D-Link ™ DGS-3224TGR

Managed 24-Port Gigabit Ethernet Switch

User's Guide

Information in this document is subject to change without notice.

FCC Warning

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

CE Mark Warning

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

Warnung!

Dies ist ein Produkt der Klasse A. Im Wohnbereich kann dieses Produkt Funkstoerungen verursachen. In diesem Fall kann vom Benutzer verlangt werden, angemessene Massnahmen zu ergreifen.

Precaución!

Este es un producto de Clase A. En un entorno doméstico, puede causar interferencias de radio, en cuyo case, puede requerirse al usuario para que adopte las medidas adecuadas.

Attention!

Ceci est un produit de classe A. Dans un environnement domestique, ce produit pourrait causer des interférences radio, auquel cas l`utilisateur devrait prendre les mesures adéquates.

Attenzione!

Il presente prodotto appartiene alla classe A. Se utilizzato in ambiente domestico il prodotto può causare interferenze radio, nel cui caso è possibile che l`utente debba assumere provvedimenti adeguati.

VCCI Warning

この装置は、クラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

September 2004 P/N 6GS3224TGR03

Table of Contents

Preface

The *DGS-3224TGR User’s Guide* is divided into chapters that describe the system installation and operating instructions with examples.

Chapter 1, *“Introduction”* – Describes the Switch and its features.

Chapter 2, *“Unpacking and Setup”* – Helps you get started with the basic installation of the Switch.

Chapter 3, *“Identifying External Components”* – Describes the front panel, rear panel, and LED indicators of the Switch.

Chapter 4, *“Connecting the Switch”* – Tells how you can connect the DGS-3224TGR to your Gigabit Ethernet network.

Chapter 5, *“Switch Management and Operating Concepts”* – Talks about management via the RS-232 DCE console port and other aspects about how to manage the Switch.

Chapter 6, *“Web-Based Network Management”* – Tells how to manage the Switch through an Internet browser.

Chapter 7, *“D-Link’s Single IP Management”* – An introduction to the new D-Link switch management feature used to manage multiple switches through a single Switch.

Appendix A, *“Technical Specifications”* – Lists the technical specifications of the DGS-3224TGR.

Appendix B, *“Cable Lengths”* – Contains chart for fiber-optic and copper cable maximum distances.

Glossary – Lists definitions for terms and acronyms used in this document.

Intended Readers

The *DGS-3224TGR User’s Guide* contains information for setup and management and of the DGS-3224TGR switch. This guide is intended for network managers familiar with network management concepts and terminology.

Notes, Notices, and Cautions

NOTE: A NOTE indicates important information that helps you make better use of your device.

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

⚠ **CAUTION:** 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 you need to review and follow.

⚠ 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 your system documentation. Opening or removing covers that are marked with the triangular symbol with a lightning bolt

may expose you 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:

– The power cable, extension cable, or plug is damaged.

– 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 you follow the operating instructions.

- Keep your system away from radiators and heat sources. Also, do not block cooling vents.
- Do not spill food or liquids on your system components, and never operate the product in a wet environment. If the system gets wet, see the appropriate section in your troubleshooting guide or contact your trained service provider.
- Do not push any objects into the openings of your 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 you are not sure of the type of power source required, consult your service provider or local power company.
- To help avoid damaging your system, be sure the voltage selection switch (if provided) on the power supply is set to match the power available at your 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.

Safety Instructions (continued)

- 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 you must use an extension cable, 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 your 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.

Safety Instructions (continued)

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 you are 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 your system. To prevent static damage, discharge static electricity from your body before you touch any of the electronic components, such as the microprocessor. You can do so by periodically touching an unpainted metal surface on the chassis.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

1. When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your system. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.
2. When transporting a sensitive component, first place it in an antistatic container or packaging.
3. Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads and an antistatic grounding strap.

Battery Handling Reminder

⚠ **CAUTION:** Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

1

Introduction

This section describes the features of the DGS-3224TGR.

Features

The DGS-3224TGR was designed for departmental and enterprise connections. As an all-gigabit-port switch, it is ideal for backbone and server connection. Powerful and versatile, the switch eliminates network bottlenecks while giving users the capability to fine-tune performance

Switch features include:

Ports

- Twenty-four high performance 1000BASE-T ports for making 10/100/1000 connections to a backbone, end stations, and servers.
- Four mini-GBIC (SFP) combo ports to connect fiber optic media to another switch, server or network backbone.
- RS-232 DCE Diagnostic port (console port) for setting up and managing the Switch via a connection to a console terminal or PC using a terminal emulation program.

Performance Features

- Store-and-forward switching scheme.
- Switching fabric: 48Gbps
- Max. Forwarding Rate: 35.7 million packets per second
- High-speed data forwarding rate of 1,488,095 pps per port at 100% of wire-speed for 1000 Mbps speed.
- Supports 16K MAC address.
- Supports eight priority queues per port.
- Supports 2Mbytes buffer memory per switch.
- Jumbo Frame support (up to 9216 bytes).
- Multi-layer (Layer 2 to Layer 4) ACL and CoS support.
- Administrator-definable port security.
- 802.1D Spanning Tree support. Can be disabled on the entire switch or on a per-port basis.
- 802.1w Rapid Reconfiguration of Spanning Tree.
- 802.1Q Tagged VLAN support, including GVRP (GARP VLAN Registration Protocol).
- Support for up to 255 VLANs.
- IGMP snooping support per switch and fast-leave.
- Link aggregation support for up to 32 trunk groups and 8 trunk members per group. Support LACP and Static mode.
- Both port-based and MAC-based 802.1x port access control.
- Per-port bandwidth control.

Management

- RS-232 console port for out-of-band network management via a console terminal.
- Spanning Tree Algorithm Protocol for creation of alternative backup paths and prevention of network loops.
- SNMP V.1, V2c1, and V3 network management, 4 groups of RMON.
- Flash memory for software upgrades. This can be done in-band via TFTP or out-of-band via the console.
- Built-in SNMP management:
  - Bridge MIB (RFC 1493)
  - MIB-II (RFC 1213)
  - 802.1P/Q MIB (RFC 2674)
  - Interface MIB (RFC 2233)
  - Ethernet-like MIB (RFC 1643)
  - Mini-RMON MIB (RFC 1757) – 4 groups. The RMON specification defines the counters for the receive functions only. However, the DGS-3224TGR provides counters for both receive and transmit functions.
- Supports Web-based management.
- TFTP support.
- BOOTP support.
- DHCP Client support.
- Password enabled.
- Telnet remote control console.
- Broadcast storm control.
- Multicast storm control.
- Command Line Interface support.
- Port security support.
- TACACS and TACACS+ protocol support.
- SYSLOG support.
- Destination Lookup Fail control.
- SSL support.
- Single IP Management v1.0 support.

2

Unpacking and Setup

This chapter provides unpacking and setup information for the switch.

Unpacking

Open the shipping carton of the switch and carefully unpack its contents. The carton should contain the following items:

- A DGS-3224TGR 24-Port Gigabit Layer 2 Ethernet switch
- A mounting kit: 2 mounting brackets and screws
- Four rubber feet with adhesive backing
- One or two AC power cords
- A printed QIG
- A printed User's Guide
- D-View 5.1 demo CD-ROM
- This User's Guide with Registration Card on CD-ROM

If any item is found missing or damaged, please contact your local D-Link reseller for replacement.

Installation

Use the following guidelines when choosing a place to install the switch:

- The surface must support at least 4 kg.
- The power outlet should be within 1.82 meters (6 feet) of the device.
- Visually inspect the power cord and see that it is secured to the AC power connector.
- Make sure that there is proper heat dissipation from and adequate ventilation around the switch. Do not place heavy objects on the switch.

Desktop or Shelf Installation

When installing the switch on a desktop or shelf, the rubber feet included with the device should first be attached. Attach these cushioning feet on the bottom at each corner of the device. Allow adequate space for ventilation between the device and the objects around it.

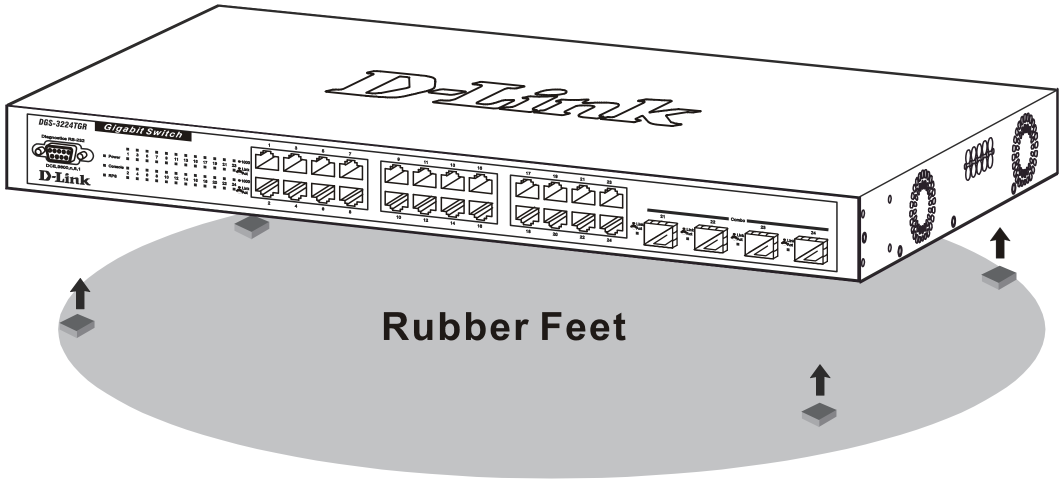


Figure 2-1. Installing rubber feet for desktop installation

Rack Installation

The DGS-3224TGR can be mounted in an EIA standard-sized, 19-inch rack, which can be placed in a wiring closet with other equipment. To install, attach the mounting brackets on the switch's side panels (one on each side) and secure them with the screws provided.

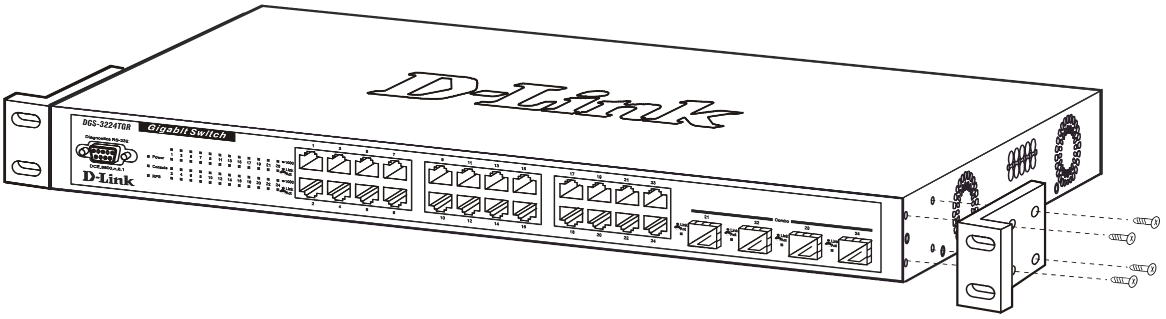


Figure 2- 2A. Attaching the mounting brackets

Then, use the screws provided with the equipment rack to mount the witch on the rack.

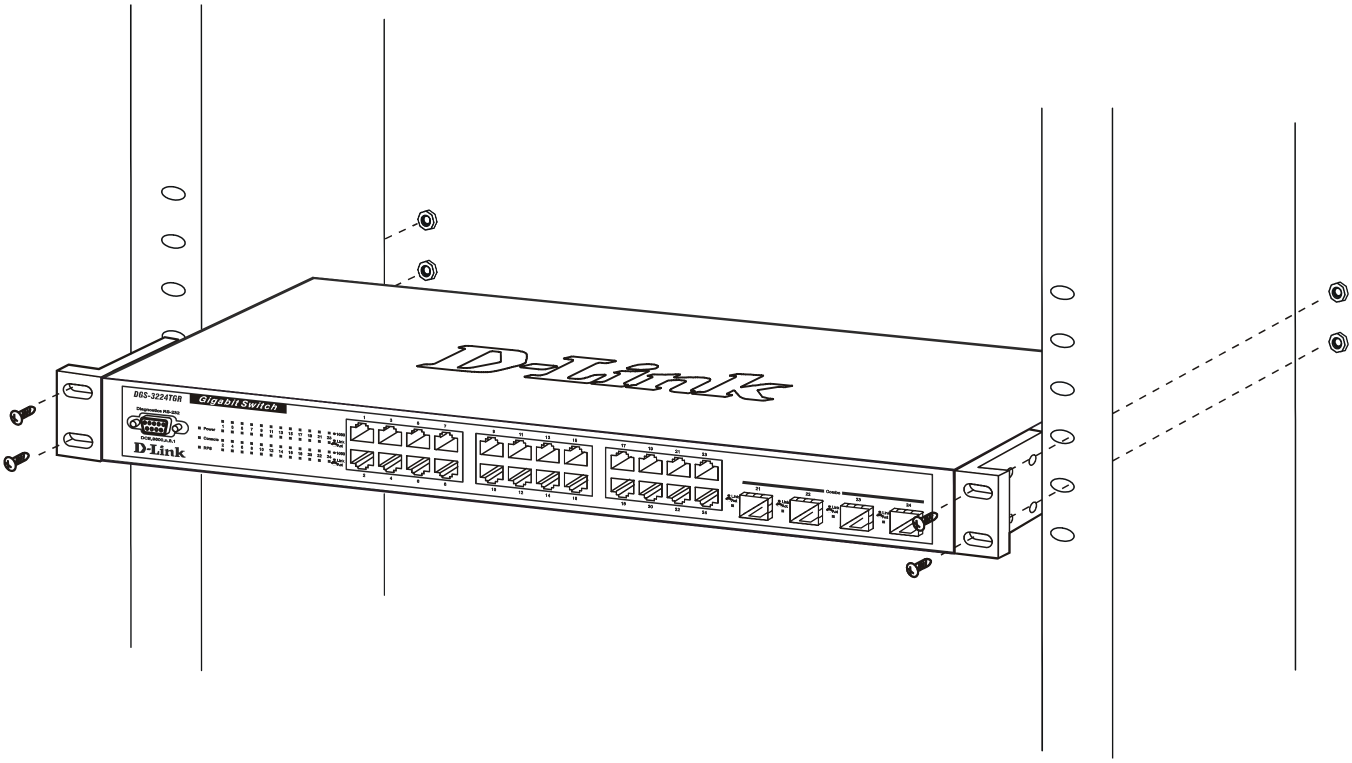


Figure 2- 2B. Installing in an equipment rack

Power on

The switch can be used with AC power supply 100-240 VAC, 50 - 60 Hz. The switch's power supply will adjust to the local power source automatically and may be powered on without having any or all LAN segment cables connected.

After the switch is plugged in, the LED indicators should respond as follows:

- All LED indicators except console will momentarily blink. This blinking of the LEDs indicates a reset of the system.
- The console LED indicator will blink while the switch loads onboard software and performs a self-test. When the POST is passed, the LED will become dark. If the POST fails, the indicator will light solid amber. This indicator lights solid green when the switch is being logged-in via out-of-band/local console management through the RS-232 console port using a straight-through serial cable.

Power Failure

As a precaution in the event of a power failure, unplug the switch. When power is resumed, plug the switch back in.

External Redundant Power System

The switch supports an external redundant power system.

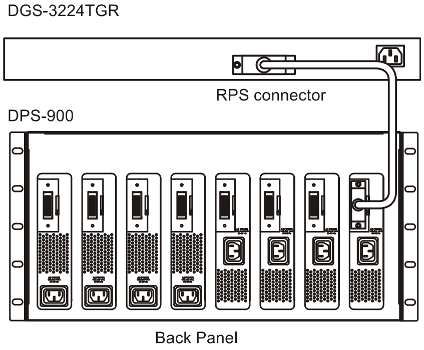


Figure 2-3. DPS-300 in DPS-900 with DGS-3224TGR

NOTE: See the DPS-300 documentation for more information.

CAUTION: Do not use the switch with any redundant power system other than the DPS-300.

3

Identifying External Components

This chapter describes the front panel, rear panel, side panels, and LED indicators of the DGS-3224TGR.

Front Panel

The front panel of the switch consists of LED indicators, an RS-232 communication port, 24 1000BASE-T ports, and 4 mini-GBIC combo ports.

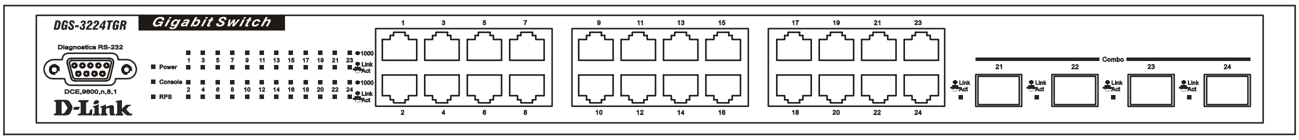


Figure 3-1. Front panel view

- An RS-232 DCE console port for setting up and managing the switch via a connection to a console terminal or PC using a terminal emulation program.
- Comprehensive LED indicators display the status of the switch and the network (see the *LED Indicators* section below).
- Twenty-four 1000BASE-T Ethernet ports for 10/100/1000 connections to a backbone, end stations, and servers.
- Four mini-GBIC combo ports to connect fiber optic media to another switch, server, or network backbone.

Rear Panel

The rear panel of the switch contains an external Redundant Power Supply connector and an AC power connector.

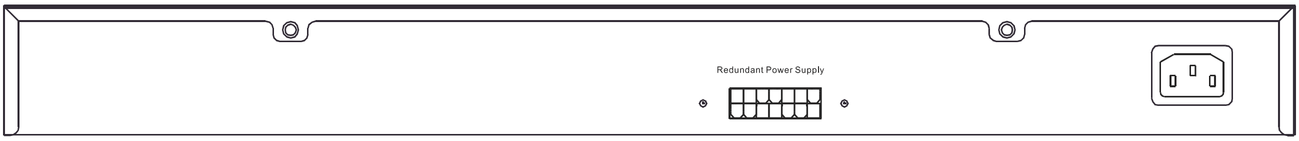


Figure 3-2. Rear panel view

- The external Redundant Power Supply connector is used to connect the DGS-3224TGR to a DPS-300. An auto-switch circuit automatically switches to an external RPS once the internal power supply fails. Transition from internal to external supply shall not disturb normal operation.
- The AC power connector is a standard three-pronged connector that supports the power cord. Plug-in the female connector of the provided power cord into this socket, and the male side of the cord into a power outlet. Supported input voltages range from 100 ~ 240 VAC at 50 ~ 60 Hz.

Side Panels

The right side panel of the switch contains two system fans (see the top part of the diagram below). The left side panel contains heat vents.

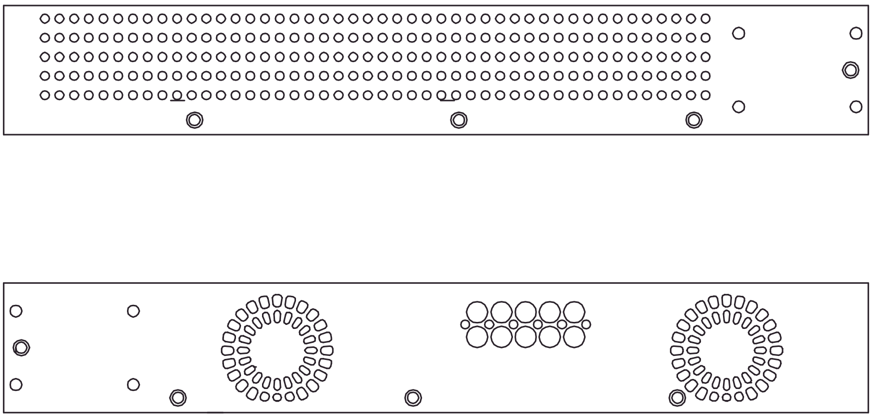


Figure 3-3. Side panel views of the Switch

- The system fans are used to dissipate heat. The sides of the system also provide heat vents to serve the same purpose. Do not block these openings, and leave at least 6 inches of space at the rear and sides of the switch for proper ventilation. Be reminded that without proper heat dissipation and air circulation, system components might overheat, which could lead to system failure.

LED Indicators

The LED indicators of the switch include Power, Console, RPS, Speed, and Link/Activity. The following shows the LED indicators for the switch along with an explanation of each indicator.

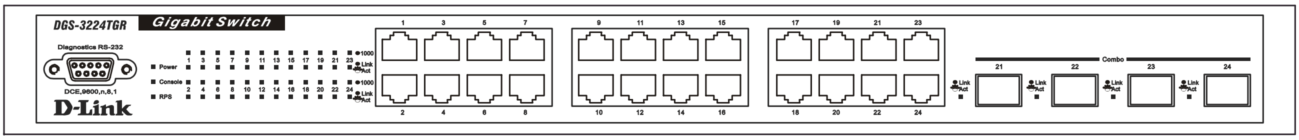


Figure 3-4. LED indicators

- **Power** – This indicator on the front panel lights solid green when the system is powered up and remains dark when the system is not powered on.
- **Console** – This indicator blinks green when the system is booting up. It remains solid green when the system is operating properly. The LED is solid amber when the POST fails.
- **RPS** – This indicator is lit solid amber when the external Redundant Power Supply is in operation and remains dark when it is not in use or the main power is working normally.
- **Speed** – This row of indicators will light solid green when the connection speed is operating at 1000 Mbps. An unlit LED indicates a connection speed of either 10 or 100 Mbps.
- **Link/Act** – This row of indicators for the 24 copper ports light solid green when there is a secure connection (or link) to a device on any of the ports. The LEDs blink green whenever there is reception or transmission (i.e. Activity--Act) of data occurring on a port.

4

Connecting The Switch

This chapter describes how to connect the DGS-3224TGR to your Gigabit Ethernet network.

Switch to End Node

End nodes include PCs outfitted with a 10, 100, or 1000 Mbps RJ-45 Ethernet/Fast Ethernet/Gigabit Ethernet Network Interface Card (NIC) and most routers.

An end node can be connected to the switch via a Category 3, 4, 5, or 5e UTP/STP cable—for optimal performance, Category 5e is recommended. The end node should be connected to any of the ports of the switch.

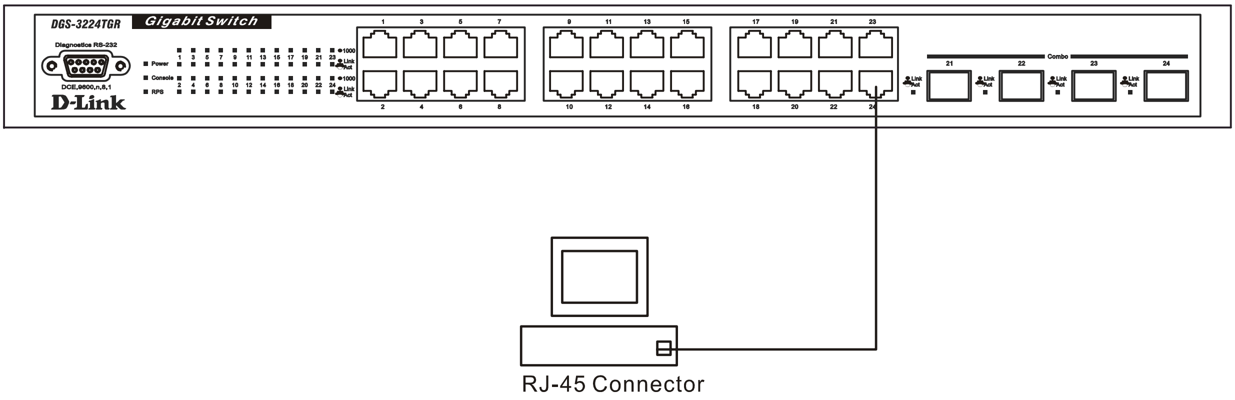


Figure 4-1. Switch connected to an End Node

The Link/Act LEDs light green when the link is valid. A blinking green LED indicates packet activity on that port. The Speed LEDs indicate port speed and will light solid green for 1000 Mbps connections. They will remain off for 10 or 100 Mbps connections.

Switch to Hub or Switch

These connections can be accomplished in a number of ways using a normal cable.

