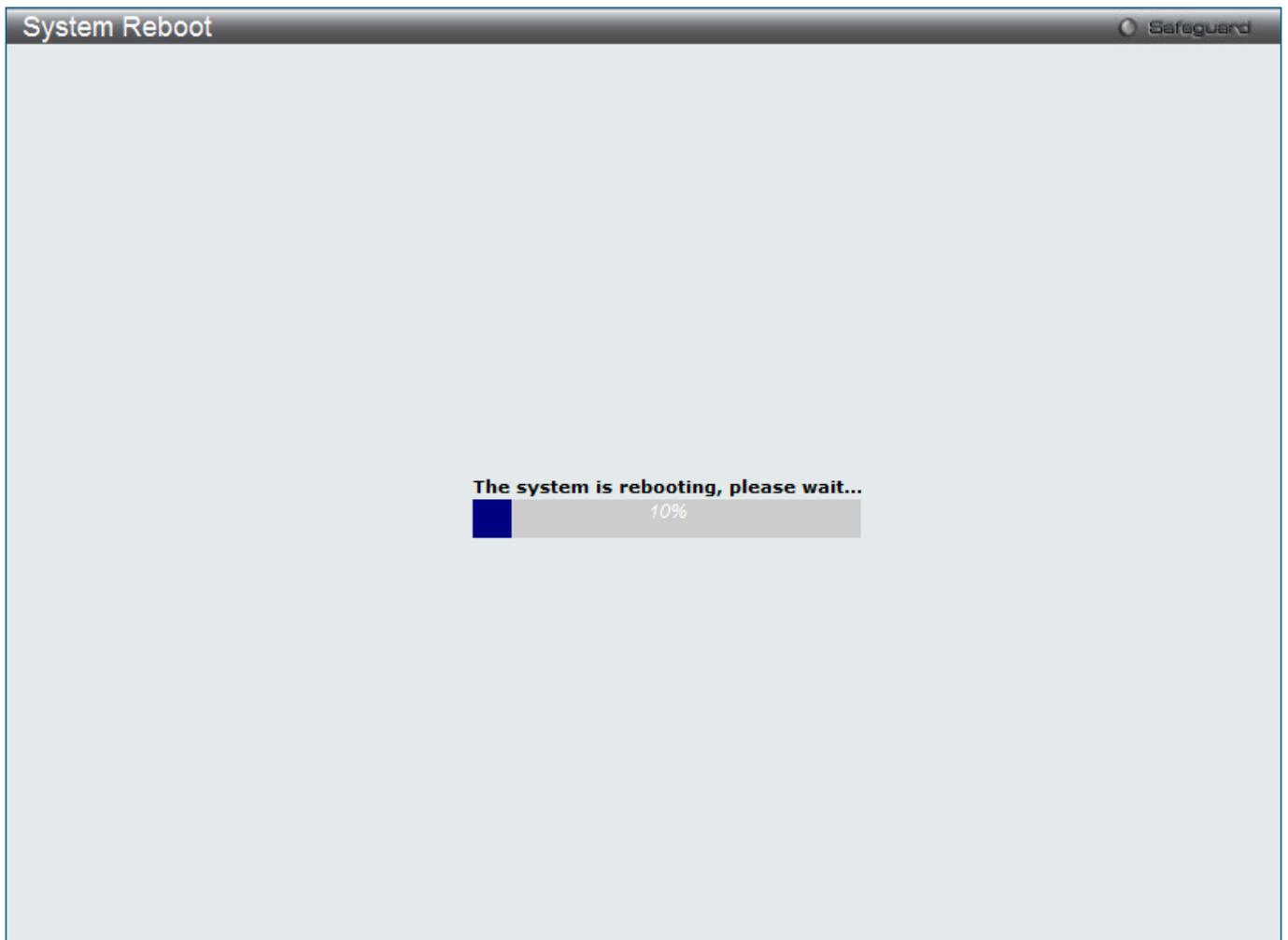


Figure 13-15 System Rebooting window

Appendix Section

Appendix A Password Recovery Procedure

This document describes the procedure for resetting passwords on D-Link Switches.

Authenticating any user who tries to access networks is necessary and important. The basic authentication method used to accept qualified users is through a local login, utilizing a Username and Password. Sometimes, passwords get forgotten or destroyed, so network administrators need to reset these passwords. This document will explain how the Password Recovery feature can help network administrators reach this goal.

The following steps explain how to use the Password Recovery feature on D-Link devices to easily recover passwords.

Complete these steps to reset the password:

- For security reasons, the Password Recovery feature requires the user to physically access the device. Therefore this feature is only applicable when there is a direct connection to the console port of the device. It is necessary for the user needs to attach a terminal or PC with terminal emulation to the console port of the switch.
- Power on the Switch. After the UART init is loaded to 100%, the Switch will allow 2 seconds for the user to press the hotkey [^] (Shift + 6) to enter the "Password Recovery Mode." Once the Switch enters the "Password Recovery Mode," all ports on the Switch will be disabled.

```

Boot Procedure                                                    V1.00.001
-----
Power On Self Test ..... 100 %

MAC Address   : F0-7D-68-25-CB-40
H/W Version   : A1

Please Wait, Loading V1.00.029 Runtime Image ..... 100 %

UART init ..... 100 %

```

```

Password Recovery Mode
>

```

1. In the "Password Recovery Mode" only the following commands can be used.

Command	Parameters
reset config {force_agree}	The reset config command resets the whole configuration back to the default values. The option ' force_agree ' means to reset the whole configuration without the user's agreement.
reboot {force_agree}	The reboot command exits the Reset Password Recovery Mode and restarts the switch. A confirmation message will be displayed to allow the user to save the current settings. The option ' force_agree ' means to reset the whole configuration without the user's agreement.

reset account	The reset account command deletes all the previously created accounts.
reset password {<username>}	The reset password command resets the password of the specified user. If a username is not specified, the passwords of all users will be reset.
show account	The show account command displays all previously created accounts.

Appendix B System Log Entries

The following table lists all possible entries and their corresponding meanings that will appear in the System Log of this Switch.

Category	Log Description	Severity	Note
System	Event description: System started up Log Message: System started up	Critical	
	Event description: Configuration saved to flash Log Message: Configuration saved to flash (Username: <username>, IP: <ipaddr>) Parameters description: username: The user name that save the configuration. ipaddr: IP address, if user login by console, there will no IP information for logging.	Informational	
	Event description: System log saved to flash Log Message: System log saved to flash(Username: <username>, IP: <ipaddr>) Parameters description: username: The user name that save the configuration. ipaddr: IP address, if user login by console, there will no IP information for logging.	Informational	
	Event description: Configuration and log saved to flash Log Message: Configuration and log saved to flash (Username: <username>, IP: <ipaddr>) Parameters description: username: The user name that save the configuration. ipaddr: IP address, if user login by console, there will no IP information for logging.	Informational	
Peripherals Function	Event description: Left Side Recovered. Log Message: Left Side Fan <id> recovered Parameters description: id: the Fan id.	Critical	
	Event description: Left Side failed. Log Message: Left Side Fan <id> failed Parameters description: id: the Fan id.	Critical	
	Event description: Temperature exceeds confidence level. Log Message: Temperature sensor <sensorID> enters alarm state (current temperature: <temperature>). Parameters description: sensorID: The sensor ID. temperature: The temperature.	Warning	
	Event description: Temperature recovers to normal. Log Message: Temperature sensor <sensorID> recovers to normal state (current temperature: <temperature>) Parameters description: sensorID: The sensor ID. temperature: The temperature.	Informational	
SNMP	Event description: SNMP request received with invalid community string Log Message: Safeguard <ipAddress> with invalid community string! Parameters description: ipAddress: IP address.	Informational	

Interface	<p>Event description: Port link up Log Message: Port <portNum> link up, <link state></p> <p>Parameters description: portNum: The port number link state: port link status, for example: 100Mbps FULL duplex</p>	Informational	
	<p>Event description: Port link down Log Message: Port <portNum> link down</p> <p>Parameters description: portNum: The port number.</p>	Informational	
Console	<p>Event description: Successful login through Console Log Message: Successful login through Console (Username: <username>, IP: <ipaddr>)</p> <p>Parameters description: username: User Name ipaddr: IP address. There are no IP if login by console.</p>	Informational	
	<p>Event description: Login failed through Console Log Message: Login failed through Console (Username: <username>, IP: <ipaddr>)</p> <p>Parameters description: username: User Name ipaddr: IP address. There are no IP if login by console.</p>	Warning	
	<p>Event description: Logout through Console Log Message: Logout through Console (Username: <username>, IP: <ipaddr>)</p> <p>Parameters description: username: User Name ipaddr: IP address. There are no IP if login by console.</p>	Informational	
	<p>Event description: Console session timed out Log Message: Console session timed out (Username: <username>, IP: <ipaddr>)</p> <p>Parameters description: username: User Name ipaddr: IP address. There are no IP if login by console.</p>	Informational	
Web	<p>Event description: Successful login through Web Log Message: Successful login through Web (Username: <username>, IP: <ipaddr>)</p> <p>Parameters description: username: User Name ipaddr: IP address.</p>	Informational	
	<p>Event description: Login failed through Web Log Message: Login failed through Web (Username: <username>, IP: <ipaddr>)</p> <p>Parameters description: username: User Name ipaddr: IP address.</p>	Warning	
	<p>Event description: Logout through Web Log Message: Logout through Web (Username: <username>, IP: <ipaddr>)</p> <p>Parameters description: username: User Name ipaddr: IP address.</p>	Informational	
	<p>Event description: Web session timed out Log Message: Web session timed out (Username: <username>, IP: <ipaddr>)</p>	Informational	