- A 10BASE-T hub or switch can be connected to the switch via a two-pair Category 3, 4, 5, or 5e UTP/STP cable.
- A 100BASE-TX hub or switch can be connected to the switch via a two-pair Category 5 or 5e UTP/STP cable.
- A 1000BASE-T switch can be connected to the switch via four-pair straight Category 5 or 5e UTP/STP cable.

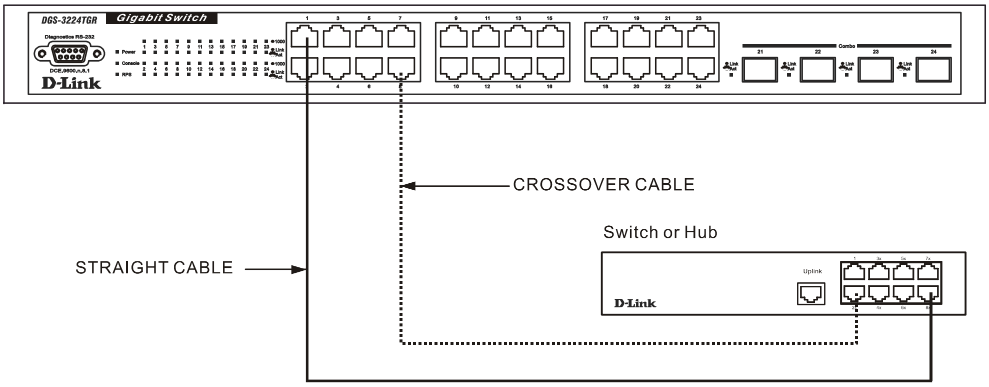


Figure 4-2. Switch connected to a normal (non-Uplink) port on a hub or switch using a straight or crossover cable

5

Switch Management and Operating Concepts

This chapter discusses many of the concepts and features used to manage the switch, as well as the concepts necessary for the user to understand the functioning of the switch. Further, this chapter explains many important points regarding these features.

Configuring the switch to implement these concepts and make use of its many features is discussed in detail in the next chapters.

Local Console Management

A local console is a terminal or a workstation running a terminal emulation program that is connected directly to the switch via the RS-232 console port on the front of the switch. A console connection is referred to as an 'Out-of-Band' connection, meaning that console is connected to the switch using a different circuit than that used for normal network communications. So, the console can be used to set up and manage the switch even if the network is down.

Local console management uses the terminal connection to operate the console program built-in to the switch (see the *DGS-3224TGR Command Line Interface Reference* manual). A network administrator can manage, control and monitor the switch from the console program.

The DGS-3224TGR contains a CPU, memory for data storage, flash memory for configuration data, operational programs, and SNMP agent firmware.

Diagnostic (console) port (RS-232 DCE)

Out-of-band management requires connecting a terminal, such as a VT-100 or a PC running a terminal emulation program (such as HyperTerminal, which is automatically installed with Microsoft Windows) a to the RS-232 DCE console port of the switch. Switch management using the RS-232 DCE console port is called *Local Console Management* to differentiate it from management performed via management platforms, such as D-View, HP OpenView, etc.

The console port is set at the factory for the following configuration:

• Baud rate:	9,600
• Data width:	8 bits
• Parity:	none
• Stop bits:	1
• Flow Control	None

Make sure the terminal or PC you are using to make this connection is configured to match these settings.

If you are having problems making this connection on a PC, make sure the emulation is set to VT-100. If you still don't see anything, try hitting <Ctrl> + r to refresh the screen.

IP Addresses and SNMP Community Names

Each switch must be assigned its own IP Address, which is used for communication with an SNMP network manager or other TCP/IP application (for example BOOTP, TFTP). The switch's default IP address is 10.90.90.90. You can change the default switch IP Address to meet the specification of your networking address scheme.

The switch is also assigned a unique MAC address by the factory. This MAC address cannot be changed, and can be found when using the command "show switch."

In addition, you can also set an IP address for a gateway router. This becomes necessary when the network management station is located on a different IP network from the switch, making it necessary for management packets to go through a router to reach the network manager, and vice-versa.

For security, you can set in the switch a list of IP Addresses of the network managers that allow you to manage the switch. You can also change the default SNMP Community Strings in the switch and set the access rights of these Community Strings. In addition, a VLAN may be designated as a Management VLAN.

Setting an IP Address

The IP address for the switch must be set before it can be managed with the Web-based manager. The switch IP address may be automatically set using BOOTP or DHCP protocols, in which case the actual address assigned to the switch must be known.

***The IP address may alternatively be set using the Command Line Interface (CLI) over the console serial port as follows*:**

1. Starting at the command line prompt **local>**, enter the commands **config ipif System ipaddress xxx.xxx.xxx.xxx/yyy.yyy.yyy.yyy**. Where the **x**'s represent the IP address to be assigned to the IP interface named **System** and the **y**'s represent the corresponding subnet mask.
2. Alternatively, you can enter the commands **config ipif System ipaddress xxx.xxx.xxx.xxx/z**. Where the **x**'s represent the IP address to be assigned to the IP interface named **System** and the **z** represents the corresponding number of subnets in CIDR notation.

Using this method, the switch can be assigned an IP address and subnet mask that can then be used to connect a management station to the switch's Web-based management agent.

Traps

Traps are messages that alert you 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 network manager (trap recipient).

Trap recipients are special users of the network who are given certain rights and access in overseeing the maintenance of the network. Trap recipients will receive traps sent from the switch; they must immediately take certain actions to avoid future failure or breakdown of the network.

You can also specify which network managers may receive traps from the switch by entering a list of the IP addresses of authorized network managers. Up to four trap recipient IP addresses, and four corresponding SNMP community strings can be entered.

SNMP community strings function like passwords in that the community string entered for a given IP address must be used in the management station software, or a trap will be sent.

The following are trap types the switch can send to a trap recipient:

- **Cold Start** –This trap signifies that the switch has been powered up and initialized such that software settings are reconfigured and hardware systems are rebooted. A cold start is different from a factory reset in that configuration settings saved to non-volatile RAM used to reconfigure the switch.
- **Authentication Failure** – This trap signifies that someone has tried to logon to the switch using an invalid SNMP community string. The switch automatically stores the source IP address of the unauthorized user.

- **New Root** – This trap indicates that the switch has become the new root of the Spanning Tree, the trap is sent by the switch soon after its election as the new root. This implies that upon expiration of the Topology Change Timer the new root trap is sent out immediately after the switch's election as the new root.
- **Topology Change (STP)** – A Topology Change trap is sent by the switch when any of its configured ports transitions from the Learning state to the Forwarding state, or from the Forwarding state to the Blocking state. The trap is not sent if a new root trap is sent for the same transition.
- **Connected and Working** – This trap is sent when the Redundant Power Supply is connected and working.
- **Disconnect or Malfunction** – This trap is sent whenever the Redundant Power Supply malfunctions.
- **MAC Notification** – This trap indicates that the switch had learned a new MAC address.

MIBs

Management and counter information are stored in the switch in the Management Information Base (MIB. 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. These MIBs may also be retrieved by specifying the MIB's Object-Identity (OID) at the network manager. MIB values can be either read-only or read-write.

Read-only MIBs variables can be either constants that are programmed into the switch, or variables that change while the switch is in operation. Examples of read-only constants are the number of port and type of ports. Examples of read-only variables are the statistics counters such as the number of errors that have occurred, or how many kilobytes of data have been received and forwarded through a port.

Read-write MIBs are variables usually related to user-customized configurations. Examples of these are the switch's IP Address, Spanning Tree Algorithm parameters, and port status.

If you use a third-party vendors' SNMP software to manage the switch, a diskette listing the switch's propriety enterprise MIBs can be obtained by request. If your software provides functions to browse or modify MIBs, you can also get the MIB values and change them (if the MIBs' attributes permit the write operation). This process however can be quite involved, since you must know the MIB OIDs and retrieve them one by one.

SNMP

The Simple Network Management Protocol (SNMP) is an OSI layer 7 (the application layer) protocol for remotely monitoring and configuring network devices. SNMP enables network management stations to read and modify the settings of gateways, routers, switches, and other network devices. SNMP can be used to perform many of the same functions as a directly connected console, or can be used within an integrated network management software package such as HP OpenView or DView.

SNMP performs the following functions:

- Sending and receiving SNMP packets through the IP protocol.
- Collecting information about the status and current configuration of network devices.
- Modifying the configuration of network devices.

The DGS-3224TGR has a software program called an 'agent' that processes SNMP requests, but the user program that makes the requests and collects the responses runs on a management station (a designated computer on the network). The SNMP agent and the user program both use the UDP/IP protocol to exchange packets.

Authentication

The authentication protocol ensures that both the router SNMP agent and the remote user SNMP application program discard packets from unauthorized users. Authentication is accomplished using 'community strings', which function like passwords. The remote user SNMP application and the router SNMP must use the same community string.

Packet Forwarding

The switch enters the relationship between destination MAC or IP addresses and the Ethernet port or gateway router the destination resides on into its forwarding table. This information is then used to forward packets. This reduces the traffic congestion on the network, because packets, instead of being transmitted to all ports, are transmitted to the destination port only. Example: if Port 1 receives a packet destined for a station on Port 2, the switch transmits that packet through Port 2 only, and transmits nothing through the other ports. This process is referred to as 'learning' the network topology.

MAC Address Aging Time

The Aging Time affects the learning process of the Switch. Dynamic forwarding table entries, which are made up of the source and destination MAC addresses and their associated port numbers, are deleted from the table if they are not accessed within the aging time.

The aging time can be from 10 to 1,000,000 seconds with a default value of 300 seconds. A very long aging time can result in dynamic forwarding table entries that are out-of-date or no longer exist. This may cause incorrect packet forwarding decisions by the Switch.

If the Aging Time is too short however, many entries may be aged out too soon. This will result in a high percentage of received packets whose source addresses cannot be found in the forwarding table, in which case the switch will broadcast the packet to all ports, negating many of the benefits of having a switch.

Static forwarding entries are not affected by the aging time.

Filtering

The switch uses a filtering database to segment the network and control communication between segments. It can also filter packets off the network for intrusion control. Static filtering entries can be made by MAC Address filtering.

Each port on the switch is a unique collision domain and the switch filters (discards) packets whose destination lies on the same port as where it originated. This keeps local packets from disrupting communications on other parts of the network.

For intrusion control, whenever a switch encounters a packet originating from or destined to a MAC address entered into the filter table, the switch will discard the packet.

Some filtering is done automatically by the switch:

- Dynamic filtering – automatic learning and aging of MAC addresses and their location on the network. Filtering occurs to keep local traffic confined to its segment.
- Filtering done by the Spanning Tree Protocol that can filter packets based on topology, making sure that signal loops don't occur.
- Filtering done for VLAN integrity. Packets from a member of a VLAN (VLAN 2, for example) destined for a device on another VLAN (VLAN 3) will be filtered.

Spanning Tree

802.1w Rapid Spanning Tree

The DGS-3224TGR implements two versions of the Spanning Tree Protocol, the Rapid Spanning Tree Protocol (RSTP) as defined by the IEE 802.1w specification and a version compatible with the IEEE 802.1d STP. RSTP can operate with legacy equipment implementing IEEE 802.1d, however the advantages of using RSTP will be lost.

The IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) evolved from the 802.1d 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 function 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 two protocols is in the way ports transition to a forwarding state and the in the way this transition relates to the role of the port (forwarding or not forwarding) in the topology. RSTP combines the transition states disabled, blocking and listening used in 802.1d 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 port state discarding there is no functional difference, the port is not active in the network topology. The table below compares how the two protocols differ regarding the port state transition.

Both 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 faster detection of failed links, and thus faster topology adjustment. A drawback of 802.1d is this absence of immediate feedback from adjacent bridges.

STP/RSTP Comparison

802.1d STP	802.1w RSTP	Forwarding?	Learning?
Disabled	Discarding	No	No
Blocking	Discarding	No	No
Listening	Discarding	No	No
Learning	Learning	No	Yes
Forwarding	Forwarding	Yes	Yes

Comparing Port States

RSTP is capable of 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, all ports operating in full-duplex mode are considered to be P2P ports, unless manually overridden through configuration.

802.1d/802.1w Compatibility

RSTP can interoperate with legacy equipment and is capable of automatically adjusting BPDU packets to 802.1d format when necessary. However, any segment using 802.1 STP will not benefit from the rapid transition and rapid topology change detection of 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.

The Spanning Tree Protocol (STP) operates on two levels: on the switch level, the settings are globally implemented. On the port level, the settings are implemented on a user-defined Group of ports basis.

VLANs

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.

Note: VLANs on the DGS-3224TGR

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 DGS-3224TGR supports only 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

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 DGS-3224TGR 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:

- Assigns packets to VLANs by filtering.
- Assumes the presence of a single global spanning tree.
- Uses an explicit tagging scheme with one-level tagging

802.1Q VLAN Packet Forwarding

Packet forwarding decisions are made based upon the following three types of rules:

- Ingress rules – rules relevant to the classification of received frames belonging to a VLAN.
- Forwarding rules between ports – decides filter or forward the packet
- Egress rules – determines if the packet must be sent tagged or untagged.

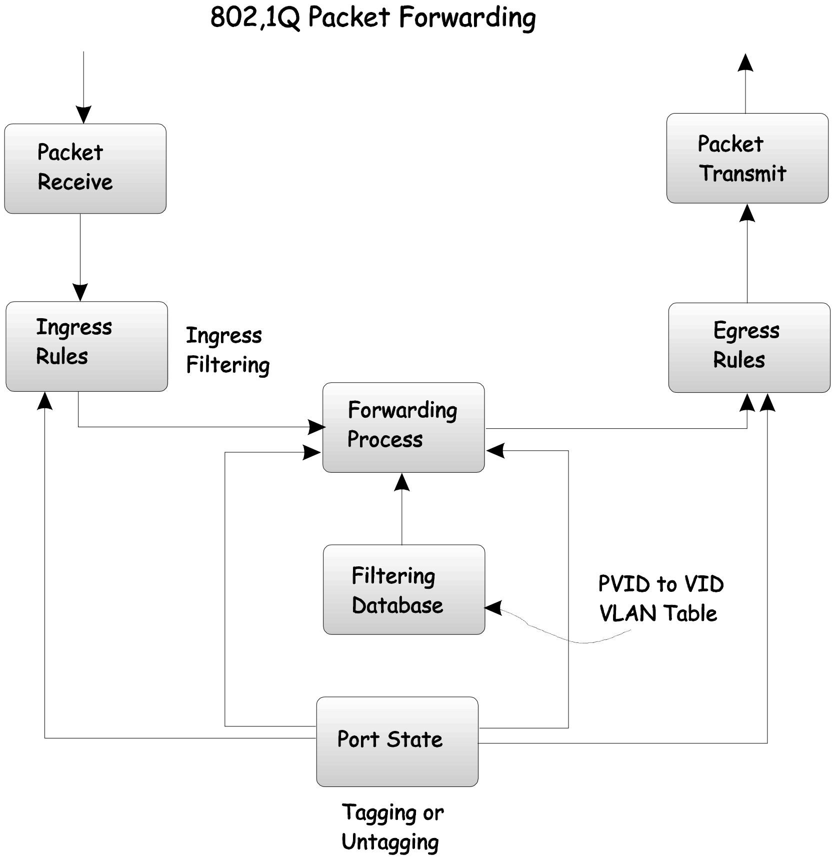


Figure 5- 1. IEEE 802.1Q Packet Forwarding

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 three bits of user priority, one bit of Canonical Format Identifier (CFI – used for encapsulating Token Ring packets so they can be carried across Ethernet backbones) and twelve bits of VLAN ID (VID). The three 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 twelve bits long, 4094 unique VLANs can be identified.

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

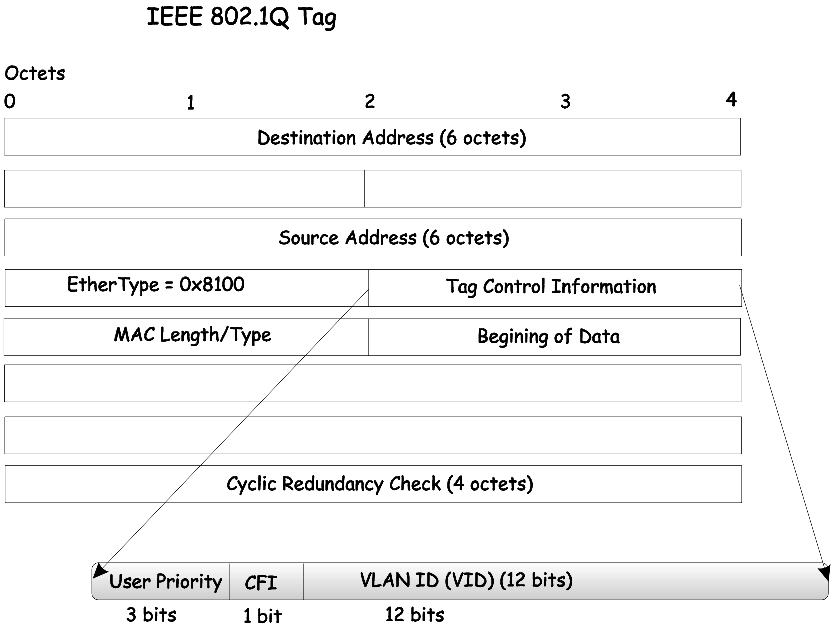


Figure 5- 2. IEEE 802.1Q Tag

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.

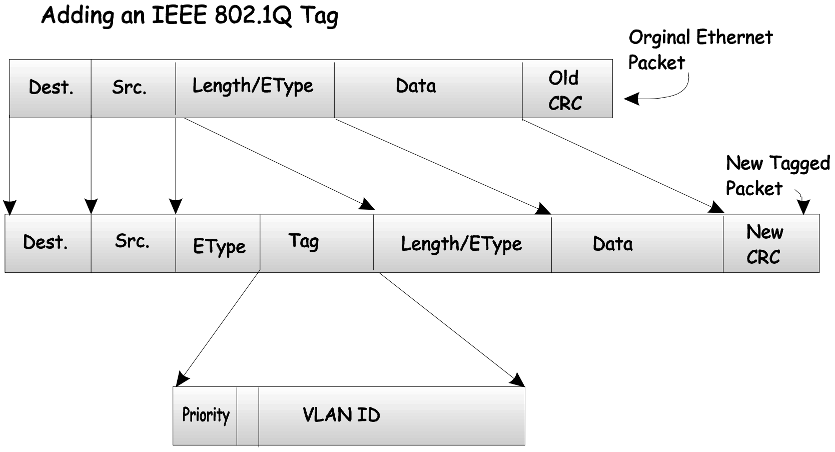


Figure 5- 3. Adding an IEEE 802.1Q Tag

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 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. A 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). If the PVID of the port that received the packet is different from the PVID of the port that is to transmit the packet, the switch will drop the packet.

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.

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. Tagged packets are also assigned a PVID, but the PVID is not used to make packet forwarding decisions, the VID is.

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. The VLAN information in the tag can then be used by other 802.1Q-compliant devices on the network to make packet forwarding decisions.

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 tagged 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.

802.1x Port-Based and MAC-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:

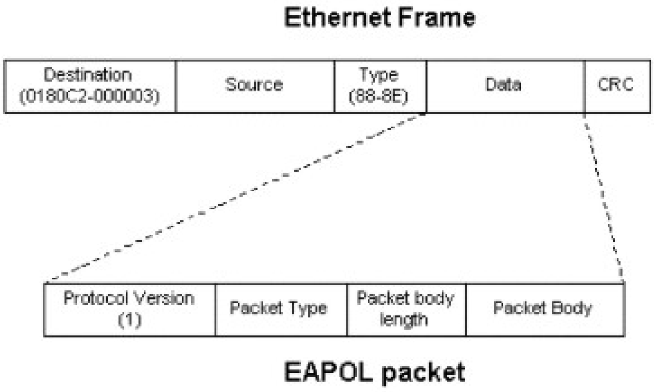


Figure 5- 4. The EAPOL Packet

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 holds three roles, each of which are vital to creating and upkeeping a stable and working Access Control security method.

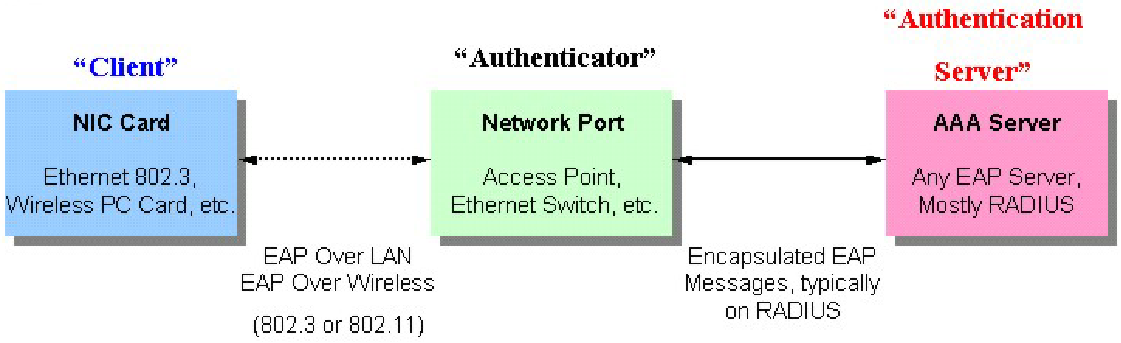

"Client"
NIC Card
Ethernet 802.3, Wireless PC Card, etc.
"Authenticator"
Network Port
Access Point, Ethernet Switch, etc.
"Authentication Server"
AAA Server
Any EAP Server, Mostly RADIUS
EAP Over LAN
EAP Over Wireless
(802.3 or 802.11)
Encapsulated EAP Messages, typically on RADIUS

Figure 5- 5. 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.

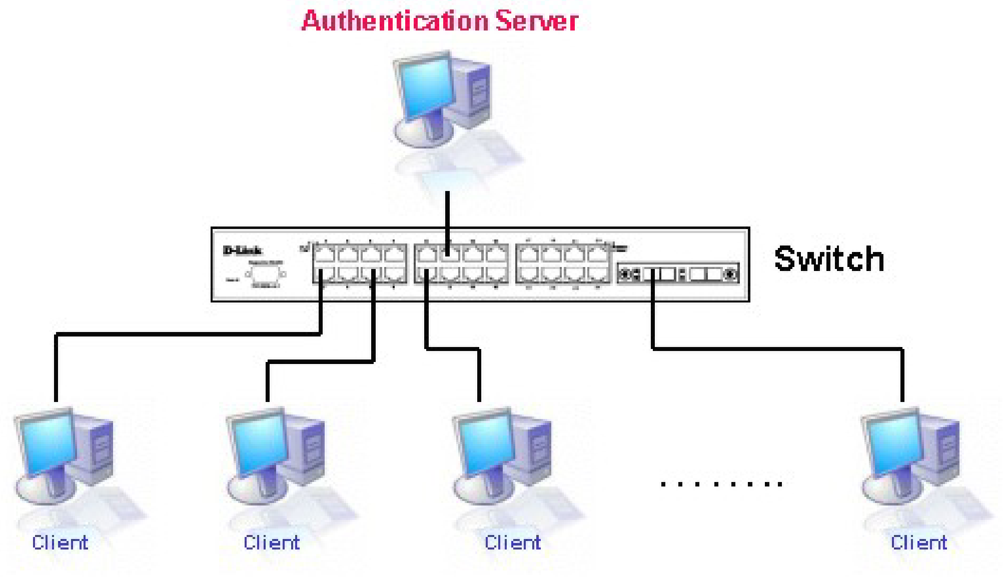


Figure 5- 6. The Authentication Server

Authenticator

The Authenticator (the Switch) is an intermediary between the Authentication Server and the Client. The Authenticator servers two purposes when utilizing 802.1x. 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.

Three steps must be implemented on the Switch to properly configure the Authenticator.

1. The 802.1x State must be *Enabled*. (**Configuration** / **Switch Information** / **Advanced Settings** / **802.1x Status**)
2. The 802.1x settings must be implemented by port (**Port Access Entity** / **PAE System Control** / **Port Capability** / **Capability**)
3. A RADIUS server must be configured on the Switch. (**Port Access Entity** / **RADIUS Server** / **Authentic RADIUS Server**)

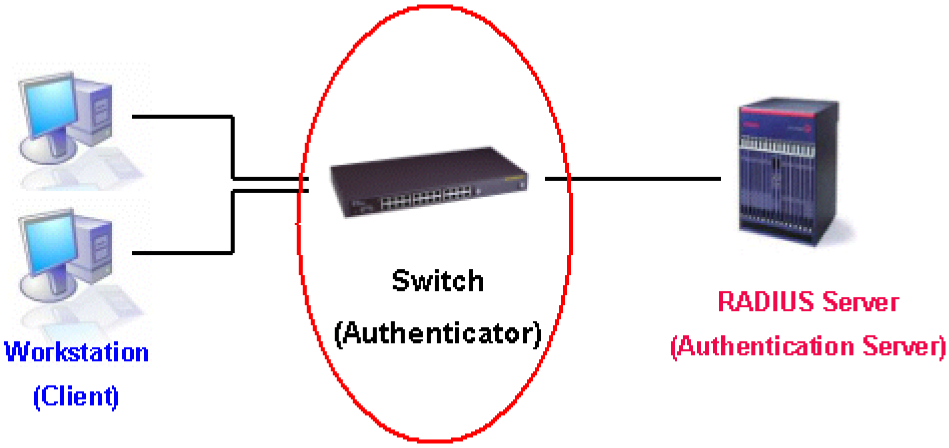


Figure 5- 7. The Authenticator

Client

The Client is simply the endstation that wishes to gain access to the LAN or switch services. All endstations must be running software that is compliant with the 802.1x protocol. For users running Windows XP, 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.

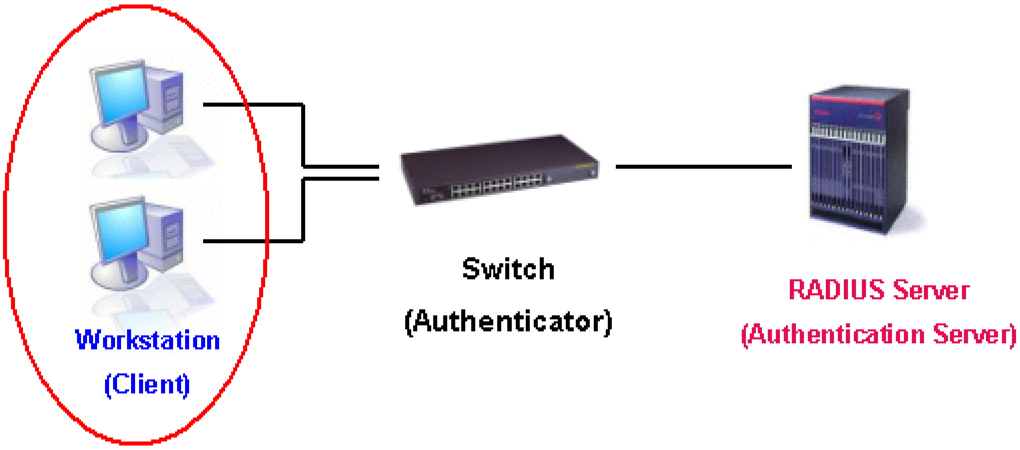


Figure 5- 8. The Client

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.

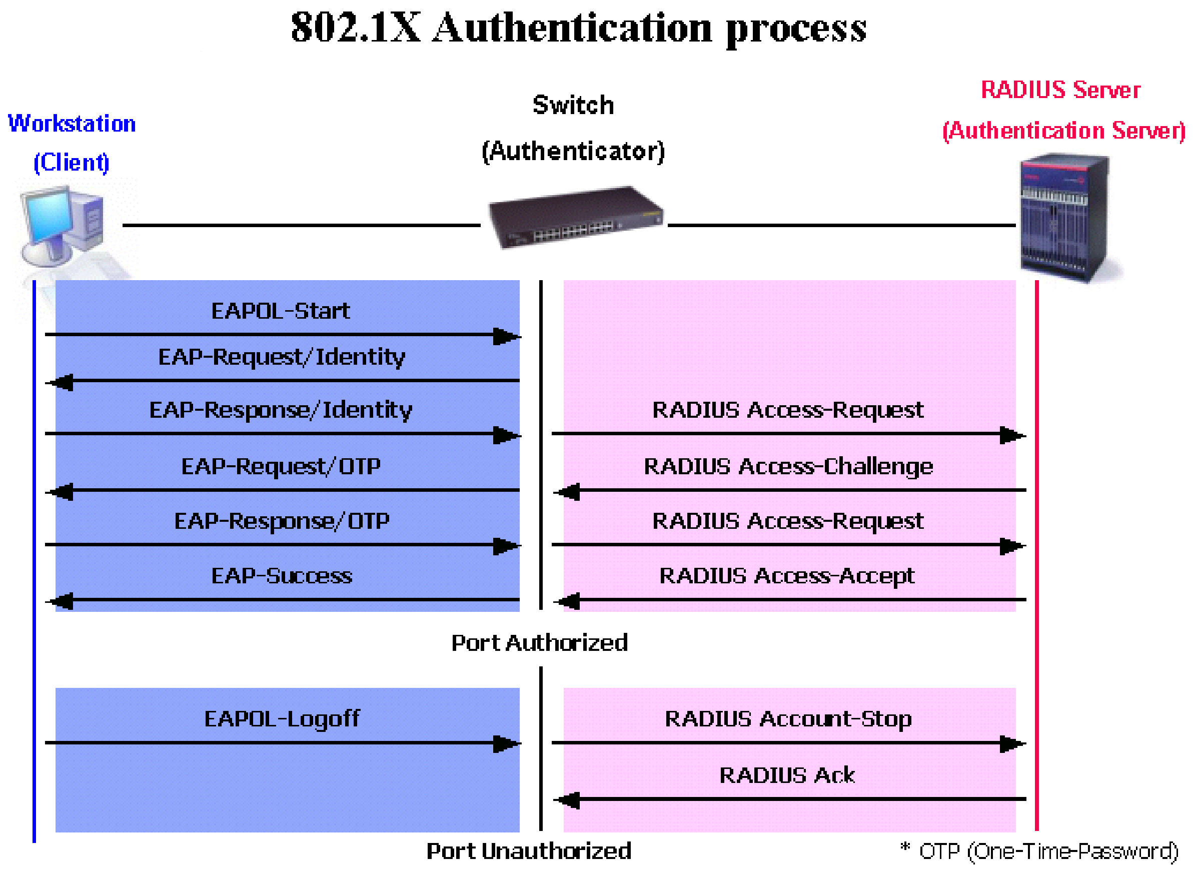


Figure 5- 9. The 802.1x Authentication Process

The D-Link implementation of 802.1x allows network administrators to choose between two types of Access Control used on the Switch, which are:

1. 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.
2. MAC-Based Access Control – Using this method, the Switch will automatically learn up to three 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.

Port-Based Network Access Control

The original intent behind the development of 802.1x was to leverage the characteristics of point-to-point in LANs. Any single LAN segment in such an 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.

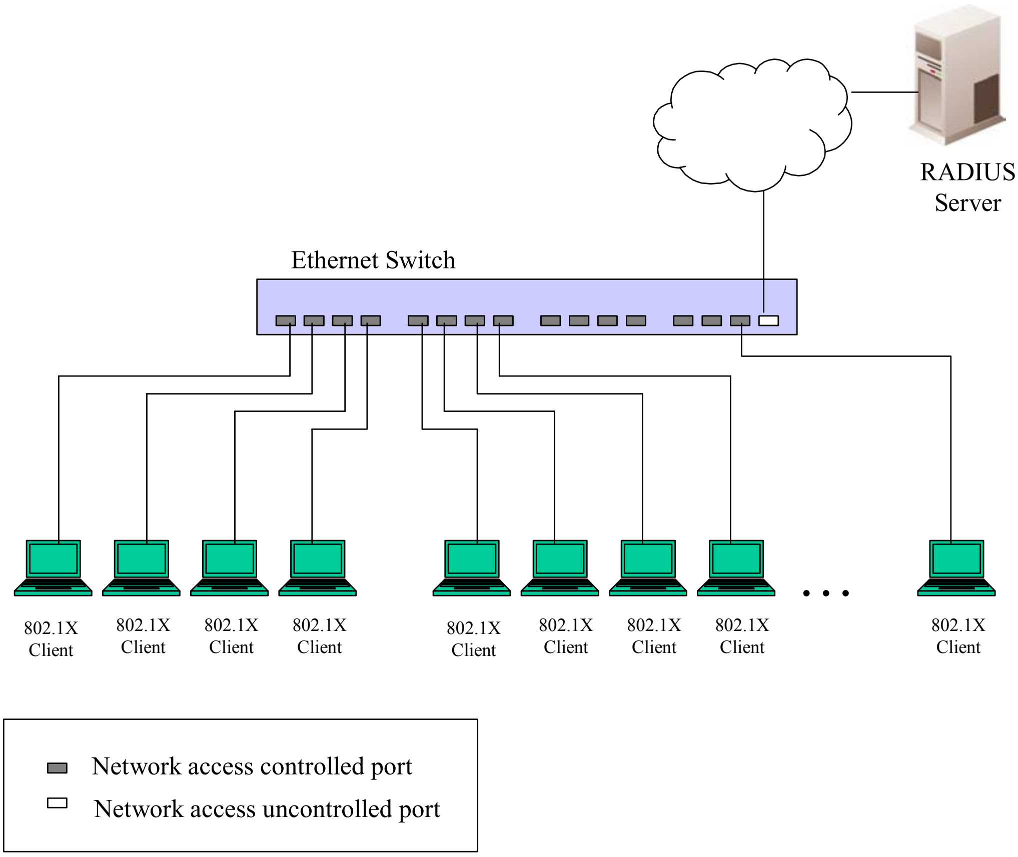


Figure 5- 10. Example of Typical Port-Based Configuration

Once the connected Client 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.

MAC-Based Network Access Control

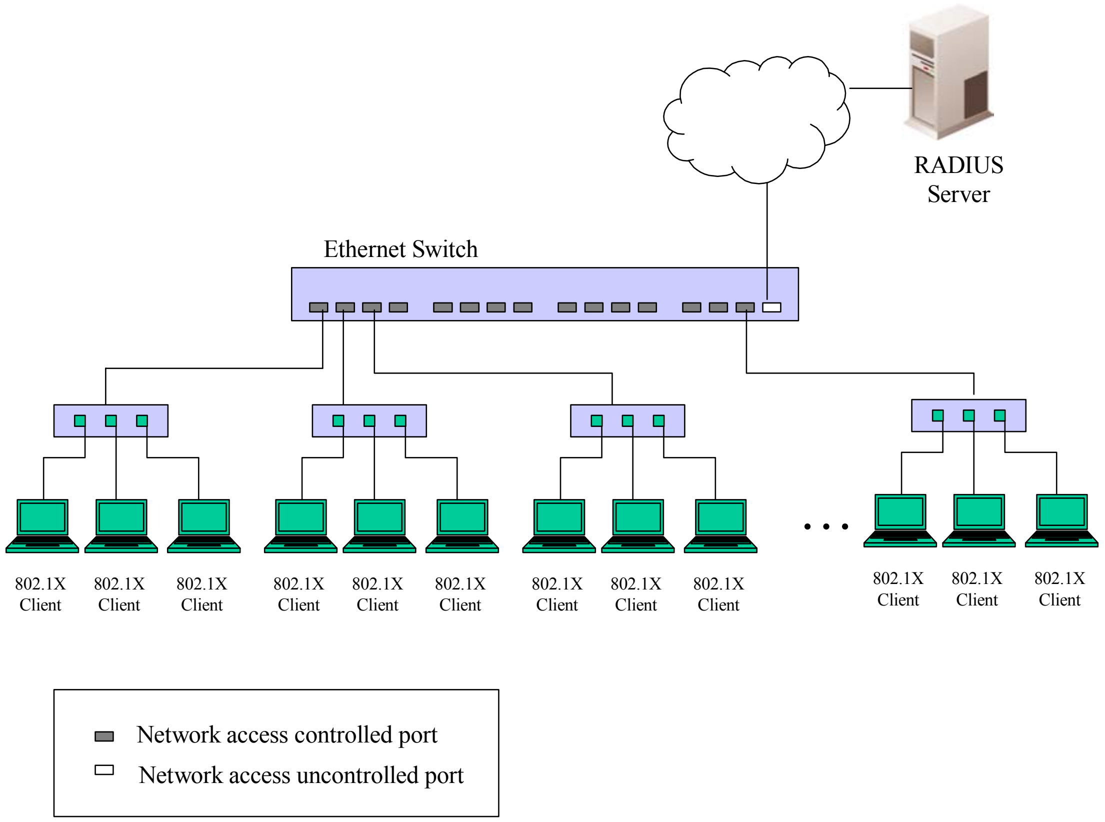


Figure 5- 11. Example of Typical MAC-Based Configuration

In order to successfully make use of 802.1x in a shared media LAN segment, it would be necessary to create "virtual" 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 virtual Ports, each virtual Port being independently controlled from the point of view of EAPOL exchanges and authorization state. The Switch learns each attached device's individual MAC address, and effectively creates a virtual Port that the attached device can then use to communicate with the LAN via the Switch.

DHCP

The Dynamic Host Configuration Protocol (DHCP) can reduce the administrative burden of assigning and maintaining IP address information. DHCP provides reliable and simple TCP/IP network configuration, ensures that address conflicts do not occur, and helps to conserve the use of IP addresses through the centralized management of address allocation.

Dynamic address allocation enables a client to be assigned an IP address from a pool of free addresses. Each address is assigned with a lease and a lease expiration period. The client must renew the lease to continue using the assigned address. Dynamically assigned addresses can be returned to the free address pool if the computer is not being used, if it is moved to another subnet, of if its lease expires. Usually, network policy ensures that the same IP address is assigned to a client each time and that addresses returned to the free address pool are reassigned.

When the address lease expires, the DHCP client enters the renewing state. The client sends a request message to the DHCP server that provided the address. The DHCP server sends an acknowledgement that contains the new lease and configuration parameters. The client then updates its configuration values and returns to the bound state.

When the DHCP client is in the renewing state, it must release its address immediately in the rare event that the DHCP server sends a negative acknowledgment. The DHCP server sends this message to inform a client that it has incorrect configuration information, forcing it to release its current address and acquire new information.

If the DHCP client cannot successfully renew its lease, the client enters a rebinding state. The client then sends a request message to all DHCP servers in its range, attempting to renew its lease. Any DHCP server that can extend the lease sends an acknowledgement containing the extended lease and updated configuration information. If the lease expires or if a DHCP server responds with a negative acknowledgement, the client must release its current configuration, and then return to the initializing state.

If the DHCP client uses more than one network adapter to connect to multiple networks, this protocol is followed for each adapter that the user wants to configure for TCP/IP. Multi-homed systems are selectively configured for any combination of the system's interfaces.

When a DHCP-enabled computer is restarted, it sends a message to the DHCP server with its current configuration information. The DHCP server either confirms this configuration or sends a negative reply so that the client must begin the initializing state again. System startup might, therefore, result in a new IP address for a client computer, but neither the user nor the network administrator has to take any action in the configuration process.

Before loading TCP/IP with an address acquired from the DHCP server, DHCP clients check for an IP address conflict by sending an Address Resolution Protocol (ARP) request containing the address. If a conflict is found, TCP/IP does not start, and the user receives an error message. The conflicting address should be removed for the list of active leases or it should be excluded until the conflict is identified and resolved.

6

Web-Based Network Management

Introduction

The DGS-3224TGR offers an embedded Web-based (HTML) interface allowing users to manage the switch from anywhere on the network through a standard browser, such as Opera, Netscape Navigator/Communicator, or Microsoft Internet Explorer. The Web browser acts as a universal access tool and can communicate directly with the switch using the HTTP protocol. Your browser window may vary with the screen shots (pictures) in this guide.

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.

NOTE: This Web-based Management Module does not accept Chinese language input (or other languages requiring 2 bytes per character).

NOTE: It is necessary to download Java Runtime Environment 1.4.2 to display the Topology windows located in the Single IP Management folder.

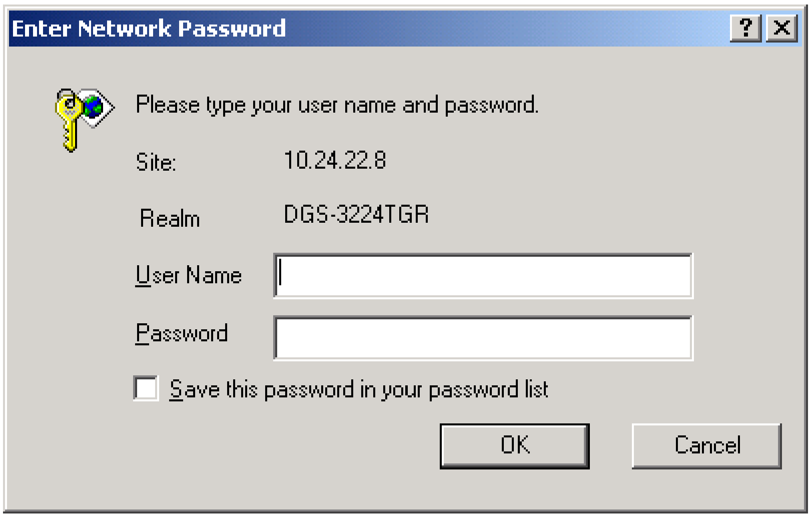
Getting Started

The first step in getting started in using Web-based management for your switch is to secure a browser. A Web browser is a program that allows a person to read hypertext, for example, Opera, Netscape Navigator, or Microsoft Internet Explorer. Follow the installation instructions for the browser.

The second and last step is to configure the IP interface of the switch. This should be done manually through a console (see the *Configure IP Address* section in the *"Using The Console Interface"* chapter).

You are now ready to begin managing your switch by simply running the browser installed on your computer and pointing 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. Please note that the proxy for session connection should be turned off.

Depending on which browser you are using, a dialog box similar to the following will open:



Enter Network Password

Please type your user name and password.

Site: 10.24.22.8

Realm DGS-3224TGR

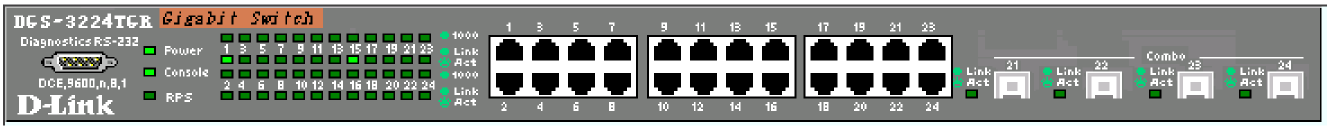
User Name

Password

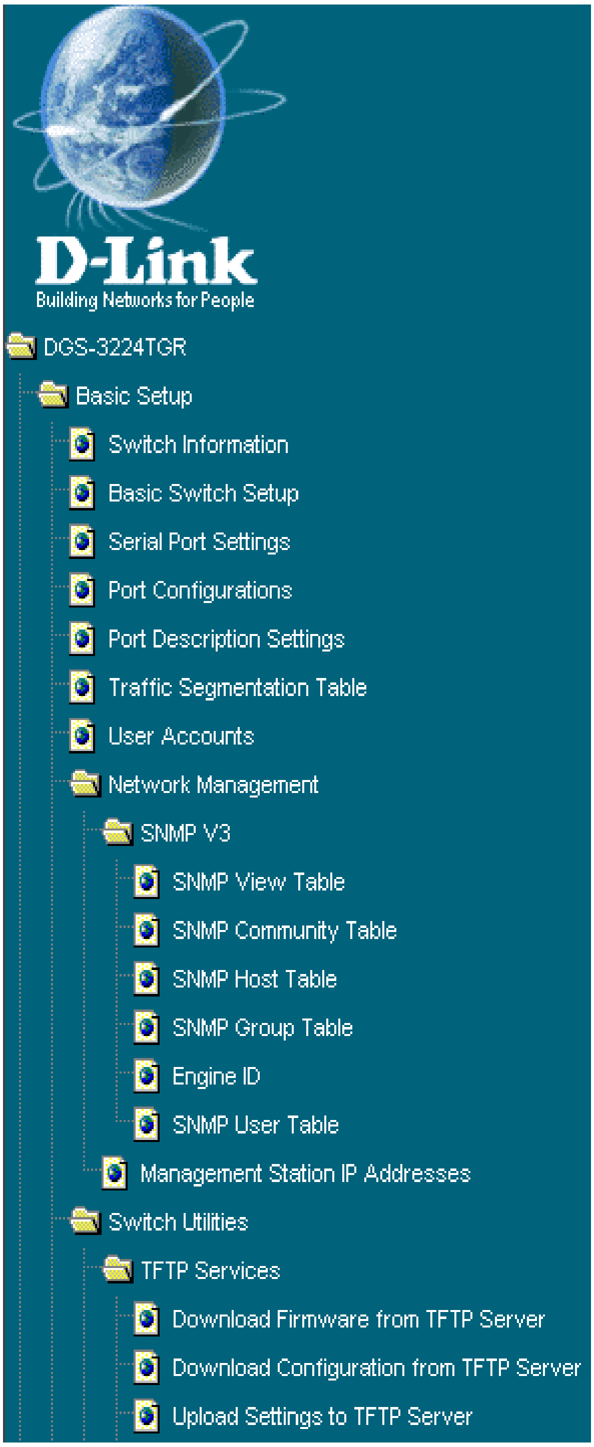
□ Save this password in your password list

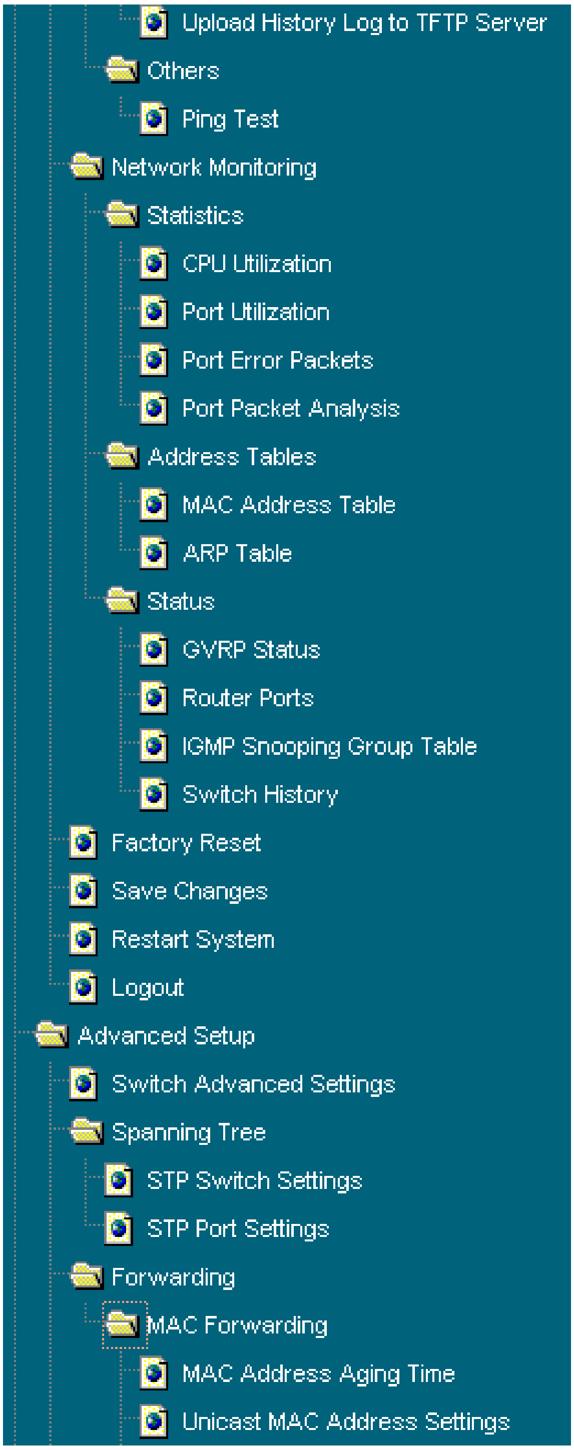
Click **OK** as there is no preset user name or password on the switch. This opens the main page in the management module.