	Parameters description: username: User Name ipaddr: IP address.		
	Event description: Successful login through Web(SSL) Log Message: Successful login through Web(SSL) (Username: <username>, IP: <ipaddr>) Parameters description: username: User Name ipaddr: IP address.	Informational	
	Event description: Login failed through Web(SSL) Log Message: Login failed through Web(SSL) (Username: <username>, IP: <ipaddr>,) Parameters description: username: User Name ipaddr: IP address.	Warning	
	Event description: Logout through Web (SSL) Log Message: Logout through Web (SSL) (Username: <username>, IP: <ipaddr>,) Parameters description: username: User Name ipaddr: IP address.	Informational	
	Event description: Web (SSL) session timed out Log Message: Web(SSL) session timed out (Username: <username>, IP: <ipaddr>,) Parameters description: username: User Name ipaddr: IP address.	Informational	
Telnet	Event description: Successful login through Telnet Log Message: Successful login through Telnet (Username: <username>, IP: <ipaddr>,) Parameters description: username: User Name ipaddr: IP address.	Informational	
	Event description: Login failed through Telnet Log Message: Login failed through Telnet (Username: <username>, IP: <ipaddr>) Parameters description: username: User Name ipaddr: IP address.	Warning	
	Event description: Logout through Telnet Log Message: Logout through Telnet (Username: <username>, IP: <ipaddr>) Parameters description: username: User Name ipaddr: IP address.	Informational	
	Event description: Telnet session timed out Log Message: Telnet session timed out (Username: <username>, IP: <ipaddr>,) Parameters description: username: User Name ipaddr: IP address.	Informational	
DDM	Event description: DDM exceeded or recover from DDM alarm threshold Log Message: DDM Port <portNum> SFP [thresholdType] [exceedType] the [thresholdSubType] alarm threshold Parameters description:	Critical	

	<p>portNum: The port number.</p> <p>thresholdType: the DDM threshold type. The value should be one of the following values: temperature, supply voltage, bias current, TX power, RX power.</p> <p>exceedType: indicate exceed threshold or recover to normal event, the value should be "recovered from" or "exceeded"</p> <p>thresholdSubType: the DDM threshold sub type, the value should be "high" or "low".</p>		
	<p>Event description: DDM exceeded or recover from DDM warning threshold</p> <p>Log Message: DDM Port <portNum> SFP [thresholdType] [exceedType] the [thresholdSubType] warning threshold</p> <p>Parameters description:</p> <p>portNum: The port number.</p> <p>thresholdType: the DDM threshold type. The value should be one of the following values: temperature, supply voltage, bias current, TX power, RX power.</p> <p>exceedType: indicate exceed threshold or recover to normal event, the value should be "recovered from" or "exceeded"</p> <p>thresholdSubType: the DDM threshold sub type, the value should be "high" or "low".</p>	Warning	
TFTP Client	<p>Event description: Firmware upgraded successfully.</p> <p>Log Message: Firmware upgrade by console successfully (Username: <username>, IP: <ipaddr>, MAC: <macaddr>)</p> <p>Parameters description:</p> <p>Username: Represent current login user.</p> <p>ipaddr: Represent client IP address. If user login by console, there will no IP information for logging.</p> <p>macaddr : Represent client MAC address.</p>	Informational	
	<p>Event description: Firmware upgrade was unsuccessful.</p> <p>Log Message: Firmware upgrade by console was unsuccessful (Username: <username>, IP: <ipaddr>, MAC: <macaddr>)</p> <p>Parameters description:</p> <p>Username: Represent current login user.</p> <p>ipaddr: Represent client IP address. If user login by console, there will no IP information for logging.</p> <p>macaddr : Represent client MAC address.</p>	Warning	
	<p>Event description: Configuration successfully downloaded.</p> <p>Log Message: Configuration successfully downloaded by console (Username: <username>, IP: <ipaddr>, MAC: <macaddr>)</p> <p>Parameters description:</p> <p>Username: Represent current login user.</p> <p>ipaddr: Represent client IP address. If user login by console, there will no IP information for logging.</p> <p>macaddr : Represent client MAC address.</p>	Informational	
	<p>Event description: Configuration download was unsuccessful.</p> <p>Log Message: Configuration download by console was unsuccessful! (Username: <username>, IP: <ipaddr>, MAC: <macaddr>)</p> <p>Parameters description:</p> <p>Username: Represent current login user.</p> <p>ipaddr: Represent client IP address. If user login by console, there will no IP information for logging.</p> <p>macaddr : Represent client MAC address.</p>	Warning	
	<p>Event description: Configuration successfully uploaded.</p> <p>Log Message: Configuration successfully uploaded by console (Username: <username>, IP: <ipaddr>, MAC: <macaddr>)</p> <p>Parameters description:</p> <p>Username: Represent current login user.</p> <p>ipaddr: Represent client IP address. If user login by console, there will no IP information for logging.</p> <p>macaddr : Represent client MAC address.</p>	Informational	

	<p>Event description: Configuration upload was unsuccessful. Log Message: Configuration upload by console was unsuccessful! (Username: <username>, IP: <ipaddr>, MAC: <macaddr>)</p> <p>Parameters description: Username: Represent current login user. Ipaddr: Represent client IP address. If user login by console, there will no IP information for logging. macaddr : Represent client MAC address.</p>	Warning	
	<p>Event description: Log message successfully uploaded. Log Message: Log message successfully uploaded by console (Username: <username>, IP: <ipaddr>, MAC: <macaddr>)</p> <p>Parameters description: Username: Represent current login user. Ipaddr: Represent client IP address. If user login by console, there will no IP information for logging. macaddr : Represent client MAC address.</p>	Informational	
	<p>Event description: Log message upload was unsuccessful. Log Message: Log message upload by console was unsuccessful! (Username: <username>, IP: <ipaddr>, MAC: <macaddr>)</p> <p>Parameters description: Username: Represent current login user. Ipaddr: Represent client IP address. If user login by console, there will no IP information for logging. macaddr : Represent client MAC address.</p>	Warning	
STP	<p>Event description: Topology changed. Log Message: Topology changed [([Instance:<InstanceID>] ,port:<portNum> [,MAC: <macaddr>])]</p> <p>Parameters description: InstanceID: Instance ID. portNum:Port ID macaddr: MAC address</p>	Notice	
	<p>Event description: New root bridge. Log Message: [CIST CIST Region MSTI Region] New Root bridge selected ([Instance: <InstanceID>] MAC:<macaddr>, Priority: <value>)</p> <p>Parameters description: InstanceID: Instance ID. macaddr: root bridge MAC address value: root bridge priority</p>	Informational	
	<p>Event description: Spanning Tree instance created. Log Message: Spanning Tree instance create (Instance:<InstanceID>)</p> <p>Parameters description: InstanceID: Instance ID.</p>	Informational	
	<p>Event description: Spanning Tree instance deleted. Log Message: Spanning Tree instance delete (Instance:<InstanceID>)</p> <p>Parameters description: InstanceID: Instance ID.</p>	Informational	
	<p>Event description: Spanning Tree Version changed. Log Message: Spanning Tree version change (new version:<new_version>)</p> <p>Parameters description: new_version: New STP version.</p>	Informational	
	<p>Event description: Spanning Tree MST configuration ID name and revision level changed. Log Message: Spanning Tree MST configuration ID name and revision level change (name:<name> revision level <revision_level>).</p>	Informational	