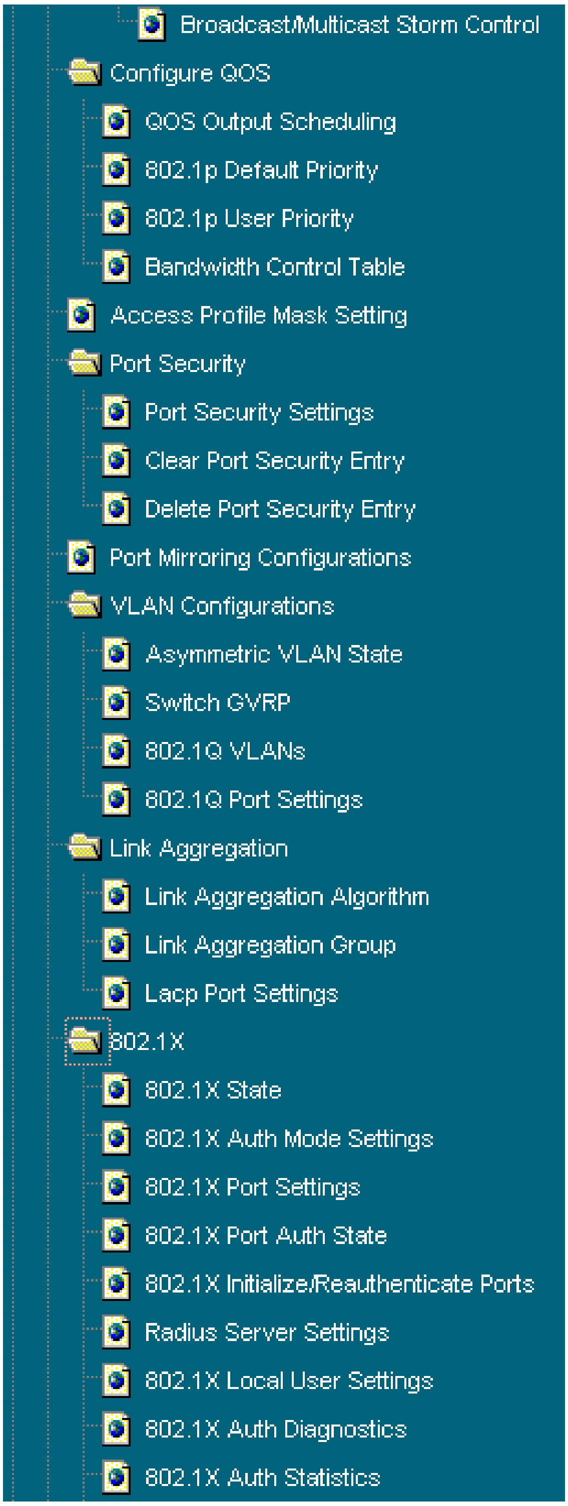
The top panel shows a real-time front panel display of the DGS-3224TGR. Clicking on an individual port on this display will connect you to the **Port Configurations** window (see **Basic Setup** → **Port Configurations** for a detailed description).

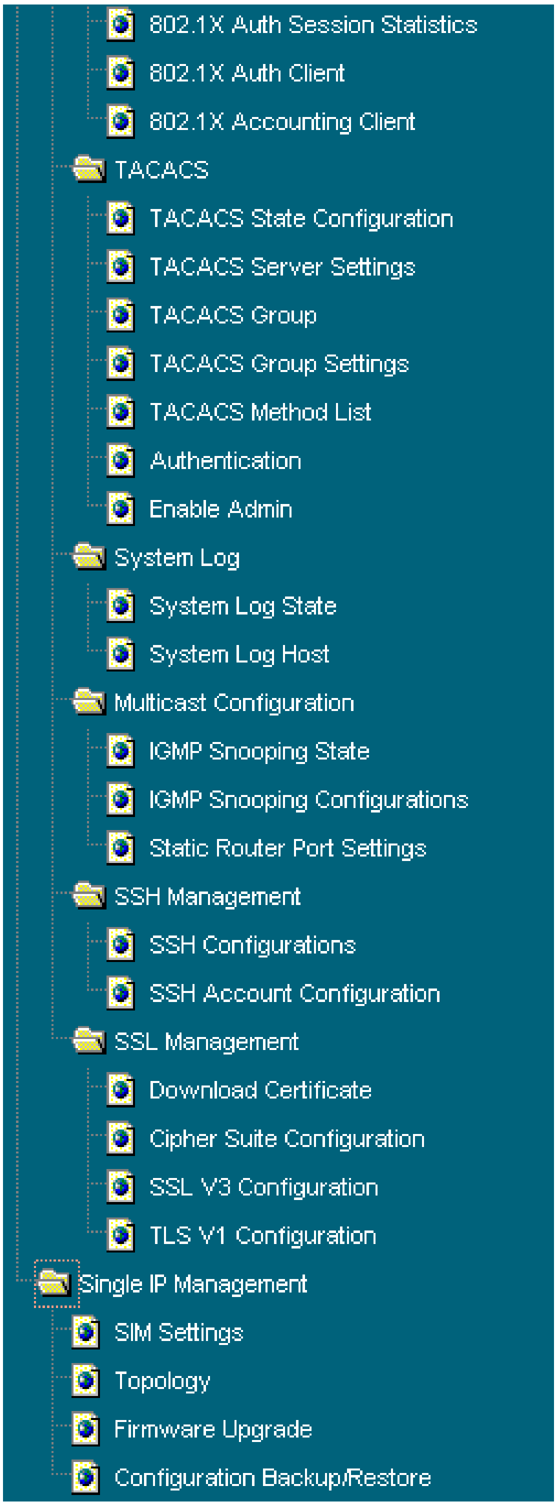


The panel on the left-hand side contains the main menu. The folders in the main menu are directories for **Basic Setup**, **Advanced Setup**, and **Single IP Management**. In these folders or directories are links to configuration windows and subdirectories containing more windows used to setup, manage and monitor the Switch.


D-Link
Building Networks for People
DGS-3224TGR
Basic Setup
Switch Information
Basic Switch Setup
Serial Port Settings
Port Configurations
Port Description Settings
Traffic Segmentation Table
User Accounts
Network Management
SNMP V3
SNMP View Table
SNMP Community Table
SNMP Host Table
SNMP Group Table
Engine ID
SNMP User Table
Management Station IP Addresses
Switch Utilities
TFTP Services
Download Firmware from TFTP Server
Download Configuration from TFTP Server
Upload Settings to TFTP Server


Upload History Log to TFTP Server
Others
Ping Test
Network Monitoring
Statistics
CPU Utilization
Port Utilization
Port Error Packets
Port Packet Analysis
Address Tables
MAC Address Table
ARP Table
Status
GVRP Status
Router Ports
IGMP Snooping Group Table
Switch History
Factory Reset
Save Changes
Restart System
Logout
Advanced Setup
Switch Advanced Settings
Spanning Tree
STP Switch Settings
STP Port Settings
Forwarding
MAC Forwarding
MAC Address Aging Time
Unicast MAC Address Settings





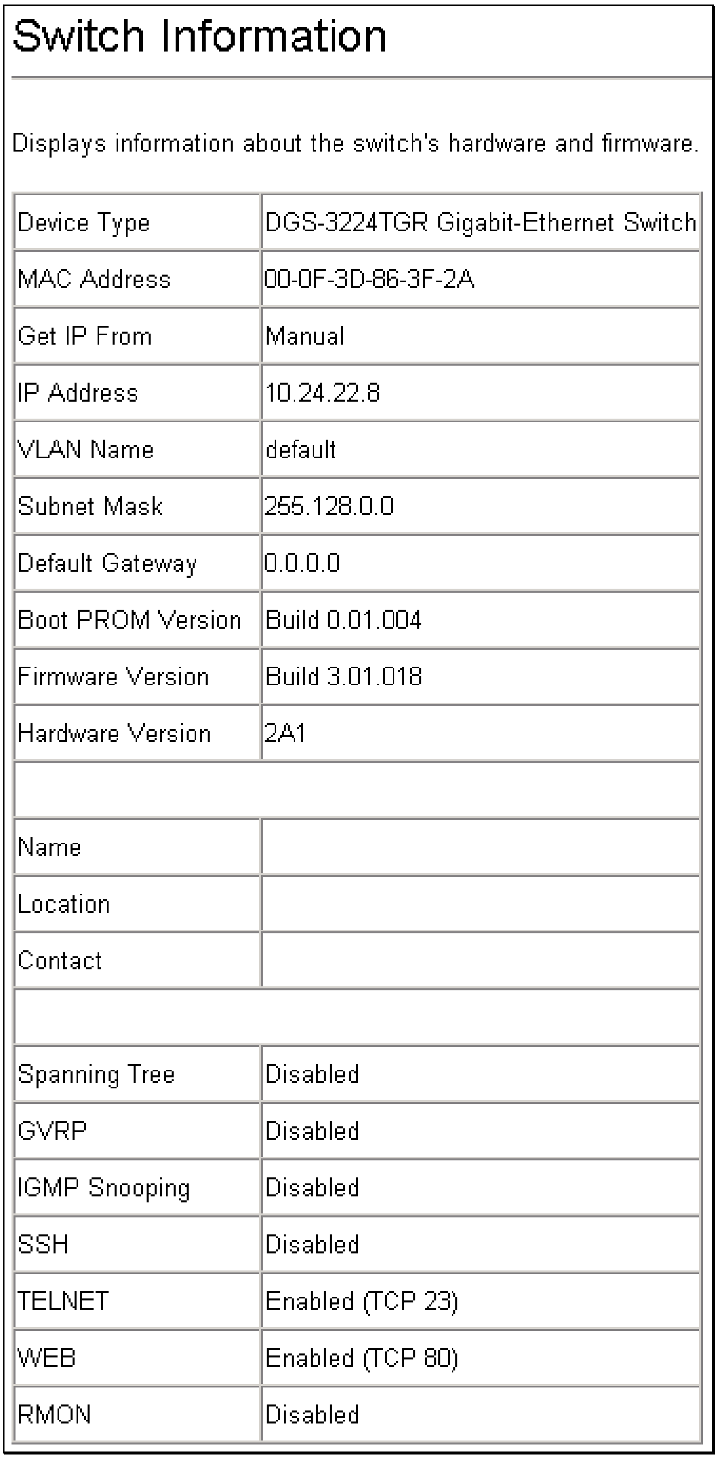
These are the major categories for switch management. If the sub-menus for each main category do not appear, click on the small square hyperlink to the left of the folder icon.

The switch management features available in the Web-based are explained below.

Basic Setup

The first category includes: **Switch Information**, **Basic Switch Setup**, **Serial Port Settings**, **Port Configurations**, **Port Description Settings**, **Traffic Segmentation Table**, **User Accounts**, **Network Management**, **Switch Utilities**, **Network Monitoring**, **Factory Reset**, **Save Changes**, **Restart System**, and **Logout**, as well as secondary windows.

Switch Information



Switch Information

Displays information about the switch's hardware and firmware.

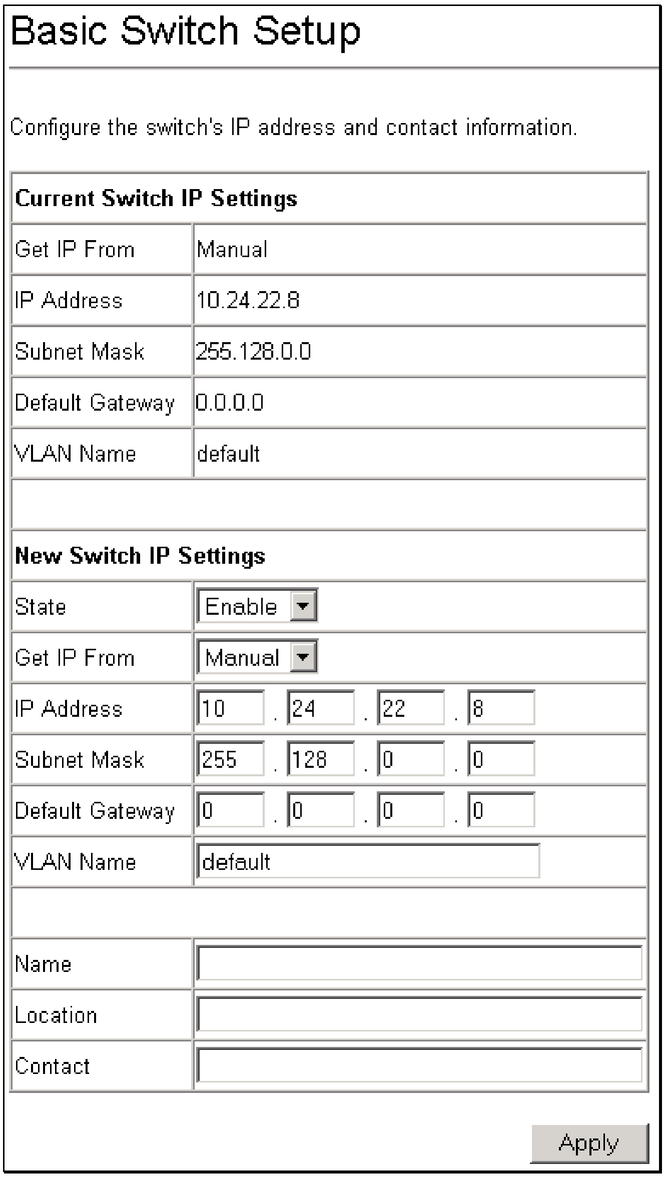
Device Type	DGS-3224TGR Gigabit-Ethernet Switch
MAC Address	00-0F-3D-86-3F-2A
Get IP From	Manual
IP Address	10.24.22.8
VLAN Name	default
Subnet Mask	255.128.0.0
Default Gateway	0.0.0.0
Boot PROM Version	Build 0.01.004
Firmware Version	Build 3.01.018
Hardware Version	2A1
Name	
Location	
Contact	
Spanning Tree	Disabled
GVRP	Disabled
IGMP Snooping	Disabled
SSH	Disabled
TELNET	Enabled (TCP 23)
WEB	Enabled (TCP 80)
RMON	Disabled

Figure 6- 1. Switch Information window

The information is described as follows:

Parameter	Description
Device Type	A description of the switch type.
MAC Address	The Ethernet address for the device. Also known as the physical address.
Get IP From	There are three choices for how the switch receives its IP Address settings: *Manual*, *BOOTP*, and *DHCP*.
IP Address	The host address for the device on the TCP/IP network.
VLAN Name	The VLAN name. The switch includes a pre-configured VLAN named "default."
Subnet Mask	The address mask that controls subnetting on your TCP/IP network.
Default Gateway	The IP address of the device—usually a router—that handles connections to other subnets and/or other TCP/IP networks.
Boot PROM Version	Version number for the firmware chip. This information is needed for new runtime software downloads.
Firmware Version	Version number of the firmware installed on the switch. This can be updated by using the Download Firmware from TFTP Server window in the TFTP Services folder (**Basic Setup → Switch Utilities**).
Hardware Version	Version of the switch hardware.
Name	A user-assigned name for the switch.
Location	A user-assigned description for the physical location of the switch.
Contact	Name of the person to contact should there be any problems or questions with the system. You may also want to include a phone number or extension.
Spanning Tree	This indicates if Spanning Tree is enabled on the switch. The switch's global STP settings can be changed on the STP Switch Settings window (**Advanced Setup → Spanning Tree**).
GVRP	This indicates if Group VLAN Registration Protocol (GVRP) is enabled on the switch. GVRP is a protocol that allows members to dynamically join VLANs. The switch's GVRP settings can be changed on the Switch GVRP window (**Advanced Setup → VLAN Configurations → Switch GVRP**).
IGMP Snooping	This indicates if Internet Group Management Protocol (IGMP) Snooping is enabled on the switch. When enabled, this feature instructs the switch to read IGMP packets being forwarded through the switch in order to obtain forwarding information from them (learn which ports contain Multicast members). The switch's IGMP snooping state can be changed on the IGMP Snooping State window (**Advanced Setup → Multicast Configuration → IGMP Snooping Global**).
SSH	This indicates if the Secure Shell protocol is currently enabled on the switch.
TELNET	This indicates if a Telnet connection is currently enabled on the switch.
WEB	This indicates if the Web manager is currently enabled on the switch.
RMON	This indicates if RMON is enabled on the switch.

Basic Switch Setup



Basic Switch Setup

Configure the switch's IP address and contact information.

Current Switch IP Settings	
Get IP From	Manual
IP Address	10.24.22.8
Subnet Mask	255.128.0.0
Default Gateway	0.0.0.0
VLAN Name	default
New Switch IP Settings	
State	Enable
Get IP From	Manual
IP Address	10 . 24 . 22 . 8
Subnet Mask	255 . 128 . 0 . 0
Default Gateway	0 . 0 . 0 . 0
VLAN Name	default
Name	
Location	
Contact	

Figure 6- 2. Basic Switch Setup window

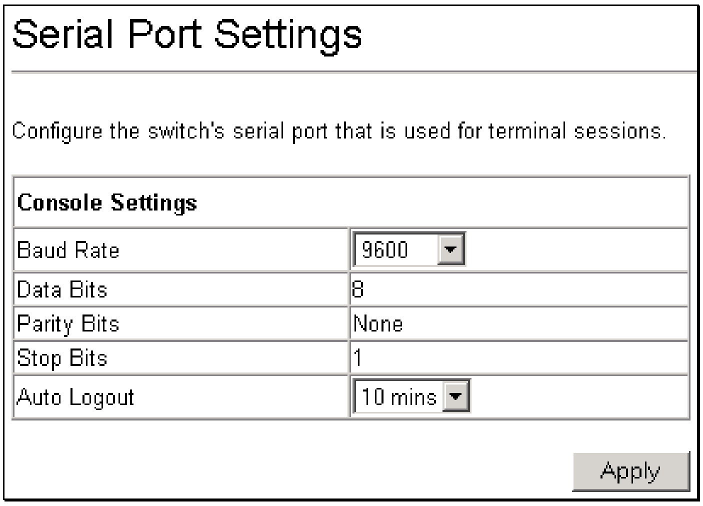
This window is used to enter name, location, and contact information, as well as to determine whether the switch should get its IP Address settings from the user (*Manual*), a *BOOTP* server, or a *DHCP* server. If you are not using either BOOTP or DHCP, enter the IP Address, Subnet Mask, and Default Gateway of the switch. If you enable BOOTP, you do not need to configure any IP parameters because a BOOTP server automatically assigns IP configuration parameters to the switch. If you enable DHCP, a Dynamic Host Configuration Protocol request will be sent when the switch is powered up. Once you have selected a setting under Get IP From, click **Apply** to activate the new settings.

The information is described as follows:

Parameter	Description
Get IP From	There are three choices for how the switch receives its IP Address settings: *Manual*, *BOOTP*, and *DHCP*.
IP Address	The host address for the device on the TCP/IP network.

Subnet Mask	The address mask that controls subnetting on your TCP/IP network.
Default Gateway	The IP address of the device—usually a router—that handles connections to other subnets and/or other TCP/IP networks.
VLAN Name	The VLAN name. The switch includes a pre-configured VLAN named "default."
Name	A user-assigned name for the switch.
Location	A user-assigned description for the physical location of the switch.
Contact	Name of the person to contact should there be any problems or questions with the system. You may also want to include a phone number or extension.
State	This allows you to enable or disable the IP interface.

Serial Port Settings



Serial Port Settings

Configure the switch's serial port that is used for terminal sessions.

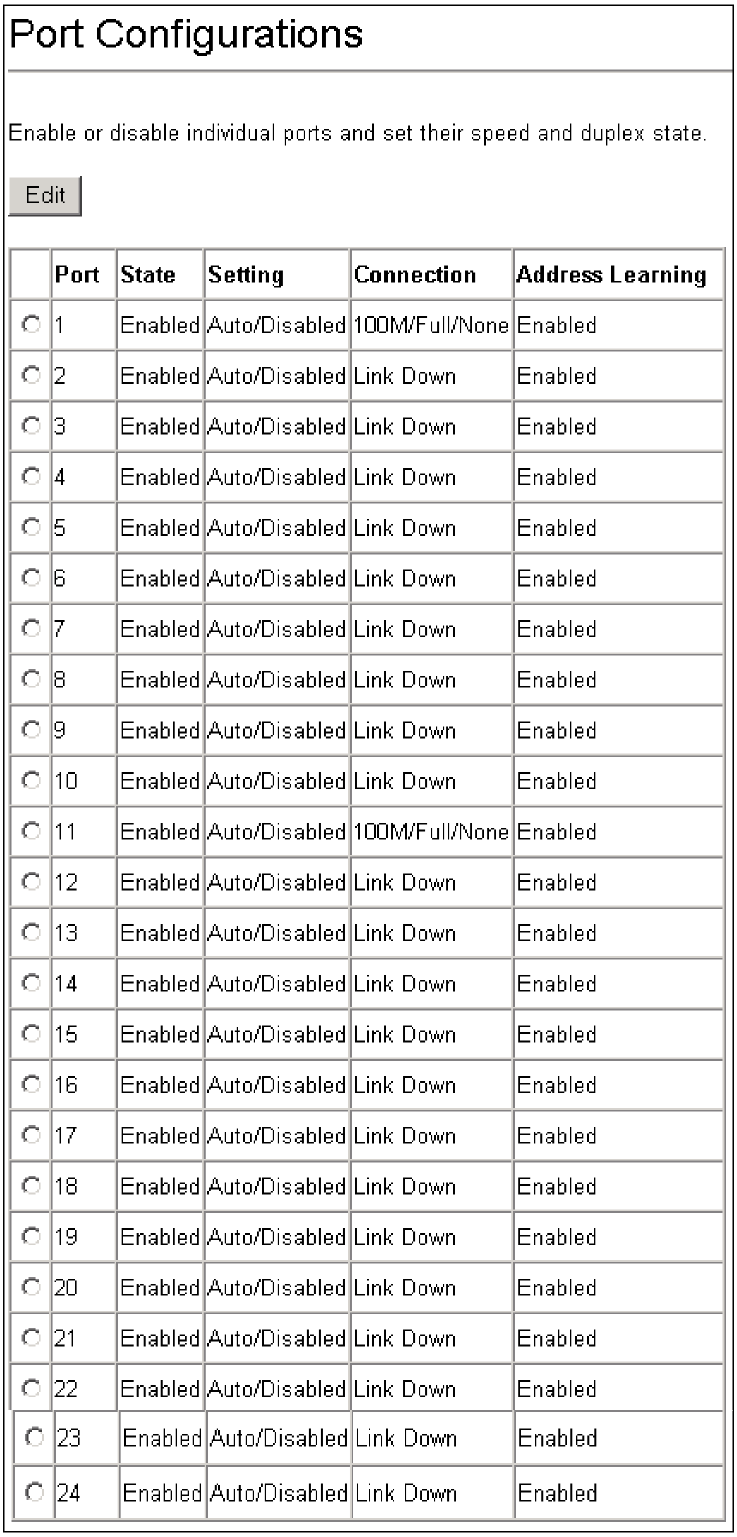
Console Settings	
Baud Rate	9600
Data Bits	8
Parity Bits	None
Stop Bits	1
Auto Logout	10 mins

Figure 6- 3. Serial Port Settings window

The following fields can be set:

Parameter	Description
Baud Rate	Determines the serial port bit rate that will be used the next time the switch is restarted. Available speeds are *9600*, *19,200*, *38,400*, and *115,200* bits per second. The default setting is *9600*.
Auto Logout	This setting for the restart of the console is *2 mins*, *5 mins*, *10 mins*, *15 mins*, or *Never*.

Port Configurations



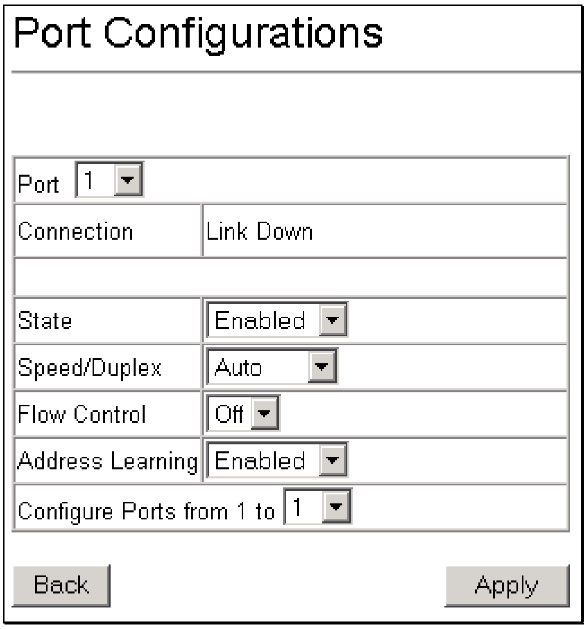
Port Configurations

Enable or disable individual ports and set their speed and duplex state.