	Parameters description: name : New name. revision_level:New revision level.		
	Event description: Spanning Tree MST configuration ID VLAN mapping table deleted. Log Message: Spanning Tree MST configuration ID VLAN mapping table change (Instance: <InstanceID> delete vlan <startvlanid> [- <endvlanid>]). Parameters description: InstanceID: Instance ID. startvlanid- endvlanid:VLANlist	Informational	
	Event description: Spanning Tree MST configuration ID VLAN mapping table added. Log Message: Spanning Tree MST configuration ID VLAN mapping table changed (Instance: <InstanceID> add vlan <startvlanid> [- <endvlanid>]). Parameters description: InstanceID: Instance ID. startvlanid- endvlanid:VLANlist	Informational	
	Event description: New root port Log Message: New root port selected [([Instance:<InstanceID>], port:<portNum>)] Parameters description: InstanceID: Instance ID. portNum:Port ID	Notice	
	Event description: Spanning Tree port status changed Log Message: Spanning Tree port status change [([Instance:<InstanceID>], port:<portNum>)] <old_status> -> <new_status> Parameters description: InstanceID: Instance ID. portNum: Port ID old_status: Old status new_status: New status	Notice	
	Event description: Spanning Tree port role changed. Log Message: Spanning Tree port role change [([Instance:<InstanceID>], port:<portNum>)] <old_role> -> <new_role> Parameters description: InstanceID: Instance ID. portNum:Port ID old_role: Old role new_status:New role	Informational	
ERPS	Event description: Signal fail detected Log Message: Signal fail detected on node <macaddr> Parameters description: macaddr: The system MAC of the node	Notice	
	Event description: Signal fail cleared Log Message: Signal fail cleared on node <macaddr> Parameters description: macaddr: The system MAC of the node	Notice	
	Event description: RPL owner conflict Log Message: RPL owner conflicted on the ring <macaddr> Parameters description: macaddr: The system MAC of the node	Warning	
LLDP-MED	Event description: LLDP-MED topology change detected Log Message: LLDP-MED topology change detected (on port <portNum>. chassis id: <chassisType>, <chassisID>, port id: <portType>, <portID>, device class: <deviceClass>)	Notice	

	<p>Parameters description: portNum: The port number. chassisType: chassis ID subtype. Value list: 1. chassisComponent(1) 2. interfaceAlias(2) 3. portComponent(3) 4. macAddress(4) 5. networkAddress(5) 6. interfaceName(6) 7. local(7) chassisID: chassis ID. portType: port ID subtype. Value list: 1. interfaceAlias(1) 2. portComponent(2) 3. macAddress(3) 4. networkAddress(4) 5. interfaceName(5) 6. agentCircuitId(6) 7. local(7) portID: port ID. deviceClass: LLDP-MED device type.</p>		
	<p>Event description: Conflict LLDP-MED device type detected Log Message: Conflict LLDP-MED device type detected (on port < portNum >, chassis id: < chassisType>, <chassisID>, port id: < portType>, <portID>, device class: <deviceClass>)</p> <p>Parameters description: portNum: The port number. chassisType: chassis ID subtype. Value list: 1. chassisComponent(1) 2. interfaceAlias(2) 3. portComponent(3) 4. macAddress(4) 5. networkAddress(5) 6. interfaceName(6) 7. local(7) chassisID: chassis ID. portType: port ID subtype. Value list: 1. interfaceAlias(1) 2. portComponent(2) 3. macAddress(3) 4. networkAddress(4) 5. interfaceName(5) 6. agentCircuitId(6) 7. local(7) portID: port ID. deviceClass: LLDP-MED device type.</p>	Notice	
	<p>Event description: Incompatible LLDP-MED TLV set detected Log Message: Incompatible LLDP-MED TLV set detected (on port < portNum >, chassis id: < chassisType>, <chassisID>, port id: < portType>, <portID>, device class: <deviceClass>)</p> <p>Parameters description: portNum: The port number. chassisType: chassis ID subtype. Value list: 1. chassisComponent(1) 2. interfaceAlias(2) 3. portComponent(3)</p>	Notice	

	<p>4. macAddress(4) 5. networkAddress(5) 6. interfaceName(6) 7. local(7) chassisID: chassis ID. portType: port ID subtype. Value list: 1. interfaceAlias(1) 2. portComponent(2) 3. macAddress(3) 4. networkAddress(4) 5. interfaceName(5) 6. agentCircuitId(6) 7. local(7) portID: port ID. deviceClass: LLDP-MED device type.</p>		
CFM	<p>Event description: Cross-connect is detected Log Message: CFM cross-connect. VLAN:<vlanid>, Local(MD Level:<mdlevel>, Port <portNum>, Direction:<mepdirection>) Remote(MEPID:<mepid>, MAC:<macaddr>) Parameters description: vlanid: Represents VLAN identifier of the MEP. mdlevel: Represents MD level of the MEP. portNum: Represents the logical port number of the MEP. mepdirection: Can be "inward" or "outward". mepid: Represents the MEPID of the MEP. macaddr: Represents the MAC address of the MEP.</p>	Critical	
	<p>Event description: CFM error ccm Log Message: CFM error ccm. MD Level:<mdlevel>, VLAN:<vlanid>, Local(Port <[unitID:]portNum>, Direction:<mepdirection>) Remote(MEPID:<mepid>, MAC:<macaddr>) Parameters description: vlanid: Represents VLAN identifier of the MEP. mdlevel: Represents MD level of the MEP. unitID: Represents the ID of the device in the stacking system. portNum: Represents logical port number of the MEP. mepdirection: Can be "inward" or "outward". mepid: Represents MEPID of the MEP. macaddr: Represents MAC address of the MEP.</p>	Warning	
	<p>Event description: CFM remote down Log Message: CFM remote down. MD Level:<mdlevel>, VLAN:<vlanid>, Local(Port <portNum>, Direction:<mepdirection>) Parameters description: vlanid: Represents VLAN identifier of the MEP. mdlevel: Represents MD level of the MEP. unitID: Represents the ID of the device in the stacking system. portNum: Represents logical port number of the MEP. mepdirection: Can be "inward" or "outward".</p>	Warning	
	<p>Event description: CFM remote MAC error Log Message: CFM remote MAC error. MD Level:<mdlevel>, VLAN:<vlanid>, Local(Port <portNum>, Direction:<mepdirection>) Parameters description: vlanid: Represents VLAN identifier of the MEP. mdlevel: Represents MD level of the MEP. portNum: Represents the logical port number of the MEP. mepdirection: Can be "inward" or "outward".</p>	Warning	
	<p>Event description: Remote MEP detects CFM defects Log Message: CFM remote detects a defect. MD Level:<mdlevel>, VLAN:<vlanid>, Local(Port <portNum>, Direction:<mepdirection>)</p>	Informational	

	<p>Parameters description: vlanid: Represents VLAN identifier of the MEP. mdlevel: Represents MD level of the MEP. unitID: Represents the ID of the device in the stacking system. portNum: Represents logical port number of the MEP. mepdirection: Can be "inward" or "outward".</p>		
CFM Extension	<p>Event description: AIS condition detected. Log Message: [CFM_EXT(1):]AIS condition detected. MD Level:<mdlevel>, VLAN:<vlanid>, Local(Port <portNum>, Direction:<mepdirection>, MEPID:<mepid>)</p> <p>Parameters description: mdlevel: Represents MD level of the MEP vlanid: Represents VLAN identifier of the MEP portNum: Represents logical port number of the MEP. mepdirection: Can be "inward" or "outward".</p>	Notice	
	<p>Event description: AIS condition cleared Log Message: [CFM_EXT(2):]AIS condition cleared. MD Level:<mdlevel>, VLAN:<vlanid>, Local(Port <portNum>, Direction:<mepdirection>, MEPID:<mepid>)</p> <p>Parameters description: mdlevel: Represents MD level of the MEP vlanid: Represents VLAN identifier of the MEP portNum: Represents logical port number of the MEP. mepdirection: Can be "inward" or "outward". mepid: Represents MEPID of the MEP.</p>	Notice	
	<p>Event description: LCK condition detected Log Message: [CFM_EXT(3):]LCK condition detected. MD Level:<mdlevel>, VLAN:<vlanid>, Local(Port <portNum>, Direction:<mepdirection>, MEPID:<mepid>)</p> <p>Parameters description: mdlevel: Represents MD level of the MEP vlanid: Represents VLAN identifier of the MEP portNum: Represents logical port number of the MEP. mepdirection: Can be "inward" or "outward". mepid: Represents MEPID of the MEP.</p>	Notice	
	<p>Event description: LCK condition cleared Log Message: [CFM_EXT(4):]LCK condition cleared. MD Level:<mdlevel>, VLAN:<vlanid>, Local(Port <portNum>, Direction:<mepdirection>)</p> <p>Parameters description: mdlevel: Represents MD level of the MEP vlanid: Represents VLAN identifier of the MEP portNum: Represents logical port number of the MEP. mepdirection: Can be "inward" or "outward".</p>	Notice	
Voice VLAN	<p>Event description: New voice device is detected. Log Message: New voice device detected (MAC <macaddr>, Port <portNum>)</p> <p>Parameters description: portNum : The port number. macaddr: Voice device MAC address</p>	Informational	
	<p>Event description: Port add into voice VLAN Log Message: Port < portNum > add into voice VLAN <vid ></p> <p>Parameters description: portNum : The port number. vid:VLAN ID</p>	Informational	
	<p>Event description: Port remove from voice VLAN. Log Message: Port < portNum > remove from voice VLAN <vid ></p> <p>Parameters description:</p>	Informational	