	Port	State	Setting	Connection	Address Learning
○	1	Enabled	Auto/Disabled	100M/Full/None	Enabled
○	2	Enabled	Auto/Disabled	Link Down	Enabled
○	3	Enabled	Auto/Disabled	Link Down	Enabled
○	4	Enabled	Auto/Disabled	Link Down	Enabled
○	5	Enabled	Auto/Disabled	Link Down	Enabled
○	6	Enabled	Auto/Disabled	Link Down	Enabled
○	7	Enabled	Auto/Disabled	Link Down	Enabled
○	8	Enabled	Auto/Disabled	Link Down	Enabled
○	9	Enabled	Auto/Disabled	Link Down	Enabled
○	10	Enabled	Auto/Disabled	Link Down	Enabled
○	11	Enabled	Auto/Disabled	100M/Full/None	Enabled
○	12	Enabled	Auto/Disabled	Link Down	Enabled
○	13	Enabled	Auto/Disabled	Link Down	Enabled
○	14	Enabled	Auto/Disabled	Link Down	Enabled
○	15	Enabled	Auto/Disabled	Link Down	Enabled
○	16	Enabled	Auto/Disabled	Link Down	Enabled
○	17	Enabled	Auto/Disabled	Link Down	Enabled
○	18	Enabled	Auto/Disabled	Link Down	Enabled
○	19	Enabled	Auto/Disabled	Link Down	Enabled
○	20	Enabled	Auto/Disabled	Link Down	Enabled
○	21	Enabled	Auto/Disabled	Link Down	Enabled
○	22	Enabled	Auto/Disabled	Link Down	Enabled
○	23	Enabled	Auto/Disabled	Link Down	Enabled
○	24	Enabled	Auto/Disabled	Link Down	Enabled

Figure 6- 4. first Port Configurations window

To make changes to port configurations, select a port and click **Edit**. The following **Port Configurations** window will open:



Port Configurations

Port	1
Connection	Link Down
State	Enabled
Speed/Duplex	Auto
Flow Control	Off
Address Learning	Enabled
Configure Ports from 1 to	1

Figure 6- 5. second Port Configurations window

Select the port(s) you want to configure by using the drop-down menus in the Port and Configure Ports from __ to fields. Follow these steps:

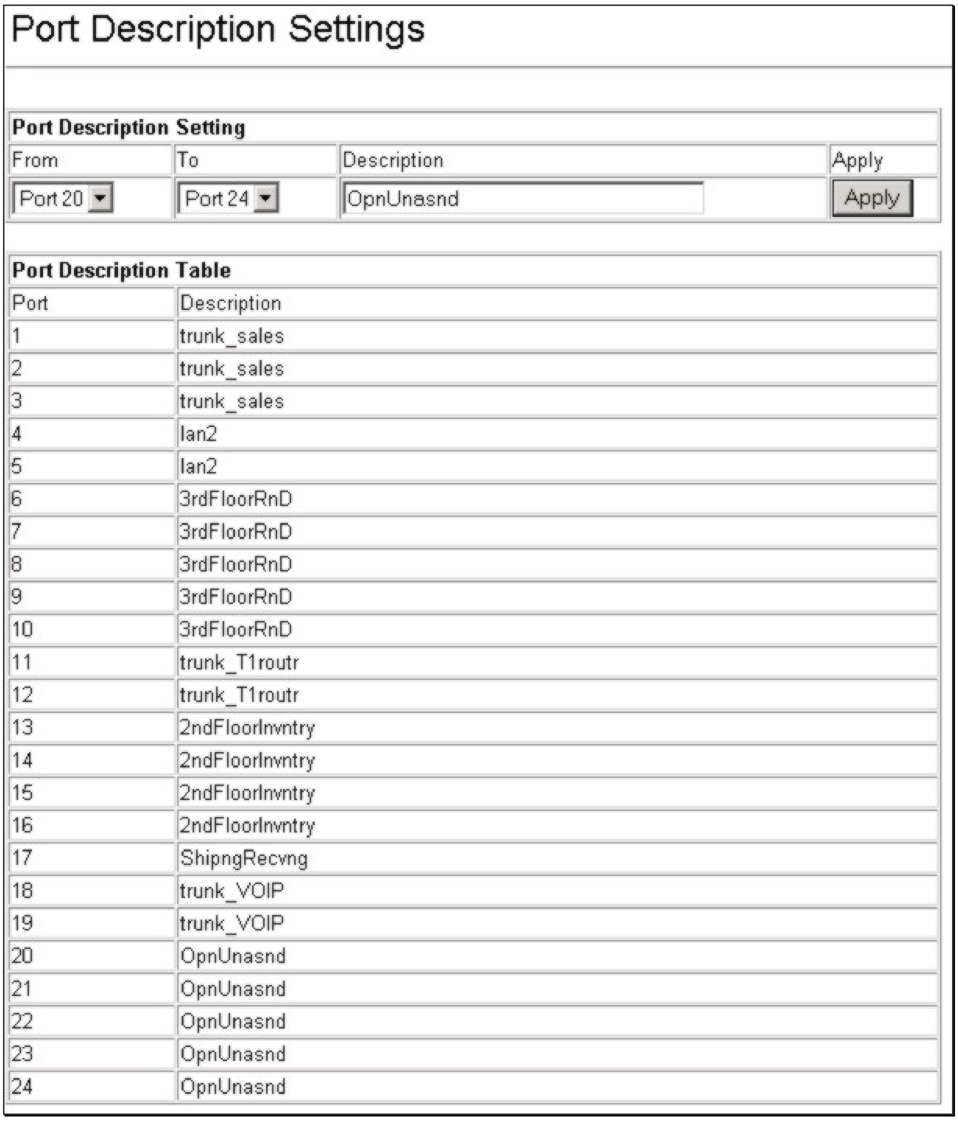
1. Enable or disable the port. If you choose *Disabled* in the State field, devices connected to that port cannot use the switch, and the switch purges their addresses from its address table after the MAC address aging time elapses.
2. Configure the Speed/Duplex setting for the twenty 10/100/1000 ports. Select *Auto* to allow the port to select the best transmission speed, duplex mode, and flow control settings based on the capabilities of the device at the other end. The other selections allow you to force the port to operate in the specified manner. Select *1000M/Full* for port operation at 1000 Mbps and full duplex. Select *100M/Half* for port operation at 100 Mbps and half duplex Select *100M/Full* for port operation at 100 Mbps and full duplex. Select *100M/Half* for port operation at 100 Mbps and half duplex. Select *10M/Full* for port operation at 10 Mbps and full duplex. Select *10M/Half* for port operation at 10 Mbps and half duplex. For 1000BASE-T ports, if *1000M/Full_M* is selected on one end of the link pair, then *1000M/Full_S* must be selected on the other end of your D-Link switch, and vice versa. For 1000M connections to switches that do not possess master/slave capability, the port speed must be set to *1000/Full*. Any other configuration will result in a link down status for both ports. The four mini-GBIC ports are *1000M/Full* only.
3. Configure the Flow Control setting for the port. Selecting *Enabled* in full-duplex mode will implement IEEE 802.3x flow control. Select *Disabled* for no flow control. Also, if the port is set for *Auto* (NWay) in the speed/duplex field above and flow control is enabled, flow control (whether full- or half-duplex) will only be implemented if the other device can auto-negotiate flow control.
4. Enable or disable Address Learning.
5. Click **Apply** to let your changes take effect.

⚠ **CAUTION:** For 1000BASE-T ports, the *master* and *slave* parameters refer to connections running a 1000BASE-T cable for connection between the switch port and another device capable of a gigabit connection. If one connection is set for *1000 master*, the other side of the connection must be set for *1000 slave,* for devices with *master/slave* capability. For connection to a device without this capability, the port speed must be set to *1000/full* on the switch connected to the DGS-3224TGR. Any other configuration will result in a link down status for both ports.

Port Description Settings

The DGS-3224TGR supports a port description feature where the user may name various ports on the Switch. To assign names to various ports:

1. Click **Port Description Settings** on the **Basic Setup** menu.
2. Use the From and To pull-down menu to choose a port or range of ports to describe, and then enter a description of the port(s).
3. Click **Apply** to set the descriptions in the Port Description Table.



Port Description Settings

Port Description Setting

From	To	Description	Apply
Port 20	Port 24	OpnUnasnd	Apply

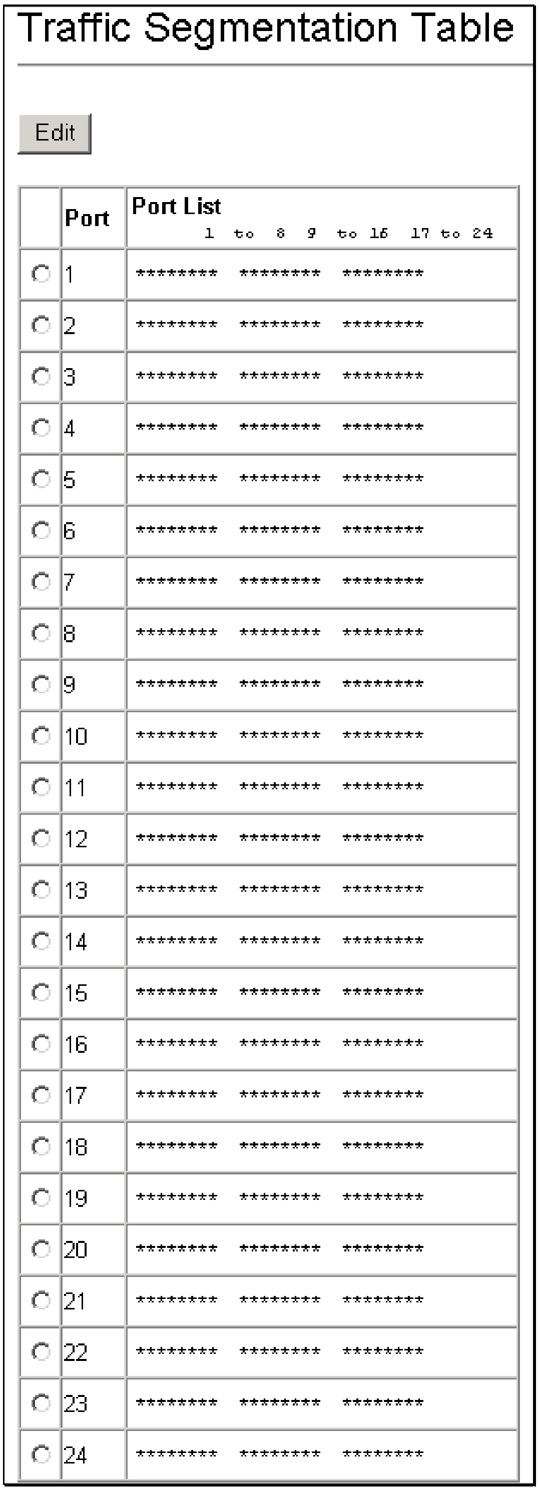
Port Description Table

Port	Description
1	trunk_sales
2	trunk_sales
3	trunk_sales
4	lan2
5	lan2
6	3rdFloorRnD
7	3rdFloorRnD
8	3rdFloorRnD
9	3rdFloorRnD
10	3rdFloorRnD
11	trunk_T1routr
12	trunk_T1routr
13	2ndFloorInvntry
14	2ndFloorInvntry
15	2ndFloorInvntry
16	2ndFloorInvntry
17	ShipngRecvng
18	trunk_VOIP
19	trunk_VOIP
20	OpnUnasnd
21	OpnUnasnd
22	OpnUnasnd
23	OpnUnasnd
24	OpnUnasnd

Figure 6- 6. Port Description Settings window

Traffic Segmentation Table

The Traffic Segmentation feature prevents the traffic of a specific port on the switch from being transferred to other ports on the switch. When an incoming packet from a specific port is received, it is only forwarded to the ports that have been user-defined, even if it is a unicast packet.

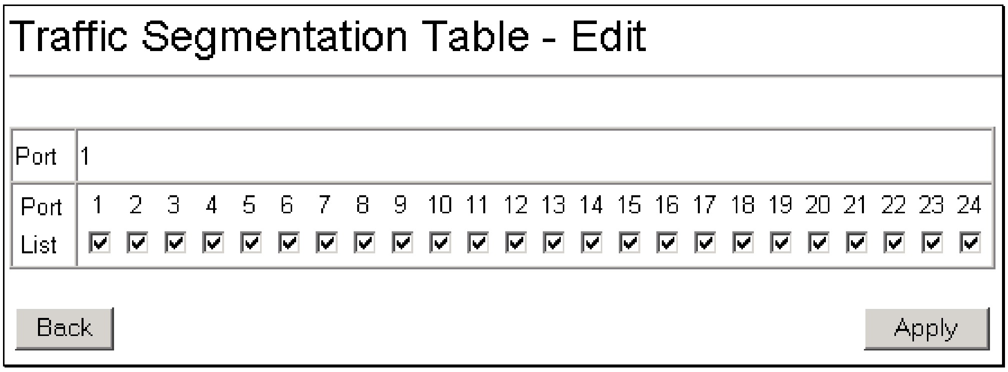


Traffic Segmentation Table

	Port	Port List 1 to 8 9 to 16 17 to 24
○	1	******** ******** ********
○	2	******** ******** ********
○	3	******** ******** ********
○	4	******** ******** ********
○	5	******** ******** ********
○	6	******** ******** ********
○	7	******** ******** ********
○	8	******** ******** ********
○	9	******** ******** ********
○	10	******** ******** ********
○	11	******** ******** ********
○	12	******** ******** ********
○	13	******** ******** ********
○	14	******** ******** ********
○	15	******** ******** ********
○	16	******** ******** ********
○	17	******** ******** ********
○	18	******** ******** ********
○	19	******** ******** ********
○	20	******** ******** ********
○	21	******** ******** ********
○	22	******** ******** ********
○	23	******** ******** ********
○	24	******** ******** ********

Figure 6- 7. Traffic Segmentation Table window

Select a Traffic Segmentation Table entry and click **Edit** to modify an entry.



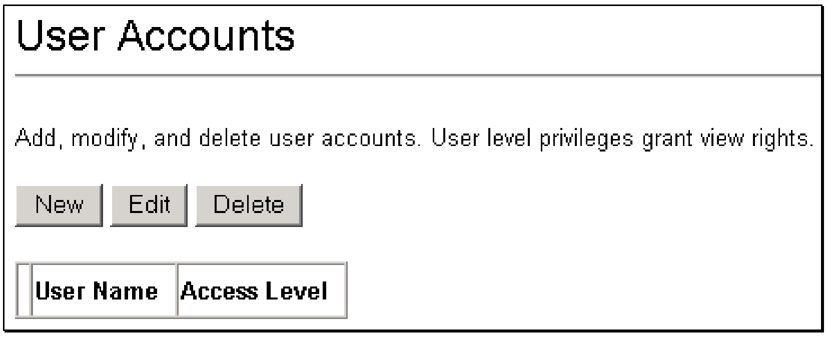
Traffic Segmentation Table - Edit

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

Figure 6- 8. Traffic Segmentation Table – Edit window

User Accounts

The switch allows you to set up and manage user accounts in the following windows.



User Accounts

Add, modify, and delete user accounts. User level privileges grant view rights.

	User Name	Access Level

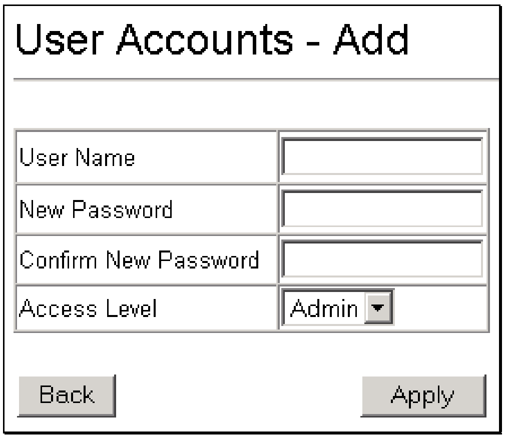
Figure 6- 9. User Accounts window

The information on the window is described as follows:

The following fields can be set:

Parameter	Description
User Name	Displays all current users for the switch.
Access Level	Displays the current access level assigned to each corresponding user. There are two access levels: *User* and *Admin*. *Admin* has full read/write access, while a *User* has read-only access.
New	Click this button to add a new user to the table.

User Accounts – Add



User Accounts - Add

User Name	
New Password	
Confirm New Password	
Access Level	Admin

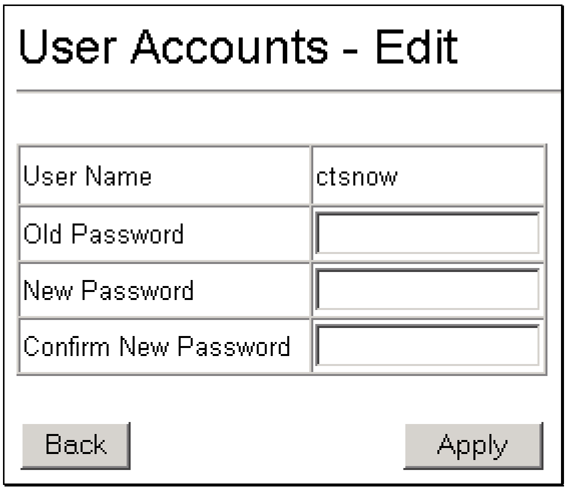
Figure 6- 10. User Accounts – Add window

To add a User Account, fill in the appropriate information in the Username, New Password, and Confirm New Password fields. Then select the desired access, *Admin* or *User,* in the Access Level drop-down menu and click **Apply**.

The information on the window is described as follows:

Parameter	Description
User Name	Enter a user name in this field.
New Password	Enter the desired new password in this field.
Confirm New Password	Enter the new password a second time.
Access Level	Displays the current access level assigned to each corresponding user. There are two access levels: *Admin* and *User*. An *Admin* user has full read/write access, while a *User* has read-only access.

User Accounts – Edit



User Accounts - Edit

User Name	ctsnow
Old Password	
New Password	
Confirm New Password	

Figure 6- 11. User Accounts – Edit window

To edit a User Account, fill in the appropriate information in the Old Password, New Password, and Confirm New Password fields. Click **Apply** to let your change take effect.

The information on the window is described as follows:

Parameter	Description
User Name	The user name being edited.
Old Password	Enter the last password used in this field.
New Password	Enter the desired new password in this field.
Confirm New Password	Enter the new password a second time.

SNMP Network Management

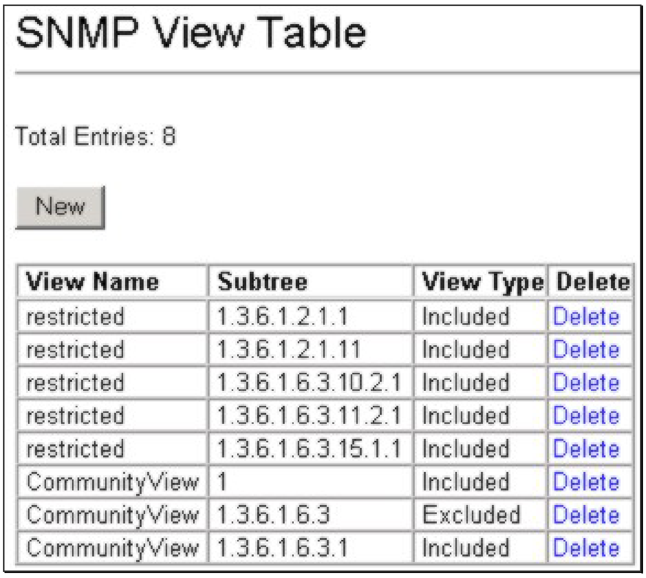
SNMP V3

The DGS-3224TGR supports the Simple Network Management Protocol (SNMP) versions 1, 2c1, and 3. The SNMP version used to monitor and control the switch can be specified by the administrator. 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 Addresses** window.

SNMP View Table

The SNMP View Table is used to assign views to community strings that define which MIB objects can be accessed by an SNMP manager.



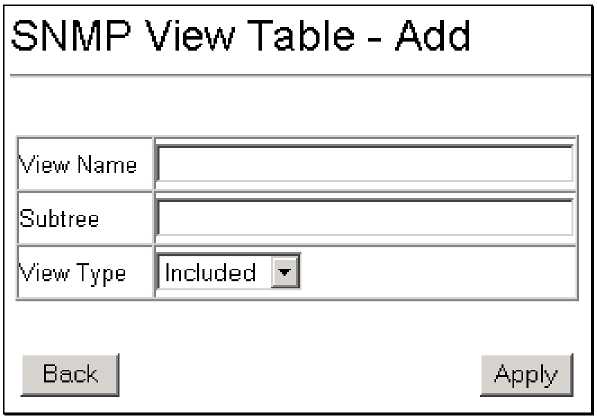
SNMP View Table

Total Entries: 8

View Name	Subtree	View Type	Delete
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 6- 12. SNMP View Table window

To delete an existing SNMP View Table entry, click **Delete** in the right-hand column that corresponds to the view name you wish to remove. To create a new entry, click the **New** button, a separate window will appear.



SNMP View Table - Add

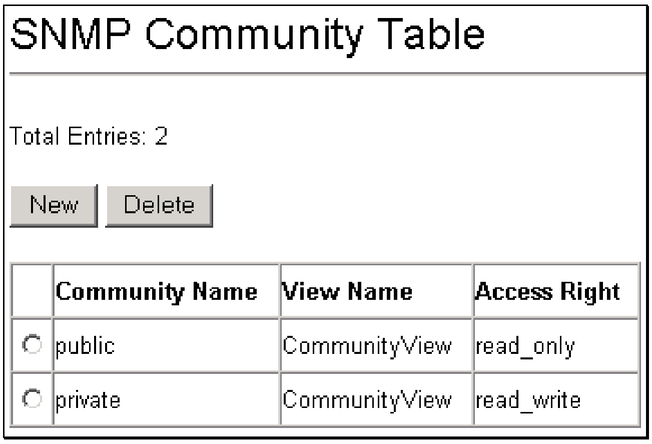
View Name	
Subtree	
View Type	Included

Figure 6- 13. SNMP View Table – Add window

The information on the SNMP View Table windows is described as follows:

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	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.

SNMP Community Table



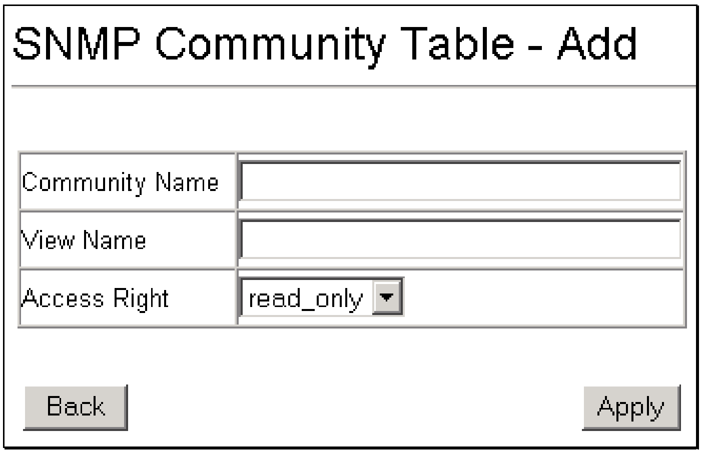
SNMP Community Table

Total Entries: 2

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

Figure 6- 14. SNMP Community Table window

To delete an entry, select it on the SNMP Community Table and then click **Delete**. To create a new entry, click the **New** button, a separate window will appear.