	portNum : The port number. vid:VLAN ID		
MAC-based Access Control	Event description: A host fails to pass the authentication Log Message: MAC-based Access Control unauthenticated host(MAC: <macaddr>, Port <portNum>, VID: <vid>) Parameters description: macaddr: MAC address portNum: The port number. vid: VLAN ID on which the host exists	Critical	
	Event description: The authorized user number on a port reaches the max user limit. It is based on per-port. Log Message: Port <portNum> enters MAC-based Access Control stop learning state. Parameters description: portNum: The port number.	Warning	
	Event description: The authorized user number on a port is below the max user limit in a time interval (interval is project depended). It is based on per-port. Log Message: Port <portNum> recovers from MAC-based Access Control stop learning state. Parameters description: portNum: The port number.	Warning	
	Event description: The authorized user number on whole device reaches the max user limit. It is based on per-system. Log Message: MAC-based Access Control enters stop learning state. Parameters description: None	Warning	
	Event description: The authorized user number on whole device is below the max user limit in a time interval (interval is project depended). It is based on per-system. Log Message: MAC-based Access Control recovers from stop learning state. Parameters description: None	Warning	
	Event description: A host passes the authentication Log Message: MAC-based Access Control host login successful (MAC: <macaddr>, port: <portNum>, VID: <vid>) Parameters description: macaddr: MAC address portNum: The port number. vid: VLAN ID on which the host exists	Informational	
	Event description: A host is aged out. Log Message: MAC-based Access Control host aged out (MAC: <macaddr>, port: <portNum>, VID: <vid>) Parameters description: macaddr: MAC address unitID: The unit ID. portNum: The port number. vid: VLAN ID on which the host exists	Informational	
AAA and SSH Log	Event description: Successful login through a SSH. Log Message: Successful login through SSH (Username: <username>, IP: <ipaddr>). Parameters description: ipaddr: IP address. username: user name.	Informational	
	Event description: Login failed through a SSH. Log Message: Login failed through SSH (Username: <username>, IP:	Warning	

	<p><ipaddr>).</p> <p>Parameters description: ipaddr: IP address. username: user name.</p>		
	<p>Event description: Logout through a SSH. Log Message: Logout through SSH (Username: <username>, IP: <ipaddr>).</p> <p>Parameters description: ipaddr: IP address. username: user name.</p>	Informational	
	<p>Event description: SSH session timed out. Log Message: SSH session timed out (Username: <username>, IP: <ipaddr>).</p> <p>Parameters description: ipaddr: IP address. username: user name.</p>	Informational	
	<p>Event description: SSH server is enabled. Log Message: SSH server is enabled</p>	Informational	
	<p>Event description: SSH server is disabled. Log Message: SSH server is disabled</p>	Informational	
	<p>Event description: Successful login through Console authenticated by AAA local method. Log Message: Successful login through Console authenticated by AAA local method (Username: <username>).</p> <p>Parameters description: username: user name.</p>	Informational	
	<p>Event description: Login failed through Console authenticated by AAA local method. Log Message: Login failed through Console authenticated by AAA local method (Username: <username>)</p> <p>Parameters description: username: user name.</p>	Warning	
	<p>Event description: Successful login through Web authenticated by AAA local method. Log Message: Successful login through Web from <userIP> authenticated by AAA local method (Username: <username>).</p> <p>Parameters description: userIP: IP address. username: user name.</p>	Informational	
	<p>Event description: Login failed through Web authenticated by AAA local method. Log Message: Login failed failed through Web from <userIP> authenticated by AAA local method (Username: <username>).</p> <p>Parameters description: userIP: IP address. username: user name.</p>	Warning	
	<p>Event description: Successful login through Web (SSL) authenticated by AAA local method. Log Message: Successful login through Web (SSL) from <userIP> authenticated by AAA local method (Username: <username>).</p> <p>Parameters description: userIP: IP address. username: user name.</p>	Informational	
	<p>Event description: Login failed through Web(SSL) authenticated by AAA local. Log Message: Login failed through Web(SSL) from <userIP> authenticated by AAA local method (Username: <username>).</p>	Warning	

	Parameters description: userIP: IP address. username: user name.		
	Event description: Successful login through Telnet authenticated by AAA local method. Log Message: Successful login through Telnet from <userIP> authenticated by AAA local method (Username: <username>,). Parameters description: userIP: IP address. username: user name.	Informational	
	Event description: Login failed through Telnet authenticated by AAA local. Log Message: Login failed through Telnet from <userIP> authenticated by AAA local method (Username: <username>) Parameters description: userIP: IP address. username: user name.	Warning	
	Event description: Successful login through SSH authenticated by AAA local method. Log Message: Successful login through SSH from <userIP> authenticated by AAA local method (Username: <username>). Parameters description: userIP: IP address. username: user name.	Informational	
	Event description: Login failed through SSH authenticated by AAA local. Log Message: Login failed through SSH from <userIP> authenticated by AAA local method (Username: <username>). Parameters description: userIP: IP address. username: user name.	Warning	
	Event description: Successful login through Console authenticated by AAA none method. Log Message: Successful login through Console authenticated by AAA none method (Username: <username>). Parameters description: username: user name.	Informational	
	Event description: Successful login through Web authenticated by AAA none method. Log Message: Successful login through Web from <userIP> authenticated by AAA none method (Username: <username>). Parameters description: userIP: IP address username: user name.	Informational	
	Event description: Successful login through Web(SSL) authenticated by AAA none method Log Message: Successful login through Web(SSL) from <userIP> authenticated by AAA none method (Username: <username>). Parameters description: userIP: IP address username: user name.	Informational	
	Event description: Successful login through Telnet authenticated by AAA none method. Log Message: Successful login through Telnet from <userIP> authenticated by AAA none method (Username: <username>). Parameters description: userIP: IP address	Informational	

	username: user name.		
	<p>Event description: Successful login through SSH authenticated by AAA none method</p> <p>Log Message: Successful login through SSH from <userIP> authenticated by AAA none method (Username: <username>).</p> <p>Parameters description: userIP: IP address username: user name.</p>	Informational	
	<p>Event description: Successful login through Console authenticated by AAA server. There are no IP and MAC if login by console.</p> <p>Log Message: Successful login through Console authenticated by AAA server <serverIP> (Username: <username>).</p> <p>Parameters description: serverIP: Server IP address username: user name.</p>	Informational	
	<p>Event description: Login failed through Console authenticated by AAA server. There are no IP and MAC if login by console.</p> <p>Log Message: Login failed through Console authenticated by AAA server <serverIP> (Username: <username>).</p> <p>Parameters description: serverIP: Server IP address username: user name.</p>	Warning	
	<p>Event description: Login failed through Console due to AAA server timeout or improper configuration</p> <p>Log Message: Login failed through Console due to AAA server timeout or improper configuration (Username: <username>).</p> <p>Parameters description: username: user name.</p>	Warning	
	<p>Event description: Successful login through Web authenticated by AAA server.</p> <p>Log Message: Successful login through Web from <userIP> authenticated by AAA server <serverIP> (Username: <username>).</p> <p>Parameters description: userIP: IP address serverIP: Server IP address username: user name.</p>	Informational	
	<p>Event description: Login failed through Web authenticated by AAA server.</p> <p>Log Message: Login failed through Web from <userIP> authenticated by AAA server <serverIP> (Username: <username>).</p> <p>Parameters description: userIP: IP address serverIP: Server IP address username: user name.</p>	Warning	
	<p>Event description: Login failed through Web due to AAA server timeout or improper configuration.</p> <p>Log Message: Login failed through Web from <userIP> due to AAA server timeout or improper configuration (Username: <username>).</p> <p>Parameters description: userIP: IP address username: user name.</p>	Warning	
	<p>Event description: Successful login through Web(SSL) authenticated by AAA server.</p> <p>Log Message: Successful login through Web(SSL) from <userIP> authenticated by AAA server <serverIP> (Username: <username>).</p> <p>Parameters description: userIP: IP address</p>	Informational	

	serverIP: Server IP address username: user name.		
	Event description: Login failed through Web(SSL) authenticated by AAA server. Log Message: Login failed through Web(SSL) from <userIP> authenticated by AAA server <serverIP> (Username: <username>). Parameters description: userIP: IP address serverIP: Server IP address username: user name.	Warning	
	Event description: Login failed through Web(SSL) due to AAA server timeout or improper configuration. Log Message: Login failed through Web(SSL) from <userIP> due to AAA server timeout or improper configuration (Username: <username>). Parameters description: userIP: IP address username: user name.	Warning	
	Event description: Successful login through Telnet authenticated by AAA server. Log Message: Successful login through Telnet from <userIP> authenticated by AAA server <serverIP> (Username: <username>). Parameters description: userIP: IP address serverIP: Server IP address username: user name.	Informational	
	Event description: Login failed through Telnet authenticated by AAA server. Log Message: Login failed through Telnet from <userIP> authenticated by AAA server <serverIP> (Username: <username>). Parameters description: userIP: IP address serverIP: Server IP address username: user name.	Warning	
	Event description: Login failed through Telnet due to AAA server timeout or improper configuration. Log Message: Login failed through Telnet from <userIP> due to AAA server timeout or improper configuration (Username: <username>). Parameters description: userIP: IP address username: user name.	Warning	
	Event description: Successful login through SSH authenticated by AAA server. Log Message: Successful login through SSH from <userIP> authenticated by AAA server <serverIP> (Username: <username>). Parameters description: userIP: IP address serverIP: Server IP address username: user name.	Informational	
	Event description: Login failed through SSH authenticated by AAA server. Log Message: Login failed through SSH from <userIP> authenticated by AAA server <serverIP> (Username: <username>). Parameters description: userIP: IP address serverIP: Server IP address username: user name.	Warning	
	Event description: Login failed through SSH due to AAA server timeout or improper configuration. Log Message: Login failed through SSH from <userIP> due to AAA server	Warning	

	timeout or improper configuration (Username: <username>). Parameters description: userIP: IP address username: user name.		
	Event description: Successful Enable Admin through Console authenticated by AAA local_enable method. Log Message: Successful Enable Admin through Console authenticated by AAA local_enable method (Username: <username>). Parameters description: username: user name.	Informational	
	Event description: Enable Admin failed through Console authenticated by AAA local_enable method. Log Message: Enable Admin failed through Console authenticated by AAA local_enable method (Username: <username>). Parameters description: username: user name.	Warning	
	Event description: Successful Enable Admin through Web authenticated by AAA local_enable method. Log Message: Successful Enable Admin through Web from <userIP> authenticated by AAA local_enable method (Username: <username>). Parameters description: userIP: IP address username: user name.	Informational	
	Event description: Enable Admin failed through Web authenticated by AAA local_enable method. Log Message: Enable Admin failed through Web from <userIP> authenticated by AAA local_enable method (Username: <username>). Parameters description: userIP: IP address username: user name.	Warning	
	Event description: Successful Enable Admin through Web(SSL) authenticated by AAA local_enable method. Log Message: Successful Enable Admin through Web(SSL) from <userIP> authenticated by AAA local_enable method (Username: <username>.). Parameters description: userIP: IP address username: user name.	Informational	
	Event description: Enable Admin failed through Web(SSL) authenticated by AAA local_enable method. Log Message: Enable Admin failed through Web(SSL) from <userIP> authenticated by AAA local_enable method (Username: <username>). Parameters description: userIP: IP address username: user name.	Warning	
	Event description: Successful Enable Admin through Telnet authenticated by AAA local_enable method. Log Message: Successful Enable Admin through Telnet from <userIP> authenticated by AAA local_enable method (Username: <username>). Parameters description: userIP: IP address username: user name.	Informational	
	Event description: Enable Admin failed through Telnet authenticated by AAA local_enable method. Log Message: Enable Admin failed through Telnet from <userIP> authenticated by AAA local_enable method (Username: <username>) Parameters description:	Warning	

	<p>userIP: IP address username: user name.</p>		
	<p>Event description: Successful Enable Admin through SSH authenticated by AAA local_enable method. Log Message: Successful Enable Admin through SSH from <userIP> authenticated by AAA local_enable method (Username: <username>)</p> <p>Parameters description: userIP: IP address username: user name.</p>	Informational	
	<p>Event description: Enable Admin failed through SSH authenticated by AAA local_enable method. Log Message: Enable Admin failed through <Telnet or Web or SSH> from <userIP> authenticated by AAA local_enable method (Username: <username>)</p> <p>Parameters description: userIP: IP address username: user name.</p>	Warning	
	<p>Event description: Successful Enable Admin through Console authenticated by AAA none method. Log Message: Successful Enable Admin through Console authenticated by AAA none method (Username: <username>)</p> <p>Parameters description: username: user name.</p>	Informational	
	<p>Event description: Successful Enable Admin through Web authenticated by AAA none method Log Message: Successful Enable Admin through Web from <userIP> authenticated by AAA none method (Username: <username>)</p> <p>Parameters description: userIP: IP address username: user name.</p>	Informational	
	<p>Event description: Successful Enable Admin through Web(SSL) authenticated by AAA none method Log Message: Successful Enable Admin through Web(SSL) from <userIP> authenticated by AAA none method (Username: <username>)</p> <p>Parameters description: userIP: IP address username: user name.</p>	Informational	
	<p>Event description: Successful Enable Admin through Telnet authenticated by AAA none method Log Message: Successful Enable Admin through Telnet from <userIP> authenticated by AAA none method (Username: <username>)</p> <p>Parameters description: userIP: IP address username: user name.</p>	Informational	
	<p>Event description: Successful Enable Admin through SSH authenticated by AAA none method Log Message: Successful Enable Admin through SSH from <userIP> authenticated by AAA none method (Username: <username>)</p> <p>Parameters description: userIP: IP address username: user name.</p>	Informational	
	<p>Event description: Successful Enable Admin through Console authenticated by AAA server Log Message: Successful Enable Admin through Console authenticated by AAA server <serverIP> (Username: <username>)</p> <p>Parameters description: serverIP: IP address</p>	Informational	

	username: user name.		
	<p>Event description: Enable Admin failed through Console authenticated by AAA server</p> <p>Log Message: Enable Admin failed through Console authenticated by AAA server <serverIP> (Username: <username>)</p> <p>Parameters description: serverIP: IP address username: user name.</p>	Warning	
	<p>Event description: Enable Admin failed through Console due to AAA server timeout or improper configuration</p> <p>Log Message: Enable Admin failed through Console due to AAA server timeout or improper configuration (Username: <username>)</p> <p>Parameters description: username: user name.</p>	Warning	
	<p>Event description: Successful Enable Admin through Web authenticated by AAA server</p> <p>Log Message: Successful Enable Admin through Web from <userIP> authenticated by AAA server <serverIP> (Username: <username>)</p> <p>Parameters description: userIP: user IP address serverIP: server IP address. username: user name.</p>	Informational	
	<p>Event description: Enable Admin failed through Web authenticated by AAA server.</p> <p>Log Message: Enable Admin failed through Web from <userIP> authenticated by AAA server <serverIP> (Username: <username>)</p> <p>Parameters description: userIP: user IP address serverIP: server IP address. username: user name.</p>	Warning	
	<p>Event description: Enable Admin failed through Web due to AAA server timeout or improper configuration.</p> <p>Log Message: Enable Admin failed through Web from <userIP> due to AAA server timeout or improper configuration (Username: <username>)</p> <p>Parameters description: userIP: user IP address username: user name.</p>	Warning	
	<p>Event description: Successful Enable Admin through Web(SSL) authenticated by AAA server.</p> <p>Log Message: Successful Enable Admin through Web(SSL) from <userIP> authenticated by AAA server <serverIP> (Username: <username>)</p> <p>Parameters description: userIP: user IP address serverIP: server IP address. username: user name.</p>	Informational	
	<p>Event description: Enable Admin failed through Web(SSL) authenticated by AAA server.</p> <p>Log Message: Enable Admin failed through Web(SSL) from <userIP> authenticated by AAA server <serverIP> (Username: <username>)</p> <p>Parameters description: userIP: user IP address serverIP: server IP address. username: user name.</p>	Warning	
	<p>Event description: Enable Admin failed through Web(SSL) due to AAA server timeout or improper configuration.</p> <p>Log Message: Enable Admin failed through Web(SSL) from <userIP> due to AAA server timeout or improper configuration (Username: <username>)</p>	Warning	