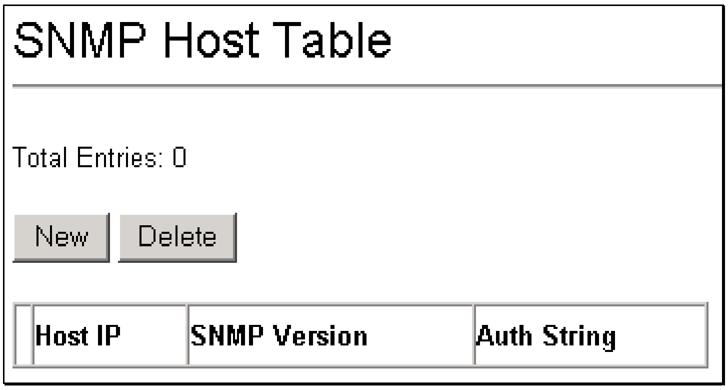
SNMP Community Table - Add

Community Name	
View Name	
Access Right	read_only

Figure 6- 15. SNMP Community Table – Add window

SNMP Host Table

Use the SNMP Host Table to set up trap recipients.



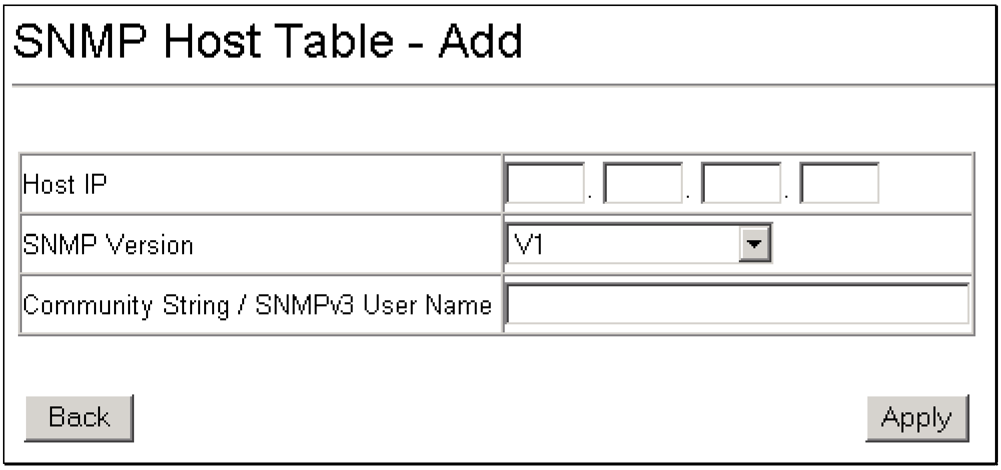
SNMP Host Table

Total Entries: 0

	Host IP	SNMP Version	Auth String

Figure 6- 16. SNMP Host Table window

To delete an existing entry, click the selection button in the right-hand column that corresponds to the port you want to remove and then click **Delete**. To create a new entry, click the **New** button, a separate window will appear.



SNMP Host Table - Add

Host IP	. . .
SNMP Version	V1
Community String / SNMPv3 User Name	

Figure 6- 17. SNMP Host Table – Add window

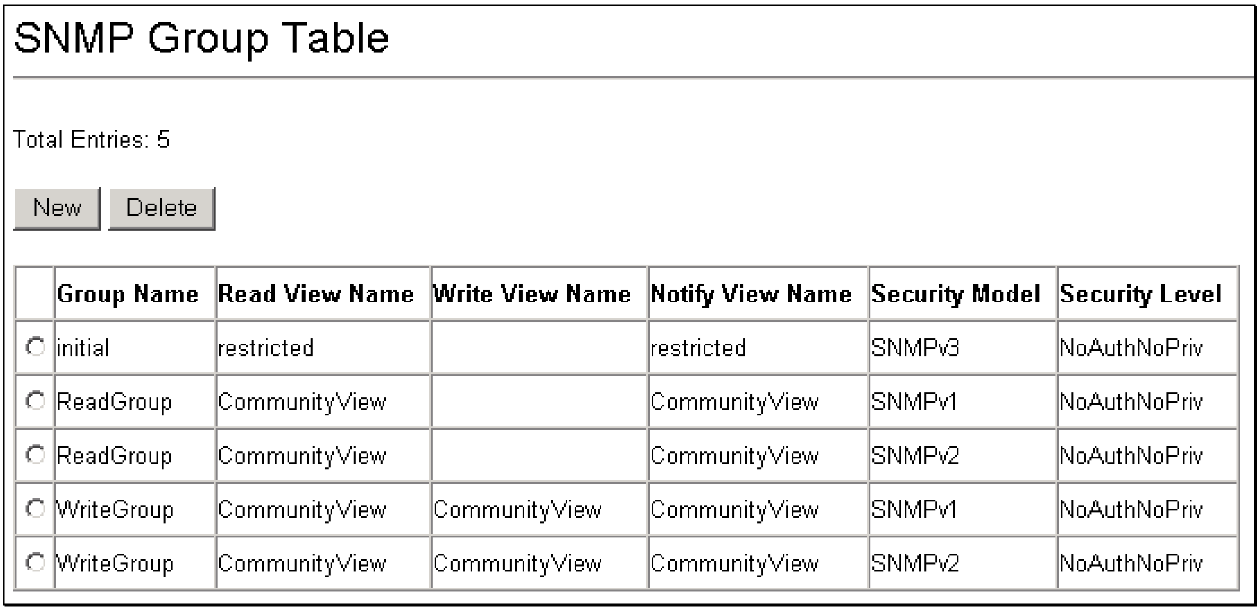
The following parameters are used in the SNMP Host Table windows:

Parameter	Description

Host IP	Type the IP address of the remote management station that will serve as the SNMP host for the switch.
SNMP Version	From the pull-down menu select: *V1* – To specifies that SNMP version 1 will be used. *V2c* – To specify that SNMP version 2 will be used. *V3-NoAuth-NoPriv* – To specify that the SNMP version 3 will be used, with a NoAuth-NoPriv security level. *V3-Auth-NoPriv* – To specify that the SNMP version 3 will be used, with an Auth-NoPriv security level. *V3-Auth-Priv* – 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.

SNMP Group Table

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



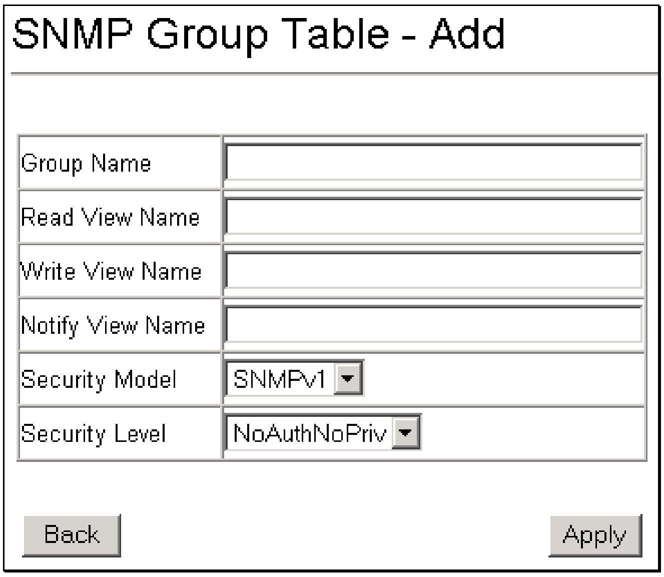
SNMP Group Table

Total Entries: 5

	Group Name	Read View Name	Write View Name	Notify View Name	Security Model	Security Level
○	initial	restricted		restricted	SNMPv3	NoAuthNoPriv
○	ReadGroup	CommunityView		CommunityView	SNMPv1	NoAuthNoPriv
○	ReadGroup	CommunityView		CommunityView	SNMPv2	NoAuthNoPriv
○	WriteGroup	CommunityView	CommunityView	CommunityView	SNMPv1	NoAuthNoPriv
○	WriteGroup	CommunityView	CommunityView	CommunityView	SNMPv2	NoAuthNoPriv

Figure 6- 18. SNMP Group Table window

To delete an existing entry, click the selection button in the right-hand column that corresponds to the port you want to remove. To create a new entry, click the **New** button, a separate window will appear.



SNMP Group Table - Add

Group Name	
Read View Name	
Write View Name	
Notify View Name	
Security Model	SNMPv1
Security Level	NoAuthNoPriv

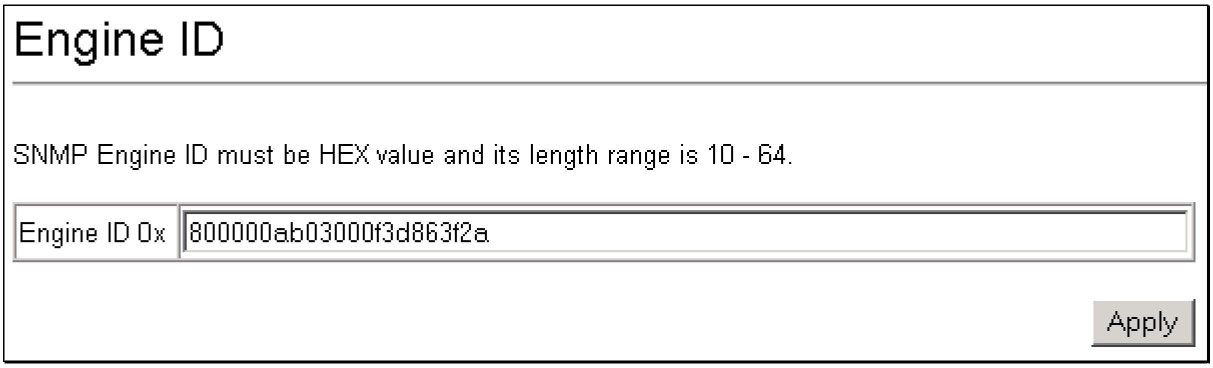
Figure 6- 19. SNMP Group Table – Add window

The following parameters are used in the SNMP Group Table windows:

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.
Security Model	Use the pull-down menu to select the SNMP version. Select one of the following: *SNMPv1* – Specifies that SNMP version 1 will be used. *SNMPv2* – Specifies that SNMP version 2c will be used. The SNMP v2c supports both centralized and distributed network management strategies. It includes improvements in the Structure of Management Information (SMI) and adds some security features. *SNMPv3* – Specifies that the SNMP version 3 will be used. SNMP v3 provides secure access to devices through a combination of authentication and encrypting packets over the network.
Security Level	Use the pull-down menu to select the SNMP version: *NoAuthNoPriv* – Specifies that there will be no authorization and no encryption of packets sent between the switch and a remote SNMP manager. *AuthNoPriv* – Specifies that authorization will be required, but there will be no encryption of packets sent between the switch and a remote SNMP manager. *AuthPriv* – Specifies that authorization will be required, and that packets sent between the switch and a remote SNMP manger will be encrypted.

Engine ID

The Engine ID is a unique identifier used for SNMP V3 implementations. This is an alphanumeric string used to identify the SNMP engine on the switch.



Engine ID

SNMP Engine ID must be HEX value and its length range is 10 - 64.

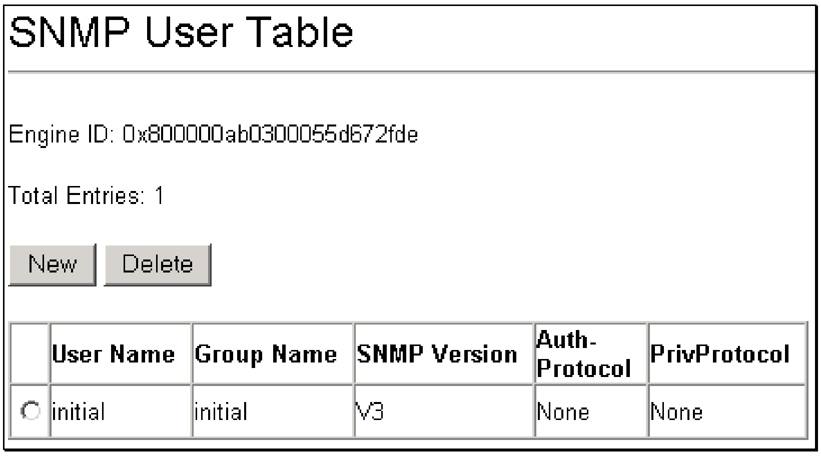
Engine ID 0x	800000ab03000f3d863f2a

Figure 6- 20. Engine ID window

To change the Engine ID, type the new Engine ID in the space provided and click the **Apply** button.

SNMP User Table

Use the SNMP User Table to create a new SNMP user and add the user to an existing SNMP group or to a newly created group.



SNMP User Table

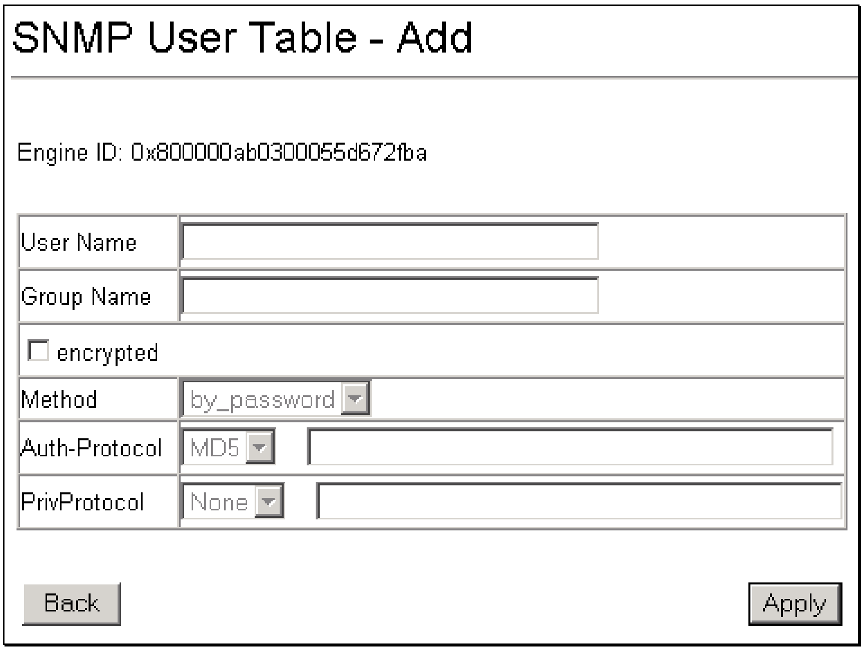
Engine ID: 0x800000ab0300055d672fde

Total Entries: 1

	User Name	Group Name	SNMP Version	Auth-Protocol	PrivProtocol
○	initial	initial	V3	None	None

Figure 6- 21. SNMP User Table window

To delete an existing entry, click the selection button in the right-hand column that corresponds to the port you want to configure and then click **Delete**. To create a new entry, click the **New** button, a separate window will appear.



SNMP User Table - Add

Engine ID: 0x800000ab0300055d672fba

User Name		
Group Name		
□ encrypted		
Method	by_password	
Auth-Protocol	MD5	
PrivProtocol	None	

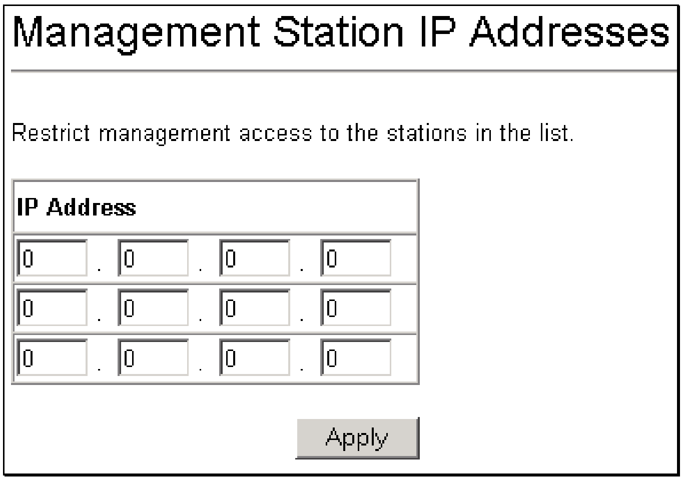
Figure 6- 22. SNMP User Table – Add window

The following parameters are used in the SNMP User Table windows:

Parameter	Description
User Name	Type in the new SNMP V3 user name or community string for V1 or V2. This can be any alphanumeric name of up to 32 characters that will identify the new SNMP user.
Group Name	Type in the new SNMP V3 group name. Again, this can be any alphanumeric name of up to 32 characters that will identify the SNMP group the new SNMP user will be associated with.
SNMP Version	From the pull-down menu select: *V1* – To specifies that SNMP version 1 will be used. *V2c*– To specify that SNMP version 2 will be used. *V3* – To specify that the SNMP version 3 will be used.
If Encryption (V3 only) is checked configure also: **Auth-Protocol**	In the space provided, type an alphanumeric sting of between 8 and 20 characters that will be used to authorize the agent to receive packets for the host. From the pull-down menu select: *MD5* – To specify that the HMAC-MD5-96 authentication level will be used. *SHA* – To specify that the HMAC-SHA-96 authentication level will be used.
If Encryption (V3 only) is checked configure also: **PrivProtocol**	In the space provided, type an alphanumeric string of between 8 and 16 characters that will be used to encrypt the contents of messages the host sends to the agent.
Method	From the pull-down menu select: *by_password*– The auth_password string length ranges from 4 to 8. *by_key*– The auth_key string length is 16 and must be hexadecimal.

Management Station IP Addresses

Management stations are computers on the network that will be used to manage the switch. You can limit the number of possible management stations by entering up to three IP addresses. If the three IP Address fields contain all zeros ("0"), then any station with any IP address can access the switch to manage and configure it. If there is one or more IP addresses entered in the IP Address fields, then only stations with the IP addresses entered will be allowed to access the switch to manage or configure it.



Management Station IP Addresses

Restrict management access to the stations in the list.

IP Address
0 . 0 . 0 . 0
0 . 0 . 0 . 0
0 . 0 . 0 . 0

Figure 6- 23. Management Station IP Addresses window

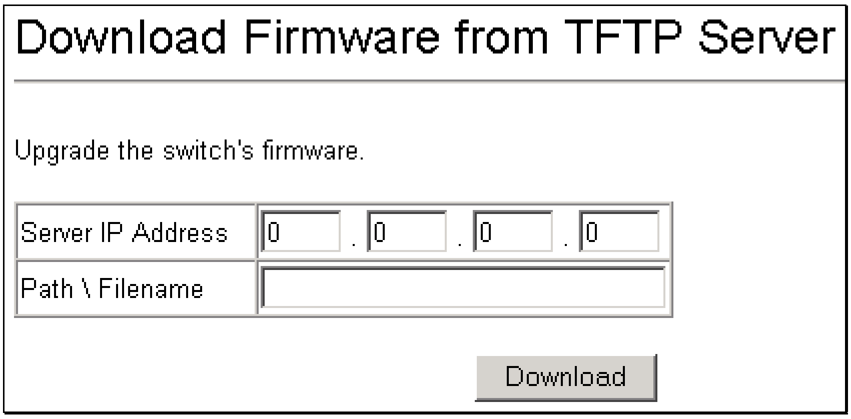
Switch Utilities

TFTP Services

Trivial File Transfer Protocol (TFTP) services allow the switch firmware to be upgraded by downloading a new firmware file from a TFTP server to the switch. A configuration file can also be loaded into the switch, and switch settings can be saved to a TFTP server. In addition, the switch's history log can be uploaded to a TFTP server.

Please note that TFTP server software must be running on the management station for the TFTP services listed here to work.

Download Firmware from TFTP Server



Download Firmware from TFTP Server

Upgrade the switch's firmware.

Server IP Address	0 . 0 . 0 . 0
Path \ Filename	

Figure 6- 24. Download Firmware from TFTP Server window

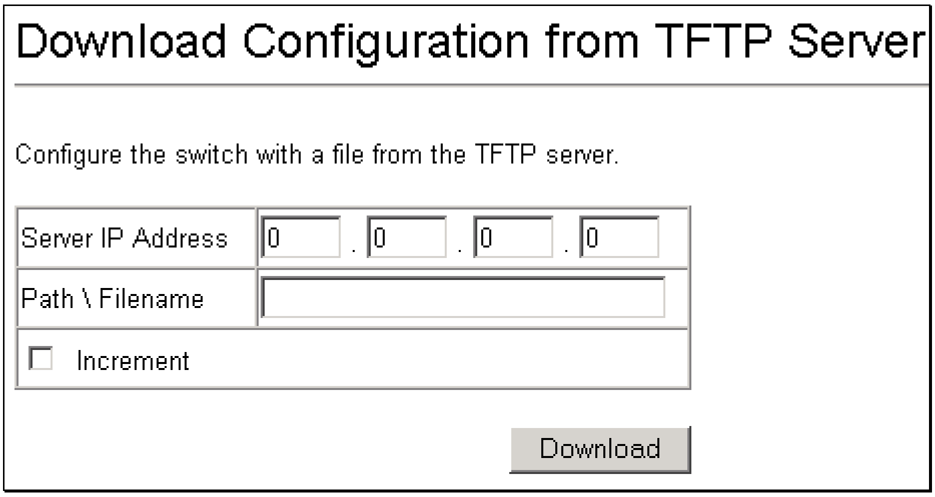
Enter the IP address of the TFTP server in the Server IP Address field and the complete path and file name of the firmware file for the switch in the Path/Filename field. Click **Download** to initiate the file transfer.

Enter the information described below to download firmware from a TFTP server:

Parameter	Description
Server IP Address	The IP address of the TFTP server.
Path/File Name	The full file name (including path) of the setting file on the TFTP server.

Download Configuration from TFTP Server

A configuration file can be downloaded from a TFTP server to the switch. This file is then used by the switch to configure itself.



Download Configuration from TFTP Server

Configure the switch with a file from the TFTP server.

Server IP Address	0 . 0 . 0 . 0
Path \ Filename	
□ Increment	

Figure 6- 25. Download Configuration from TFTP Server window

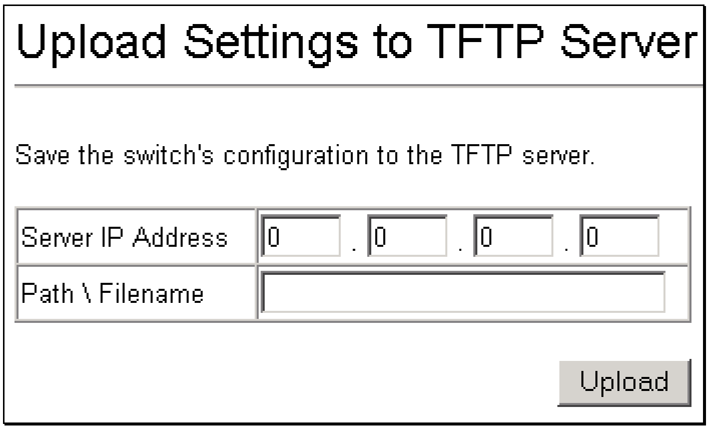
Enter the IP address of the TFTP Server in the Server IP Address field and the complete path and file name of the firmware file for the switch in the Path/Filename field. Click **Download** to initiate the file transfer.

Enter the information described below to download a configuration file from a TFTP server:

Parameter	Description
Server IP Address	The IP address of the TFTP server.
Path/File Name	The full file name (including path) of the setting file on the TFTP server.
Increment	Checking this box allows the switch to add the current configuration file to any previously downloaded partial configuration files. If this box is not checked, the new configuration file will completely replace the previous configuration file(s).

Upload Settings to TFTP Server

The switch's current settings can be uploaded to a TFTP Server by the switch's management agent.



Upload Settings to TFTP Server

Save the switch's configuration to the TFTP server.

Server IP Address	0 . 0 . 0 . 0
Path \ Filename	

Figure 6- 26. Upload Settings to TFTP Server window

Enter the IP address of the TFTP Server in the Server IP Address field and the complete path and file name of the firmware file for the switch in the Path/Filename field. Click **Upload** to initiate the file transfer.

Please note that if the user does not save configurations to NV-RAM, the configurations the user is uploading to a TFTP server will not be saved correctly.