	Parameters description: userIP: user IP address username: user name.		
	Event description: Successful Enable Admin through Telnet authenticated by AAA server. Log Message: Successful Enable Admin through Telnet from <userIP> authenticated by AAA server <serverIP> (Username: <username>) Parameters description: userIP: user IP address serverIP: server IP address. username: user name.	Informational	
	Event description: Enable Admin failed through Telnet authenticated by AAA server. Log Message: Enable Admin failed through Telnet from <userIP> authenticated by AAA server <serverIP> (Username: <username>) Parameters description: userIP: user IP address serverIP: server IP address. username: user name.	Warning	
	Event description: Enable Admin failed through Telnet due to AAA server timeout or improper configuration. Log Message: Enable Admin failed through Telnet from <userIP> due to AAA server timeout or improper configuration (Username: <username>) Parameters description: userIP: user IP address username: user name.	Warning	
	Event description: Successful Enable Admin through SSH authenticated by AAA server. Log Message: Successful Enable Admin through SSH from <userIP> authenticated by AAA server <serverIP> (Username: <username>) Parameters description: userIP: user IP address serverIP: server IP address. username: user name.	Informational	
	Event description: Enable Admin failed through SSH authenticated by AAA server. Log Message: Enable Admin failed through SSH from <userIP> authenticated by AAA server <serverIP> (Username: <username>) Parameters description: userIP: user IP address serverIP: server IP address. username: user name.	Warning	
	Event description: Enable Admin failed through SSH due to AAA server timeout or improper configuration. Log Message: Enable Admin failed through SSH from <userIP> due to AAA server timeout or improper configuration (Username: <username>) Parameters description: userIP: user IP address serverIP: server IP address. username: user name.	Warning	
	Event description: AAA server timed out. Log Message: AAA server <serverIP> (Protocol: <protocol>) connection failed Parameters description: serverIP: server IP address. protocol: protocol value (it is one of TACACS, XTACACS, TACACS+, RADIUS).	Warning	

	<p>Event description: AAA server ACK error. Log Message: AAA server <serverIP> (Protocol: <protocol>) response is wrong</p> <p>Parameters description: serverIP: server IP address. protocol: protocol value (it is one of TACACS, XTACACS, TACACS+, RADIUS).</p>	Warning	
	<p>Event description: AAA does not support this functionality. Log Message: AAA doesn't support this functionality.</p> <p>Parameters description: None</p>	Informational	
	<p>Event description: Authentication Policy is enabled Log Message: Authentication Policy is enabled (Module: AAA)</p>	Informational	
	<p>Event description: Authentication Policy is disabled Log Message: Authentication Policy is disabled (Module: AAA)</p>	Informational	
Port Security	<p>Event description: port security is exceeded to its maximum learning size and will not learn any new address Log Message: Port security violation (Port: <portNum>, MAC: <macaddr>)</p> <p>Parameters description: macaddr: The violation MAC address. portNum: The port number.</p>	Warning	
IMPB	<p>Event description: Dynamic IMPB entry is conflicting with static ARP Log Message: Dynamic IMPB entry is conflicting with static ARP(IP: <ipaddr>, MAC: <macaddr>, Port <portNum>)</p> <p>Parameters description: ipaddr: IP address macaddr: MAC address portNum : The port number</p>	Warning	
	<p>Event description: Dynamic IMPB entry is conflicting with static FDB. Log Message: Dynamic IMPB entry is conflicting with static FDB(IP: <ipaddr>, MAC: <macaddr>, Port <portNum>)</p> <p>Parameters description: ipaddr: IP address macaddr: MAC address portNum : The port number</p>	Warning	
	<p>Event description: Dynamic IMPB entry conflicts with static IMPB. Log Message: Dynamic IMPB entry is conflicting with static IMPB(IP: <ipaddr>, MAC: <macaddr>, Port <portNum>).</p> <p>Parameters description: ipaddr: IP address macaddr: MAC address portNum : The port number</p>	Warning	
	<p>Event description: Creating IMPB entry failed due to no ACL rule available. Log Message: Creating IMPB entry Failed due to no ACL rule available(IP:<ipaddr>, MAC: <macaddr>, Port <portNum>)</p> <p>Parameters description: ipaddr: IP address macaddr: MAC address portNum : The port number</p>	Warning	
	<p>Event description: The number of blocked entries reaches the threshold. Log Message: Port <portNum> IMPB stop learning state.</p> <p>Parameters description: unitID: The unit ID portNum : The port number</p>	Warning	

	<p>Event description: User manually recover from IMPB stop learning state. Log Message: Port <portNum> IMPB normal state.</p> <p>Parameters description: portNum : The port number</p>	Warning	
	<p>Event description: Unauthenticated IP address encountered and discarded by ip IP-MAC port binding I. Log Message: Unauthenticated IP-MAC address and discarded by ip mac port binding (IP: < ipaddr >], MAC :< macaddr >, Port <portNum >).</p> <p>Parameters description: ipaddr: IP address macaddr: MAC address portNum : The port number</p>	Warning	
BPDU Attack Protection	<p>Event description: BPDU attack happened. Log Message: Port <portNum> enter BPDU under protection state (mode: drop block shutdown)</p> <p>Parameters description: portNum : The port number drop / block / shutdown: There only one of they in a log entry.</p>	Informational	
	<p>Event description: BPDU attack automatically recover. Log Message: Port <portNum > recover from BPDU under protection state automatically</p> <p>Parameters description: unitID: The unit ID portNum : The port number</p>	Informational	
	<p>Event description: BPDU attack manually recover. Log Message: Port <portNum > recover from BPDU under protection state manually</p> <p>Parameters description: unitID: The unit ID portNum : The port number</p>	Informational	
WAC	<p>Event description: When a client host fail to authenticate. Log Message: WAC unauthenticated user (Username: <string>, IP: <ipaddr>, MAC: <macaddr>, Port: <portNum>)</p> <p>Parameters description: string: Username ipaddr: IP address macaddr: MAC address portNum : The port number</p>	Warning	
	<p>Event description: This log will be triggered when the authorized user number reaches the max user limit on whole device. It is based on per-system. Log Message: WAC enters stop learning state.</p>	Warning	
	<p>Event description: This log will be triggered when the authorized user number is below the max user limit on whole device in a time interval (interval is project depended). It is based on per-system. Log Message: WAC recovers from stop learning state.</p>	Warning	
LBD	<p>Event Description: Loop back is detected under port-based mode. Log Message: Port < portNum> LBD loop occurred. Port blocked.</p> <p>Parameters Description: portNum: The port number.</p>	Critical	
	<p>Event Description: Port loop detection restarted after interval time. Log Message: Port< portNum> LBD port recovered. Loop detection restarted</p> <p>Parameters Description: portNum: The port number.</p>	Informational	

	<p>Event Description: Loop back is detected under VLAN-based mode. Log Message: Port <portNum> VID <vlanID> LBD loop occurred. Packet discard begun</p> <p>Parameters Description: portNum: The port number. vlanID: the VLAN ID number.</p>	Critical	
	<p>Event Description: Port recovered from LBD blocked state under VLAN-based mode. Log Message: Port < portNum> VID <vlanID> LBD recovered. Loop detection restarted</p> <p>Parameters Description: portNum: The port number. vlanID: the VLAN ID number.</p>	Informational	
Traffic Control	<p>Event description: Broadcast storm occurrence. Log Message: Port <portNum> Broadcast storm is occurring.</p> <p>Parameters description: portNum: The port number.</p>	Warning	
	<p>Event description: Broadcast storm cleared. Log Message: Port <portNum> Broadcast storm has cleared.</p> <p>Parameters description: portNum: The port number.</p>	Informational	
	<p>Event description: Multicast storm occurrence. Log Message: Port <portNum> Multicast storm is occurring.</p> <p>Parameters description: portNum: The port number.</p>	Warning	
	<p>Event description: Multicast Storm cleared. Log Message: Port <portNum> Multicast storm has cleared.</p> <p>Parameters description: portNum: The port number.</p>	Informational	
	<p>Event description: Port shut down due to a packet storm Log Message: Port <portNum> is currently shut down due to a packet storm</p> <p>Parameters description: portNum: The port number.</p>	Warning	
SafeGuard	<p>Event description: Safeguard Engine is in normal mode Log Message: Safeguard Engine enters NORMAL mode</p>	Informational	
	<p>Event description: Safeguard Engine is in filtering packet mode Log Message: Safeguard Engine enters EXHAUSTED mode</p>	Warning	
IP and Password Changed	<p>Event description: IP Address change activity Log Message: Management IP address was changed by console (Username: <username>)</p> <p>Parameters description: username: user name.</p>	Informational	
	<p>Event description: Password change activity Log Message: Password was changed by console (Username: <username>)</p> <p>Parameters description: username: user name.</p>	Informational	
DoS Attack	<p>Event description: Spoofing attack: 1. The source ip is same as switch's interface ip but the source mac is different 2. Source ip is the same as the switch's IP in ARP packet 3. Self IP packet detected Log Message: Possible spoofing attack from IP: <ipaddr>, MAC: <macaddr>, port: <portNum></p>	Critical	