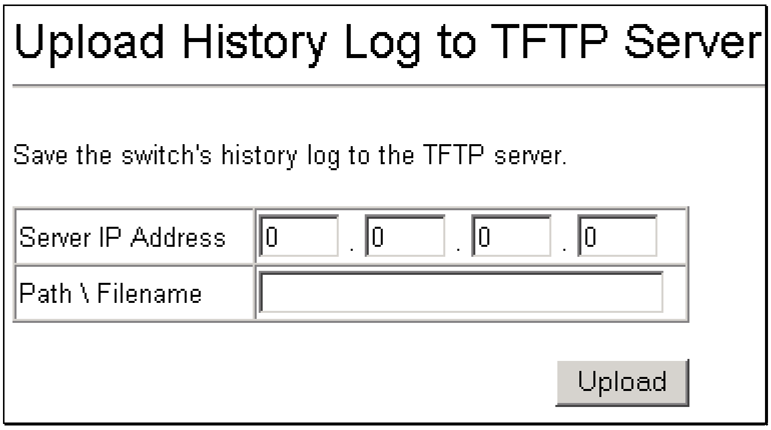
Enter the information described below to upload Switch configuration settings to a TFTP server:

Parameter	Description
Server IP Address	The IP address of the TFTP server.
Path/File Name	The full file name (including path) of the setting file on the TFTP server.

Upload History Log to TFTP Server

The switch's management agent can upload its history log file to a TFTP server.

Please note that an empty history file on the TFTP server must exist on the server before the switch can upload its history file.



Upload History Log to TFTP Server

Save the switch's history log to the TFTP server.

Server IP Address	0 . 0 . 0 . 0
Path \ Filename	

Figure 6- 27. Upload History Log to TFTP Server window

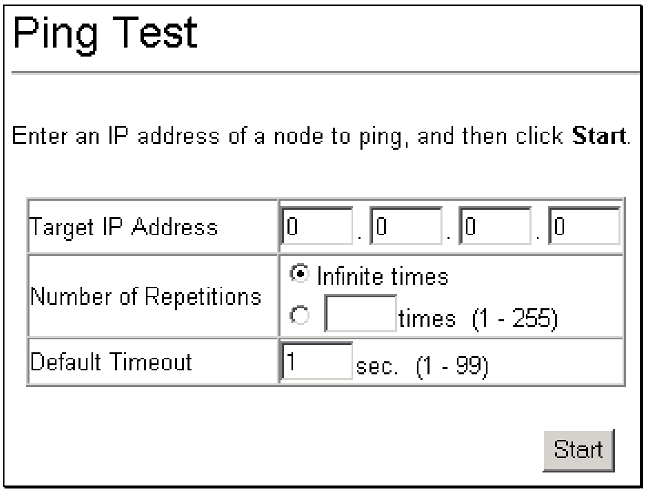
Enter the IP address of the TFTP Server in the Server IP Address field and the complete path and file name of the firmware file for the switch in the Path/Filename field. Click **Upload** to initiate the file transfer.

The information is described as follows:

Parameter	Description
Server IP Address	The IP address of the TFTP server.
Path/File Name	The full file name (including path) of the setting file on the TFTP server.

Ping Test

The switch is able to test the connection with another network device using Ping.



Ping Test

Enter an IP address of a node to ping, and then click **Start**.

Target IP Address	0 . 0 . 0 . 0
Number of Repetitions	● Infinite times ○ times (1 - 255)
Default Timeout	1 sec. (1 - 99)

Figure 6- 28. Ping Test window

Enter the IP address of the network device to be Pinged in the first field, select the number of test packets to be sent (three is usually enough) in the second field, and enter a time-out value in the third field. Click **Start** to initiate the Ping program.

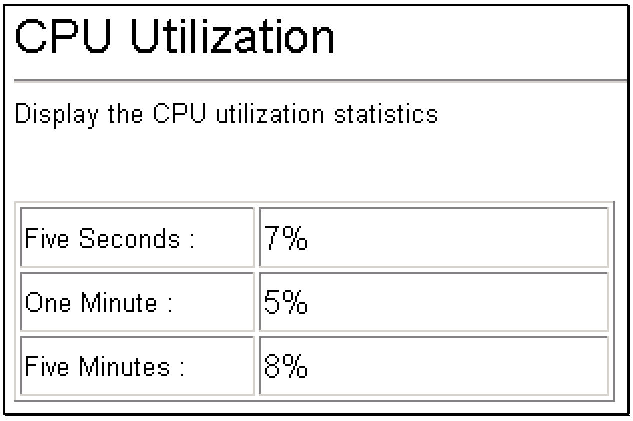
Network Monitoring

The switch's monitoring features are located in the following three folders: **Statistics**, **Address Tables**, and **Status**.

Statistics

The Statistics windows include **CPU Utilization**, **Port Utilization**, **Port Error Packets**, and **Port Packet Analysis**.

CPU Utilization



CPU Utilization

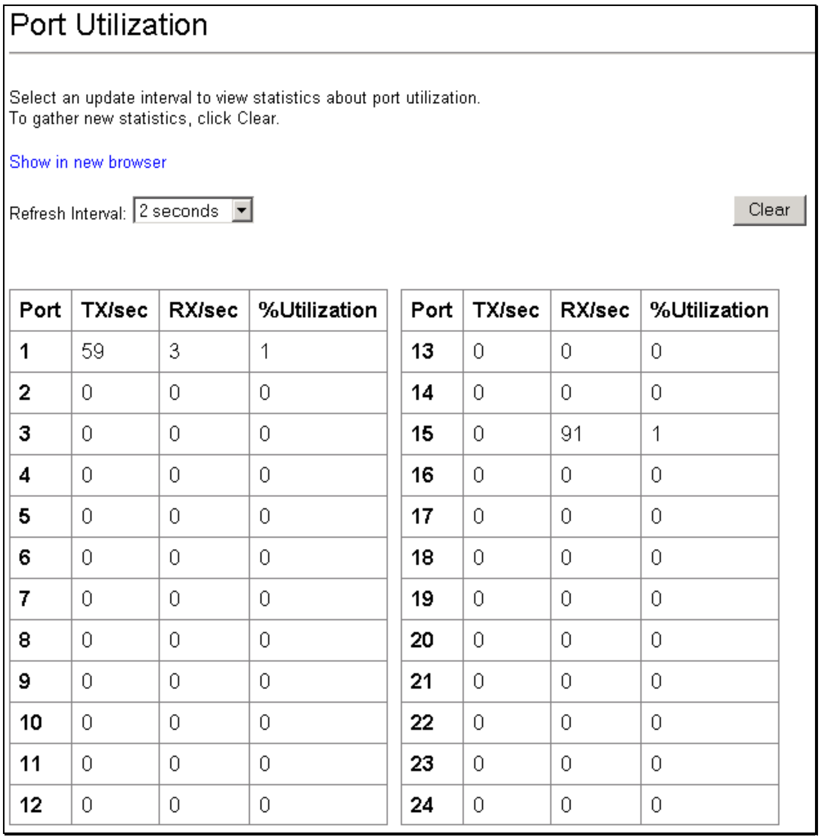
Display the CPU utilization statistics

Five Seconds :	7%
One Minute :	5%
Five Minutes :	8%

Figure 6- 29. CPU Utilization window

The **CPU Utilization** window displays the percentage of the CPU being used, expressed as an integer percentage and calculated as a simple average by time interval.

Port Utilization



Port Utilization

Select an update interval to view statistics about port utilization.
To gather new statistics, click Clear.

Show in new browser

Refresh Interval: 2 seconds

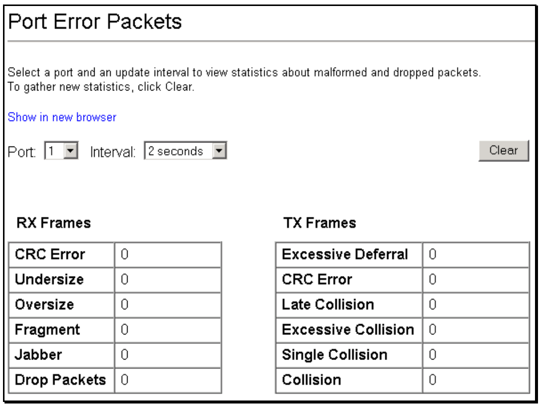
Port	TX/sec	RX/sec	%Utilization	Port	TX/sec	RX/sec	%Utilization
1	59	3	1	13	0	0	0
2	0	0	0	14	0	0	0
3	0	0	0	15	0	91	1
4	0	0	0	16	0	0	0
5	0	0	0	17	0	0	0
6	0	0	0	18	0	0	0
7	0	0	0	19	0	0	0
8	0	0	0	20	0	0	0
9	0	0	0	21	0	0	0
10	0	0	0	22	0	0	0
11	0	0	0	23	0	0	0
12	0	0	0	24	0	0	0

Figure 6- 30. Port Utilization window

The information is described as follows:

Parameter	Description
Refresh Interval	Select the desired setting between *2 seconds* and *60 second,* or *Suspend*.
Clear	Clicking this button clears all statistics counters on this window.

Port Error Packets



Port Error Packets

Select a port and an update interval to view statistics about malformed and dropped packets.
To gather new statistics, click Clear.

Show in new browser

Port: 1 Interval: 2 seconds

RX Frames

CRC Error	0
Undersize	0
Oversize	0
Fragment	0
Jabber	0
Drop Packets	0

TX Frames

Excessive Deferral	0
CRC Error	0
Late Collision	0
Excessive Collision	0
Single Collision	0
Collision	0

Figure 6- 31. Port Error Packets window

The information is described as follows:

Parameter	Description

Port Select the port you want port error packet statistics for from the drop-down menu.

Interval Select the desired setting between *2 seconds* and *60 seconds* or *Suspend*.

Clear Clicking this button clears all statistics counters on this window.

CrcError Counts otherwise valid frames that did not end on a byte (octet) boundary.

Undersize The number of frames detected that are less than the minimum permitted frame size of 64 bytes and have a good CRC. Undersize frames usually indicate collision fragments, a normal network occurrence.

Oversize Counts packets received that were longer than 1518 octets, or if a VLAN frame 1522 octets, and less than the MAX_PKT_LEN. Internally, MAX_PKT_LEN is equal to 1522.

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 The number of frames with lengths more than the MAX_PKT_LEN bytes. Internally, MAX_PKT_LEN is equal to 1522.

Drop Packets The number of frames that are dropped by this port since the last Switch reboot.

Excessive Deferral Counts the number of frames for which the first transmission attempt on a particular interface was delayed because the medium was busy.

CRC Error For 10 Mbps ports, the counter records CRC errors (FCS or alignment errors). For 100 Mbps ports, the counter records the sum of CRC errors and code errors (frames received with rxerror signal).

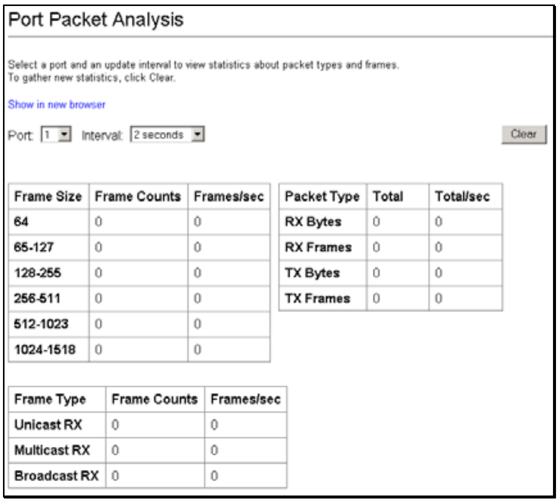
Late Collision Counts the number of times that a collision is detected later than 512 bit-times into the transmission of a packet.

Excessive Collision The number of frames for which transmission failed due to excessive collisions.

Single Collision The number of successfully transmitted frames for which transmission is inhibited by more than one collision.

Collision An estimate of the total number of collisions on this network segment.

Port Packet Analysis



Port Packet Analysis

Select a port and an update interval to view statistics about packet types and frames.
To gather new statistics, click Clear.

Show in new browser

Port: 1 Interval: 2 seconds

Frame Size	Frame Counts	Frames/sec
64	0	0
65-127	0	0
128-255	0	0
256-511	0	0
512-1023	0	0
1024-1518	0	0

Packet Type	Total	Total/sec
RX Bytes	0	0
RX Frames	0	0
TX Bytes	0	0
TX Frames	0	0

Frame Type	Frame Counts	Frames/sec
Unicast RX	0	0
Multicast RX	0	0
Broadcast RX	0	0

Figure 6- 32. Port Packet Analysis window

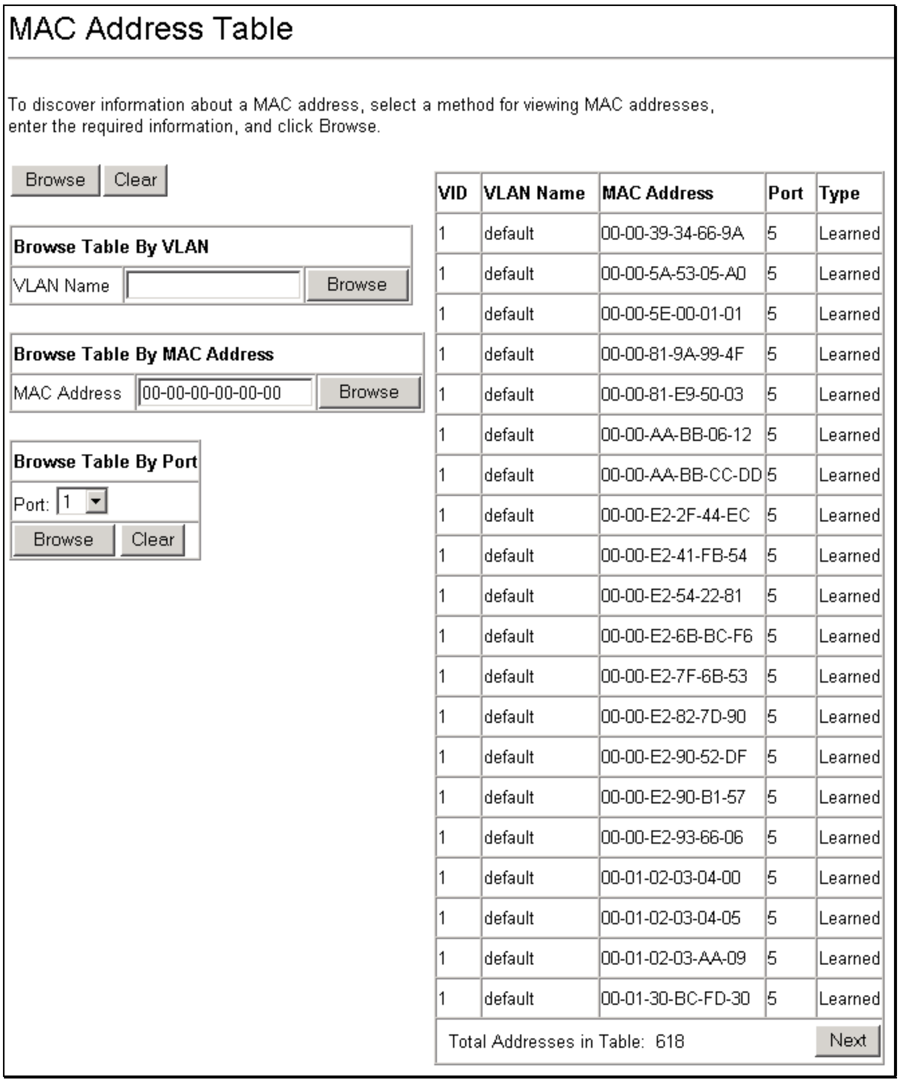
The information is described as follows:

Parameter	Description
Port	Select the port you want port error analysis statistics for from the drop-down menu.
Interval	Select the desired setting between *2 seconds* and *60 second,* or *Suspend*.
Clear	Clicking this button clears all statistics counters on this window.
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).
Unicast RX	Displays the number of unicast packets received by the switch in total number (Frames) and the rate (Frames/sec).
Multicast RX	Displays the number of multicast packets received by the switch in total number (Frames) and the rate (Frames/sec).
Broadcast RX	Displays the number of broadcast packets received by the switch in total number (Frames) and the rate (Frames/sec).
RX Bytes	Displays the number of bytes (octets) received by the switch in total number (Total), and rate (Total/sec).
RX Frames	Displays the number of packets (frames) received by the switch in total number (Total), and rate (Total/sec).
TX Bytes	Displays the number of bytes (octets) transmitted by the switch in total number (Total), and rate (Total/sec).

Address Tables

The Address Tables include the **MAC Address Table** and **ARP Table**.

MAC Address Table



To discover information about a MAC address, select a method for viewing MAC addresses, enter the required information, and click Browse.

MAC Address: 00-00-00-00-00-00

Port: 1

VID	VLAN Name	MAC Address	Port	Type
1	default	00-00-39-34-66-9A	5	Learned
1	default	00-00-5A-53-05-A0	5	Learned
1	default	00-00-5E-00-01-01	5	Learned
1	default	00-00-81-9A-99-4F	5	Learned
1	default	00-00-81-E9-50-03	5	Learned
1	default	00-00-AA-BB-06-12	5	Learned
1	default	00-00-AA-BB-CC-DD	5	Learned
1	default	00-00-E2-2F-44-EC	5	Learned
1	default	00-00-E2-41-FB-54	5	Learned
1	default	00-00-E2-54-22-81	5	Learned
1	default	00-00-E2-6B-BC-F6	5	Learned
1	default	00-00-E2-7F-6B-53	5	Learned
1	default	00-00-E2-82-7D-90	5	Learned
1	default	00-00-E2-90-52-DF	5	Learned
1	default	00-00-E2-90-B1-57	5	Learned
1	default	00-00-E2-93-66-06	5	Learned
1	default	00-01-02-03-04-00	5	Learned
1	default	00-01-02-03-04-05	5	Learned
1	default	00-01-02-03-AA-09	5	Learned
1	default	00-01-30-BC-FD-30	5	Learned

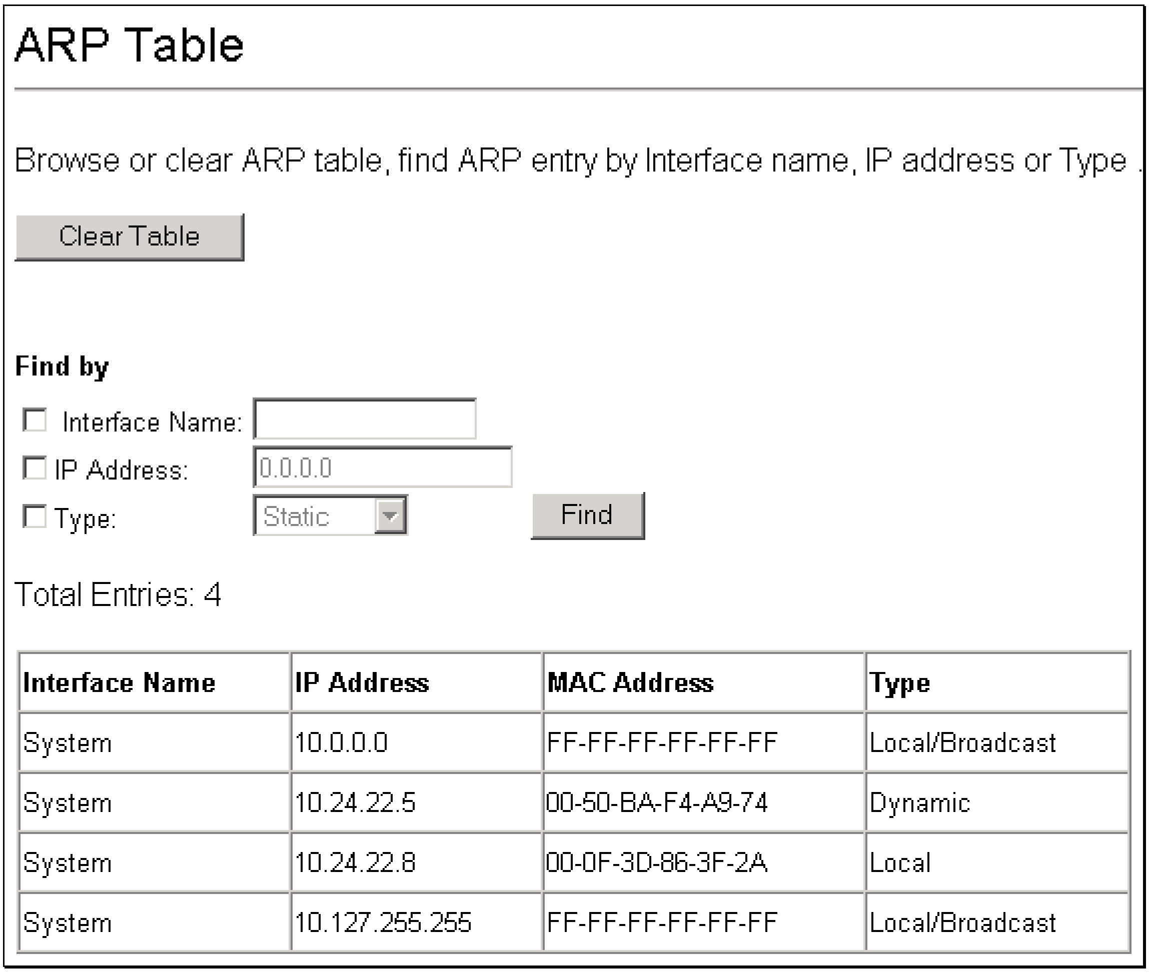
Total Addresses in Table: 618

Figure 6- 33. MAC Address Table window

The information is described as follows:

Parameter	Description
Browse	Click this button to initiate the desired method for viewing MAC addresses.
Clear	Clicking this button clears all statistics counters on this window.

ARP Table



ARP Table

Browse or clear ARP table, find ARP entry by Interface name, IP address or Type .

Find by

☐ Interface Name:

☐ IP Address: 0.0.0.0

☐ Type: Static

Total Entries: 4

Interface Name	IP Address	MAC Address	Type
System	10.0.0.0	FF-FF-FF-FF-FF-FF	Local/Broadcast
System	10.24.22.5	00-50-BA-F4-A9-74	Dynamic
System	10.24.22.8	00-0F-3D-86-3F-2A	Local
System	10.127.255.255	FF-FF-FF-FF-FF-FF	Local/Broadcast

Figure 6- 34. ARP Table window

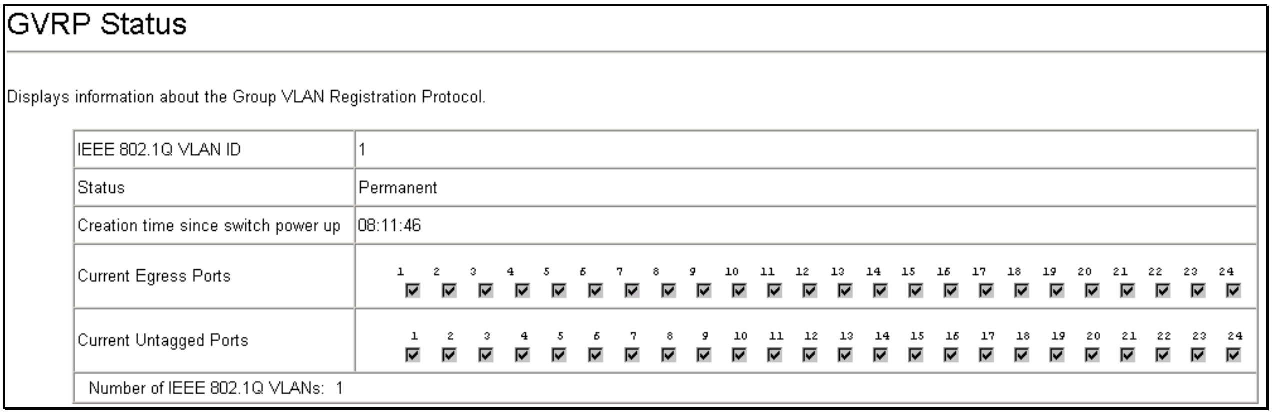
Search the ARP entry table by Interface Name or by IP Address. You may also specify Static or Dynamic entries only by selecting the Type and specifying *Static* or *Dynamic* from the pull-down menu. Click the **Find** button to initiate the search for the ARP Table. Clicking the **Clear Table** button to clear all statistics counters on this window.

Status

The Status windows include **GVRP Status**, **Router Ports**, **IGMP Snooping Group Table**, and **Switch History**.

GVRP Status

This allows the GVRP status for each of the switch's ports to be viewed by VLAN. This window displays the ports on the switch that are currently Egress or Untagged ports.