	<p>Parameters description: ipaddr: IP address macaddr: MAC address portNum : The port number</p>		
DHCP Server Screening	<p>Event description: Detected untrusted DHCP server IP address. Log Message: Detected untrusted DHCP server(IP: <ipaddr>, Port <portNum>)</p> <p>Parameters description: ipaddr: The untrusted IP address which has been detected with our device. portNum : Represent the logic port number of the device.</p>	Informational	
DHCPv6 Client	<p>Event description: DHCPv6 client interface administrator state changed. Log Message: [DHCPv6_CLIENT(1):]DHCPv6 client on interface <intf-name> changed state to <enabled disabled></p> <p>Parameters description: intf-name: interface name. enabled disabled: enabled or disabled.</p>	Informational	
	<p>Event description: DHCPv6 client obtains an ipv6 address from a DHCPv6 server. Log Message: [DHCPv6_CLIENT(2):]DHCPv6 client obtains an ipv6 address < ipv6address > on interface <intf-name></p> <p>Parameters description: ipv6address: IPv6 address. intf-name: interface name.</p>	Informational	
	<p>Event description: The IPv6 address obtained from a DHCPv6 server starts renewing. Log Message: [DHCPv6_CLIENT(3):]The IPv6 address < ipv6address > on interface <intf-name> starts renewing.</p> <p>Parameters description: ipv6address: IPv6 address. intf-name: interface name.</p>	Informational	
	<p>Event description: The IPv6 address obtained from a DHCPv6 server renews success. Log Message: [DHCPv6_CLIENT(4):]The IPv6 address < ipv6address > on interface <intf-name> renews success.</p> <p>Parameters description: ipv6address: IPv6 address. intf-name: interface name.</p>	Informational	
	<p>Event description: The IPv6 address obtained from a DHCPv6 server starts rebinding. Log Message: [DHCPv6_CLIENT(5):]The IPv6 address < ipv6address > on interface <intf-name> starts rebinding.</p> <p>Parameters description: ipv6address: IPv6 address. intf-name: interface name.</p>	Informational	
	<p>Event description: The IPv6 address obtained from a DHCPv6 server rebinds success Log Message: [DHCPv6_CLIENT(6):]The IPv6 address < ipv6address > on interface <intf-name> rebinds success.</p> <p>Parameters description: ipv6address: IPv6 address. intf-name: interface name.</p>	Informational	
	<p>Event description: The IPv6 address from a DHCPv6 server was deleted. Log Message: [DHCPv6_CLIENT(7):]The IPv6 address < ipv6address > on interface <intf-name> was deleted.</p> <p>Parameters description:</p>	Informational	

	ipv6address: IPv6 address. intf-name: interface name.		
Command	Event description: User execute a command. Log Message: <Username>: execute command " <command>" Parameters description: Username: user name. command: command string..	Informational	
External Alarm	Event description: External Alarm. Log Message: External Alarm Channel <channel_id> : <alarm_message> Parameters description: channel_id:channel id. alarm_message:alarm message	Critical	

Appendix C Trap Entries

This table lists the trap logs found on the Switch.

Category	Trap Name	Description	Note
SNMP	coldStart/1.3.6.1.6.3.1.1.5.1	A coldStart trap signifies that the SNMP entity, supporting a notification originator application, is reinitializing itself and that its configuration may have been altered.	(RFC1907 SNMPv2-MIB)
	warmStart/1.3.6.1.6.3.1.1.5.2	A warmStart trap signifies that the SNMP entity, supporting a notification originator application, is initializing itself such that its configuration is unaltered.	(RFC1907 SNMPv2-MIB)
	linkDown/1.3.6.1.6.3.1.1.5.3	A linkDown trap signifies that the SNMP entity, acting in an agent role, has detected that the ifOperStatus object for one of its communication links is about to enter the down state from some other state. This other state is indicated by the included value of ifOperStatus. Binding objects: (1)ifIndex (2)ifAdminStatus (3)ifOperStatus	(RFC2233 IF-MIB)
	linkUp/1.3.6.1.6.3.1.1.5.4	A linkUp trap signifies that the SNMP entity, acting in an agent role, has detected that the ifOperStatus object for one of its communication links left the down state and transitioned into some other state. This other state is indicated by the included value of ifOperStatus. Binding objects: (1)ifIndex (2)ifAdminStatus (3)ifOperStatus	(RFC2233 IF-MIB)
	authenticationFailure/1.3.6.1.6.3.1.1.5.5	An authenticationFailure trap signifies that the SNMP entity has received a protocol message that is not properly authenticated.	(RFC1907 SNMPv2-MIB)
BRIDGE-MIB	newRoot/1.3.6.1.2.1.17.0.1	The newRoot trap indicates that the sending agent has become the new root of the Spanning Tree	
	topologyChange/1.3.6.1.2.1.17.0.2	A topologyChange trap is sent by a bridge when any of its configured ports transitions from the learning state to the forwarding state, or from the forwarding state to the blocking state.	
OAM	dot3OamNonThresholdEvent/1.3.6.1.2.1.158.0.2	A dot3OamNonThresholdEvent notification is sent when a local or remote non-threshold crossing event is detected. A local event is detected by the local entity, while a remote event is detected by the reception of an Ethernet OAM Event Notification OAMPDU that indicates a non-threshold crossing event. Binding objects: (1)dot3OamEventLogTimestamp (2)dot3OamEventLogOui (3)dot3OamEventLogType(only support the value: dyingGaspEvent(257)) (4)dot3OamEventLogLocation (5)dot3OamEventLogEventTotal	(ie8023ah.mib)
MAC-based Access Control	swMacBasedAccessControlLoggedSuccess/1.3.6.1.4.1.171.12.35.11.1.0.1	The trap is sent when a MAC-based Access Control host is successfully logged in. Binding objects: (1) swMacBasedAuthInfoMacIndex (2) swMacBasedAuthInfoPortIndex (3) swMacBasedAuthVID	
	swMacBasedAccessControlLoggedFail/1.3.6.1.4.1.171.12.35.11.1.0.2	The trap is sent when a MAC-based Access Control host login fails. Binding objects:	

		(1) swMacBasedAuthInfoMacIndex (2) swMacBasedAuthInfoPortIndex (3) swMacBasedAuthVID	
	swMacBasedAccessControlAgesOut/ 1.3.6.1.4.1.171.12.35.11.1.0.3	The trap is sent when a MAC-based Access Control host ages out. Binding objects: (1) swMacBasedAuthInfoMacIndex (2) swMacBasedAuthInfoPortIndex (3) swMacBasedAuthVID	
RMON (RFC2819.mib)	risingAlarm/1.3.6.1.2.1.16.0.1	The SNMP trap that is generated when an alarm entry crosses its rising threshold and generates an event that is configured for sending SNMP traps. Binding objects: (1)alarmIndex, (2)alarmVariable (3)alarmSampleType, (4)alarmValue, (5)alarmRisingThreshold	
	fallingAlarm/1.3.6.1.2.1.16.0.2	The SNMP trap that is generated when an alarm entry crosses its falling threshold and generates an event that is configured for sending SNMP traps. Binding objects: (1)alarmIndex, (2)alarmVariable (3)alarmSampleType, (4)alarmValue, (5)alarmFallingThreshold	
LLDP (lldp.mib)	lldpRemTablesChange/1.0.8802.1.1.2.0.0.1	A lldpRemTablesChange notification is sent when the value of lldpStatsRemTableLastChangeTime changes. It can be utilized by an NMS to trigger LLDP remote systems table maintenance polls. Binding objects: (1)lldpStatsRemTablesInserts, (2)lldpStatsRemTablesDeletes, (3)lldpStatsRemTablesDrops, (4)lldpStatsRemTablesAgeouts	
LLDP-MED	lldpXMedTopologyChangeDetected/1.0.8802.1.1.2.1.5.4795.0.1	A notification generated by the local device sensing a change in the topology that indicates that a new remote device attached to a local port, or a remote device disconnected or moved from one port to another. Binding objects: (1) lldpRemChassisIdSubtype (2) lldpRemChassisId (3) lldpXMedRemDeviceClass	
Port Security	swL2PortSecurityViolationTrap/1.3.6.1.4.1.171.11.115.1.2.2.100.1.2.0.2	When the port security trap is enabled, new MAC addresses that violate the pre-defined port security configuration will trigger trap messages to be sent out. Binding objects: (1)swPortSecPortIndex (2)swL2PortSecurityViolationMac	
FDB	swL2macNotification/ 1.3.6.1.4.1.171.11.102.1.5.2.100.1.2.0.1	This trap indicates the MAC addresses variation in address table Binding objects: (1)swL2macNotifyInfo	
Peripherals	swPowerStatusChg/ /1.3.6.1.4.1.171.12.11.2.2.2.0.1	Power Status change notification. The notification is issued Binding objects: (1) swPowerUnitIndex (2). SwPowerID (3). swPowerStatus	
	SwFanFailure/ 1.3.6.1.4.1.171.12.11.2.2.3.0.1	Fan Failure notification. Binding objects: (1).swFanUnitIndex	

		(2). swFanID	
	SwFanRecover/ /1.3.6.1.4.1.171.12.11.2.2.3.0.2	Fan Recover notification. Binding objects: (1).swFanUnitIndex (2). swFanID	
	swHighTemperature/ /1.3.6.1.4.1.171.12.11.2.2.4.0.1	When Temperature High. Binding objects: (1) swTemperatureUnitIndex (2) swTemperSensorID (3) swTemperatureCurrent	
	swHighTemperatureRecover /1.3.6.1.4.1.171.12.11.2.2.4.0.2	When Temperature recover from High. Binding objects: (1) swTemperatureUnitIndex (2) swTemperSensorID (3) swTemperatureCurrent	
	swLowTemperature /1.3.6.1.4.1.171.12.11.2.2.4.0.3	When Temperature Low. Binding objects: (1) swTemperatureUnitIndex (2) swTemperSensorID (3) swTemperatureCurrent	
	swLowTemperatureRecover/ /1.3.6.1.4.1.171.12.11.2.2.4.0.4	When Temperature recover from Low. Binding objects: (1) swTemperatureUnitIndex (2) swTemperSensorID (3) swTemperatureCurrent	
	SwExternalAlarm/ 1.3.6.1.4.1.171.12.11.2.2.5.0.1	The notice of an Alarm in the specified channel. Binding objects: (1). swExternalAlarmChannel (2). swExternalAlarmMessage	
SafeGuard	swSafeGuardChgToExhausted /1.3.6.1.4.1.171.12.19.4.1.0.1	This trap indicates System change operation mode from normal to exhausted. Binding objects: (1) swSafeGuardCurrentStatus	
	swSafeGuardChgToNormal /1.3.6.1.4.1.171.12.19.4.1.0.2	This trap indicates System change operation mode from exhausted to normal. Binding objects: (1) swSafeGuardCurrentStatus	
Traffic Control	swPktStormOccurred/ /1.3.6.1.4.1.171.12.25.5.0.1	This trap is sent when a packet storm is detected by a packet storm mechanism and a shutdown action is taken. Binding objects: (1) swPktStormCtrlPortIndex	
	swPktStormCleared /1.3.6.1.4.1.171.12.25.5.0.2	The trap is sent when the packet storm is cleared by the packet storm mechanism. Binding objects: (1) swPktStormCtrlPortIndex	
IMPB	swlpMacBindingViolation Trap/ /1.3.6.1.4.1.171.12.23.5.0.1	When the IMPB trap is enabled, if there's a new MAC that violates the predefined port security configuration, a trap will be sent out. Binding objects: swlpMacBindingPortIndex swlpMacBindingViolationIP swlpMacBindingViolationMac	
	swlpMacBindingStop LearningTrap /1.3.6.1.4.1.171.12.23.5.0.2	When the IMPB trap is enabled, if the specific port changes from a normal state to a stop_learning state, a trap will be sent out. Binding objects: (1) swlpMacBindingPortIndex	
	swlpMacBindingRecover LearningTrap/ /1.3.6.1.4.1.171.12.23.5.0.3	When the IMPB trap is enabled, if the specific port changes from a stop_learning state to a normal state, a trap will be sent out. Binding objects: (1) swlpMacBindingPortIndex	

DDM	swDdmAlarmTrap/1.3.6.1.4.1.171.12.72.4.0.1	The trap is sent when any parameter value exceeds the alarm threshold value, depending on the configuration of the trap_log action. Binding objects: (1) swDdmPort (2) swDdmThresholdType (3) swDdmThresholdExceedType (4) swDdmThresholdExceedOrRecover	
	swDdmWarningTrap/1.3.6.1.4.1.171.12.72.4.0.2	The trap is sent when any parameter value exceeds the warning threshold value, depending on the configuration of the trap_log action. Binding objects: (1)swDdmPort (2)swDdmThresholdType (3)swDdmThresholdExceedType (4) swDdmThresholdExceedOrRecover	
DHCP Server Screening	swFilterDetectedTrap /1.3.6.1.4.1.171.12.37.100.0.1	Send trap when an illegal DHCP server is detected. The same illegal DHCP server IP address detected is just sent once to the trap receivers within the log ceasing unauthorized duration. Binding objects: (1) swFilterDetectedIP (2) swFilterDetectedport	
LBD	swPortLoopOccurred /1.3.6.1.4.1.171.12.41.10.0.1	The trap is sent when a port loop occurs. Binding objects: (1) swLoopDetectPortIndex	
	swPortLoopRestart /1.3.6.1.4.1.171.12.41.10.0.2	The trap is sent when a port loop restarts after the interval time. Binding objects: (1) swLoopDetectPortIndex	
	swVlanLoopOccurred /1.3.6.1.4.1.171.12.41.10.0.3	The trap is sent when a port loop occurs under LBD VLAN-based mode. Binding objects: (1) swLoopDetectPortIndex (2) swVlanLoopDetectVID	
	swVlanLoopRestart /1.3.6.1.4.1.171.12.41.10.0.4	The trap is sent when a port loop restarts under LBD VLAN-based mode after the interval time. Binding objects: (1) swLoopDetectPortIndex (2) swVlanLoopDetectVID	
BPDU Attack Protection	swBpduProtectionUnderAttackingTrap /1.3.6.1.4.1.171.12.76.4.0.1	When the BPDU Protection trap is enabled, if the specific port changes from a normal state to an under attack state, a trap will be sent out. Binding objects: (1)swBpduProtectionPortIndex (2)swBpduProtectionPortMode	
	swBpduProtectionRecoveryTrap /1.3.6.1.4.1.171.12.76.4.0.2	When the BPDU Protection trap is enabled, if the specific port changes from an under attack state to a normal state, a trap will be sent out. Binding objects: (1)swBpduProtectionPortIndex (2)swBpduProtectionRecoveryMethod	
ERPS	swERPSSFDetectedTrap /1.3.6.1.4.1.171.12.78.4.0.1	When a signal failure occurs, a trap will be generated. Binding objects: (1)swERPSNodeId	
	swERPSSFClearedTrap /1.3.6.1.4.1.171.12.78.4.0.2	When the signal failure clears, a trap will be generated. Binding objects: (1)swERPSNodeId	
	swERPSPRPOwnerConflictTrap /1.3.6.1.4.1.171.12.78.4.0.3	When a conflict occurs, a trap will be generated. Binding objects: (1)swERPSNodeId	

CFM	dot1agCfmFaultAlarm /1.3.111.2.802.1.1.8.0.1	A MEP has a persistent defect condition. A notification (fault alarm) is sent to the management entity with the OID of the MEP that has detected the fault. Binding objects: (1) dot1agCfmMdIndex (2) dot1agCfmMaIndex (3) dot1agCfmMepIdentifier (4)dot1agCfmMepHighestPrDefect	
CFM Extension	swCFMExtAISOccurred / 1.3.6.1.4.1.171.12.86.100.0.1	A notification is generated when local MEP enters AIS status Binding objects: (1).dot1agCfmMdIndex (2). dot1agCfmMaIndex (3). dot1agCfmMepIdentifier	
	swCFMExtAISCleared / 1.3.6.1.4.1.171.12.86.100.0.2	A notification is generated when local MEP exits AIS status. Binding objects: (1).dot1agCfmMdIndex (2). dot1agCfmMaIndex (3). dot1agCfmMepIdentifier	
	swCFMExtLockOccurred / 1.3.6.1.4.1.171.12.86.100.0.3	A notification is generated when local MEP enters lock status Binding objects: (1).dot1agCfmMdIndex (2). dot1agCfmMaIndex (3). dot1agCfmMepIdentifier	
	swCFMExtLockCleared / 1.3.6.1.4.1.171.12.86.100.0.4	A notification is generated when local MEP exits lock status. Binding objects: (1).dot1agCfmMdIndex (2). dot1agCfmMaIndex (3). dot1agCfmMepIdentifier	
Power	swL2DyingGaspPowerLost / 1.3.6.1.4.1.171.11.102.1.5.2.100.1.2.0 .7 (DGS-3710-12c)	OAM dying gasp event occurred on device when the power lost. Binding objects: (1). swL2DyingGaspMac	
Firmware Updates	agentFirmwareUpgrade /1.3.6.1.4.1.171.12.1.7.2.0.7	This trap is sent when upgrade firmware via SNMP is finished. Binding objects: (1). swMultimageVersion	