GVRP Status

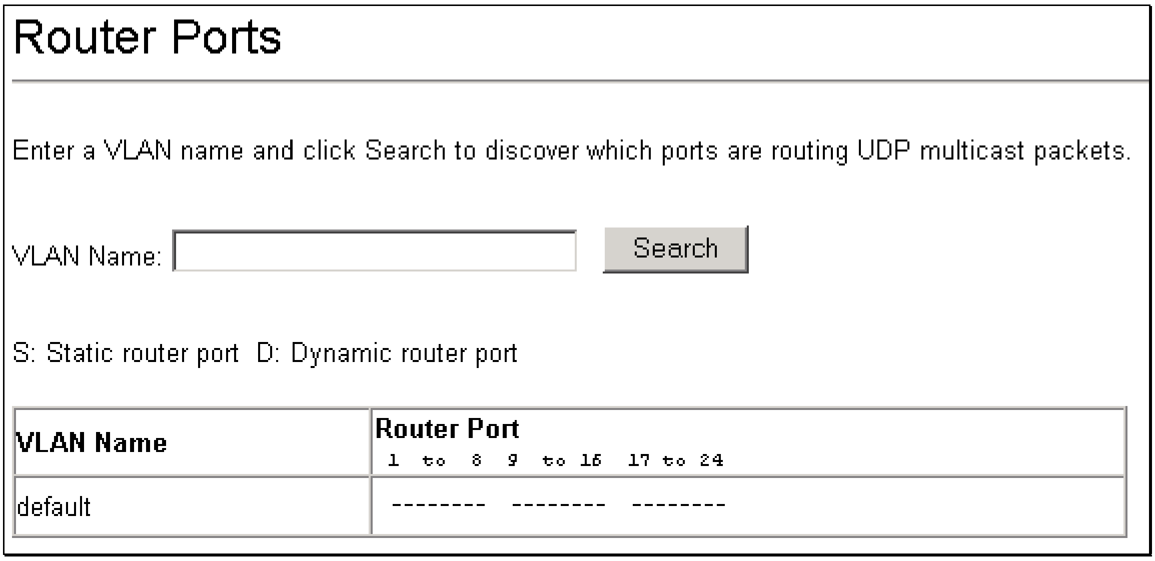
Displays information about the Group VLAN Registration Protocol.

IEEE 802.1Q VLAN ID	1
Status	Permanent
Creation time since switch power up	08:11:46
Current Egress Ports	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 ☑
Current Untagged Ports	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 ☑
Number of IEEE 802.1Q VLANs: 1	

Figure 6- 35. GVRP Status window

Router Ports

This displays 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**.



Router Ports

Enter a VLAN name and click Search to discover which ports are routing UDP multicast packets.

VLAN Name:

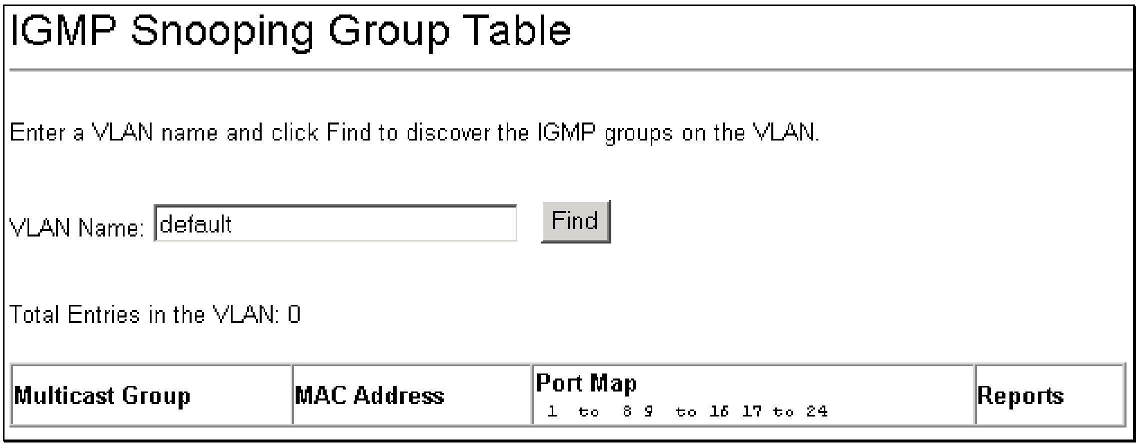
S: Static router port D: Dynamic router port

VLAN Name	Router Port 1 to 8 9 to 16 17 to 24
default	-------- -------- --------

Figure 6- 36. Router Ports window

IGMP Snooping Group Table

This allows the switch’s IGMP Snooping table to be viewed. 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. The ports where the IGMP packets were snooped are displayed, signified with an M. The number of IGMP reports that were snooped is also displayed in the Reports field.



IGMP Snooping Group Table

Enter a VLAN name and click Find to discover the IGMP groups on the VLAN.

VLAN Name: default Find

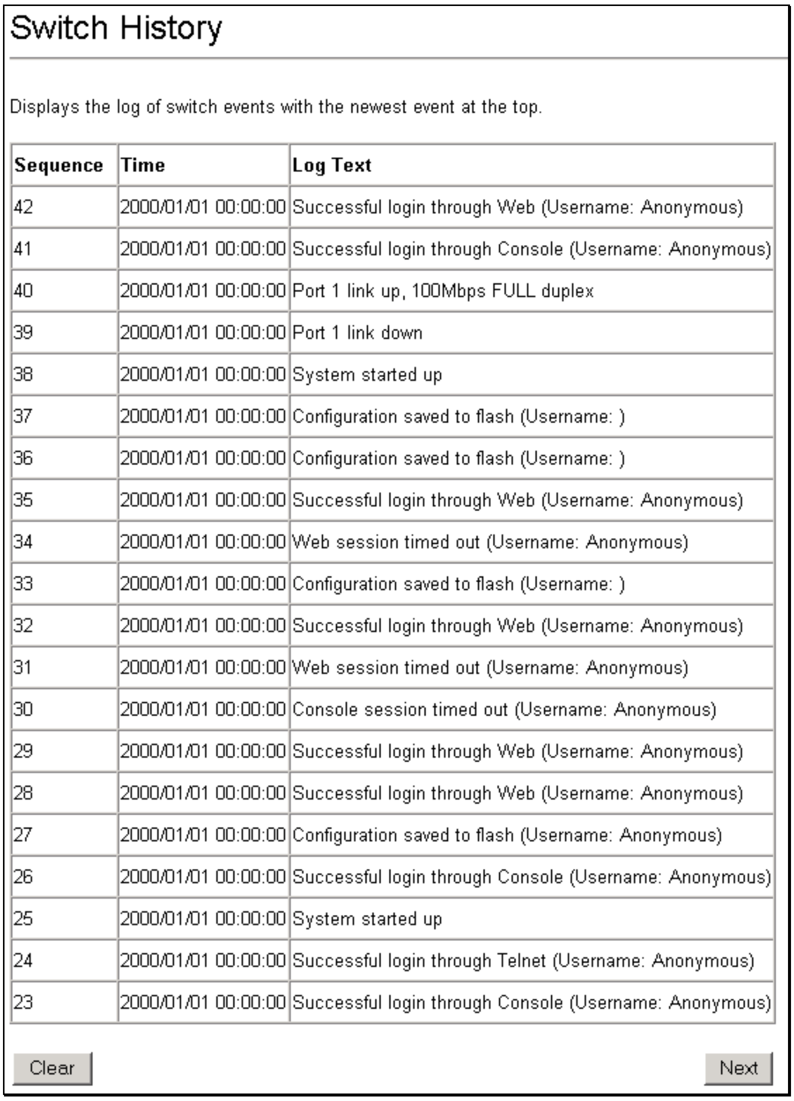
Total Entries in the VLAN: 0

Multicast Group	MAC Address	Port Map 1 to 8 9 to 16 17 to 24	Reports

Figure 6- 37. IGMP Snooping Group Table window

Switch History

The Web manager allows the switch's history log, as compiled by the switch's management agent, to be viewed.



Switch History

Displays the log of switch events with the newest event at the top.

Sequence	Time	Log Text
42	2000/01/01 00:00:00	Successful login through Web (Username: Anonymous)
41	2000/01/01 00:00:00	Successful login through Console (Username: Anonymous)
40	2000/01/01 00:00:00	Port 1 link up, 100Mbps FULL duplex
39	2000/01/01 00:00:00	Port 1 link down
38	2000/01/01 00:00:00	System started up
37	2000/01/01 00:00:00	Configuration saved to flash (Username:)
36	2000/01/01 00:00:00	Configuration saved to flash (Username:)
35	2000/01/01 00:00:00	Successful login through Web (Username: Anonymous)
34	2000/01/01 00:00:00	Web session timed out (Username: Anonymous)
33	2000/01/01 00:00:00	Configuration saved to flash (Username:)
32	2000/01/01 00:00:00	Successful login through Web (Username: Anonymous)
31	2000/01/01 00:00:00	Web session timed out (Username: Anonymous)
30	2000/01/01 00:00:00	Console session timed out (Username: Anonymous)
29	2000/01/01 00:00:00	Successful login through Web (Username: Anonymous)
28	2000/01/01 00:00:00	Successful login through Web (Username: Anonymous)
27	2000/01/01 00:00:00	Configuration saved to flash (Username: Anonymous)
26	2000/01/01 00:00:00	Successful login through Console (Username: Anonymous)
25	2000/01/01 00:00:00	System started up
24	2000/01/01 00:00:00	Successful login through Telnet (Username: Anonymous)
23	2000/01/01 00:00:00	Successful login through Console (Username: Anonymous)

Figure 6- 38. Switch History window

The switch can record event information in its own logs, to designated SNMP trap receiving stations, and to the PC connected to the console manager. Clicking **Next** at the bottom of the window will allow you to display all the switch Trap Logs.

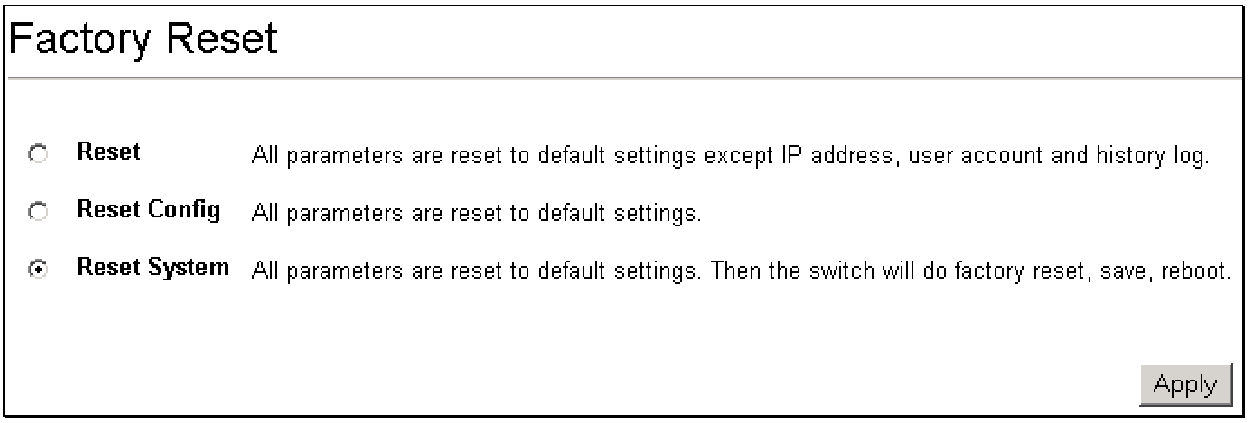
The information in the Switch History log is described as follows:

Parameter	Description
Sequence	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	Displays the time in days, hours, and minutes since the switch was last restarted.
Log Text	Displays text describing the event that triggered the history log entry.

Factory Reset

The following window allows you to Reset, Reset Config, or Reset System. See the on-screen instructions for the differences among each option.

Note that all changes are kept in normal memory. If a user does not save the result into NV-RAM with the Save Changes function, the switch will recover all the settings the last user configured after the switch is rebooted.



Factory Reset

○ **Reset** All parameters are reset to default settings except IP address, user account and history log.

○ **Reset Config** All parameters are reset to default settings.

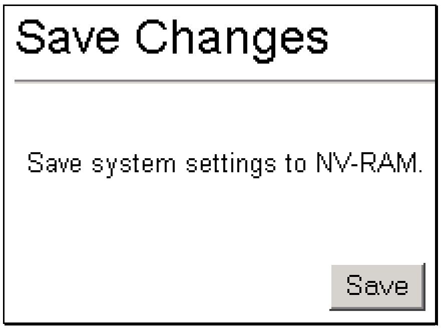
● **Reset System** All parameters are reset to default settings. Then the switch will do factory reset, save, reboot.

Figure 6- 39. Factory Reset window

Save Changes

The DGS-3224TGR has two levels of memory, normal RAM and non-volatile or NV-RAM.

To retain any configuration changes permanently, highlight **Save Changes** on the **Basic Setup** window. The following window will appear to verify that your new settings have been saved to NV-RAM.



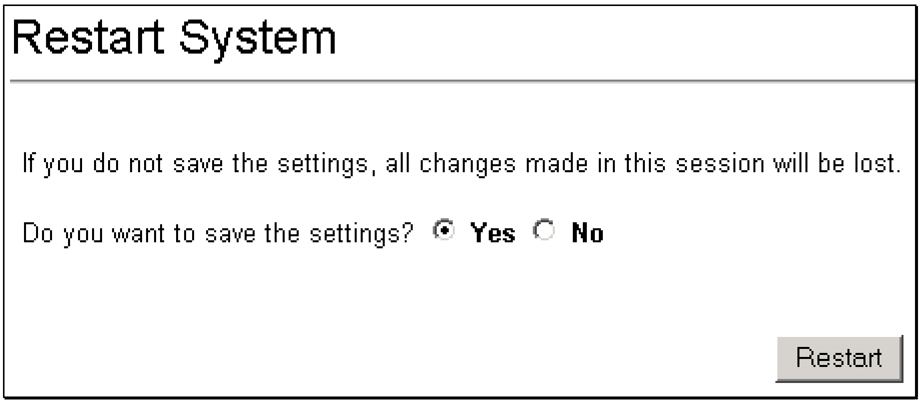
Save Changes

Save system settings to NV-RAM.

Figure 6- 40. Save Changes window

Once the switch configuration settings have been saved to NV-RAM, they become the default settings for the switch. These settings will be used every time the switch is rebooted.

Restart System



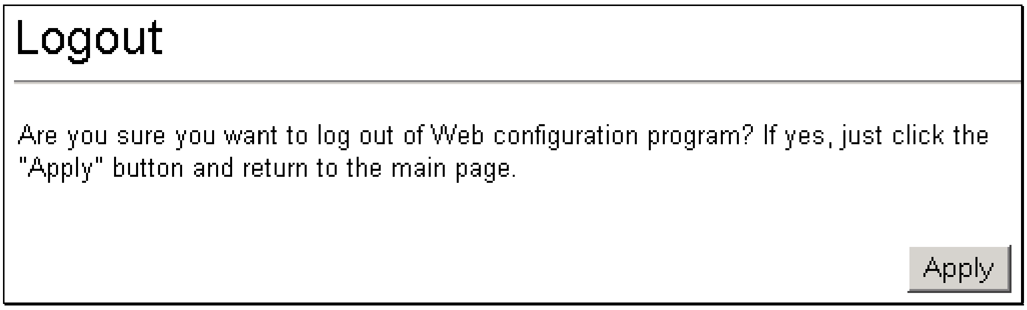
Restart System

If you do not save the settings, all changes made in this session will be lost.

Do you want to save the settings? ● Yes ○ No

Figure 6- 41. Restart System window

Logout



Logout

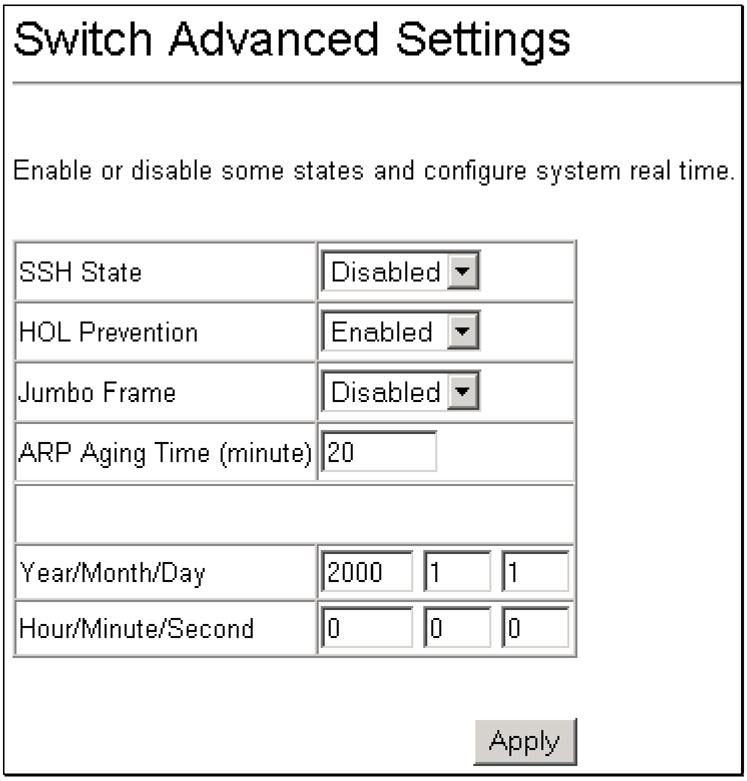
Are you sure you want to log out of Web configuration program? If yes, just click the "Apply" button and return to the main page.

Figure 6- 42. Logout window

Advanced Setup

This category includes: **Switch Advanced Settings**, **Spanning Tree**, **Forwarding**, **Configure QOS**, **Access Profile Mask Setting**, **Port Security**, **Port Mirroring Configurations**, **VLAN Configurations**, **Link Aggregation**, **802.1X**, TACACS, **System Log**, **Multicast Configuration**, **SSH Management**, and **SSL Management**, as well as secondary windows.

Switch Advanced Settings



Switch Advanced Settings

Enable or disable some states and configure system real time.

SSH State	Disabled
HOL Prevention	Enabled
Jumbo Frame	Disabled
ARP Aging Time (minute)	20
Year/Month/Day	2000 1 1
Hour/Minute/Second	0 0 0

Figure 6- 43. Switch Advanced Settings window

The information is described as follows:

Parameter	Description
SSH State	This allows you to enable or disable the Secure Shell feature.
HOL Prevention	This allows you to enable or disable Head of Line prevention.
Jumbo Frame	This allows you to enable or disable Jumbo Frame support.
ARP Aging Time (minute)	This allows you to configure the timeout value of an entry maintained in the ARP table.
Year/Month/Date	This allows you to set the year, month, and date.
Hour/Minute/Second	This allows you to set the hour, minute, and second.

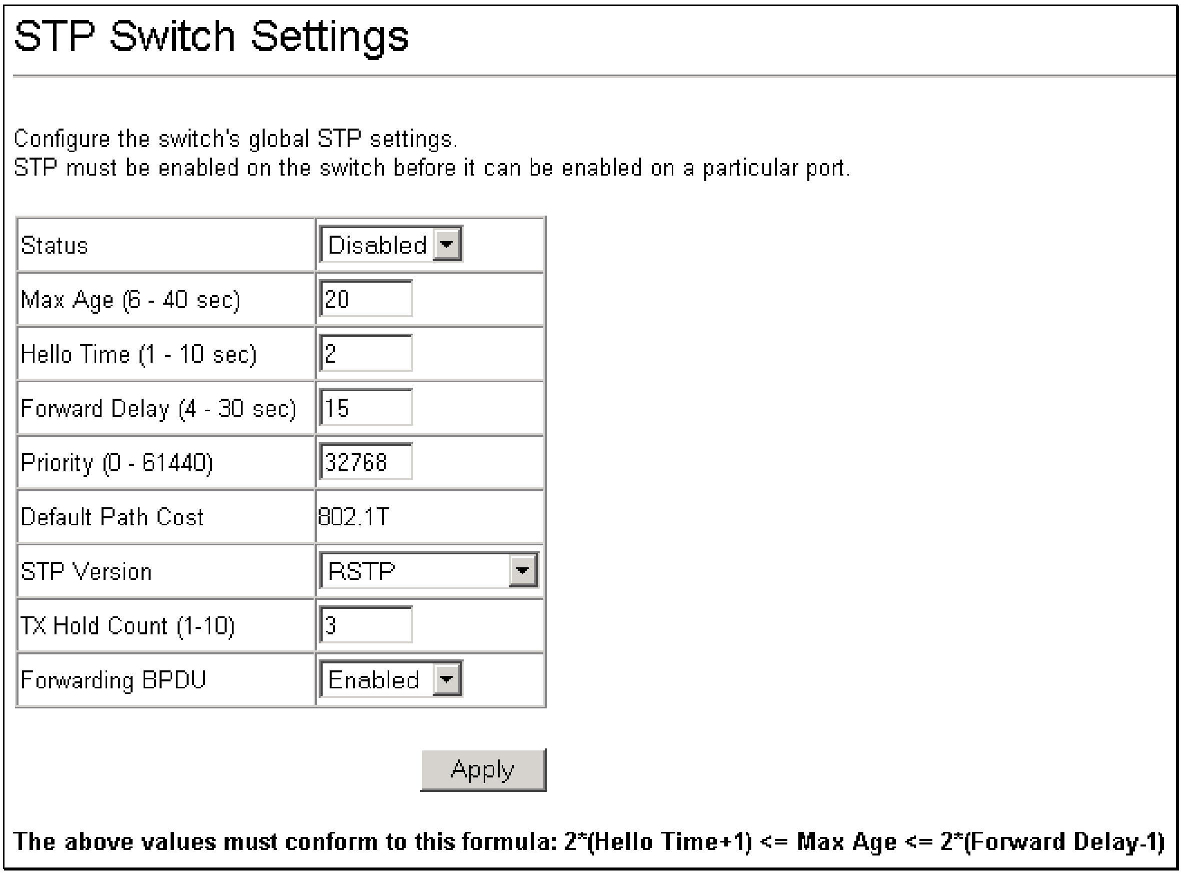
Spanning Tree

The Switch supports 802.1d Spanning Tree Protocol (STP) and 802.1w Rapid Spanning Tree Protocol (RSTP). 802.1d STP will be familiar to most networking professionals. However since 802.1w RSTP has been recently introduced to D-Link managed Ethernet switches, a brief introduction to the technology is provided in Chapter Five's "Spanning Tree" section.

The Spanning Tree section includes two windows, **STP Switch Settings** and **STP Port Settings**.

STP Switch Settings

The switch supports 802.1W Rapid Spanning Tree Protocol, which allows you to create alternative paths (with multiple switches or other types of bridges) in your network. See the Spanning Tree Algorithm section of the "*Switch Management and Operating Concepts*" chapter for a detailed explanation.



STP Switch Settings

Configure the switch's global STP settings.
STP must be enabled on the switch before it can be enabled on a particular port.

Status	Disabled
Max Age (6 - 40 sec)	20
Hello Time (1 - 10 sec)	2
Forward Delay (4 - 30 sec)	15
Priority (0 - 61440)	32768
Default Path Cost	802.1T
STP Version	RSTP
TX Hold Count (1-10)	3
Forwarding BPDU	Enabled

The above values must conform to this formula: 2*(Hello Time+1) <= Max Age <= 2*(Forward Delay-1)

Figure 6- 44. STP Switch Settings window

Click **Apply** after making changes to the window above.

The STP Switch parameters that you can change are:

Parameter	Description
Status	This drop-down menu allows you to enable the Spanning Tree Protocol setting.
Max Age (6-40 sec) <*20*>	The Maximum Age can be from *6* to *40* seconds. At the end of the Maximum Age, if a BPDU has still not been received from the Root Bridge, your switch will start sending its own BPDU to all other switches for permission to become the Root Bridge. If it turns out that your switch has the lowest Bridge Identifier, it will become the Root Bridge.
Hello Time (1-10 sec) <*2*>	The Hello Time can be from *1* to *10* 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. If you set a Hello Time for your switch, and it is not the Root Bridge, the set Hello Time will be used if and when your switch becomes the Root Bridge.
Forward Delay (4-30 sec) <*15*>	The Forward Delay can be from *4* to *30* seconds. This is the time any port on the switch spends in the listening state while moving from the blocking state to the forwarding state.

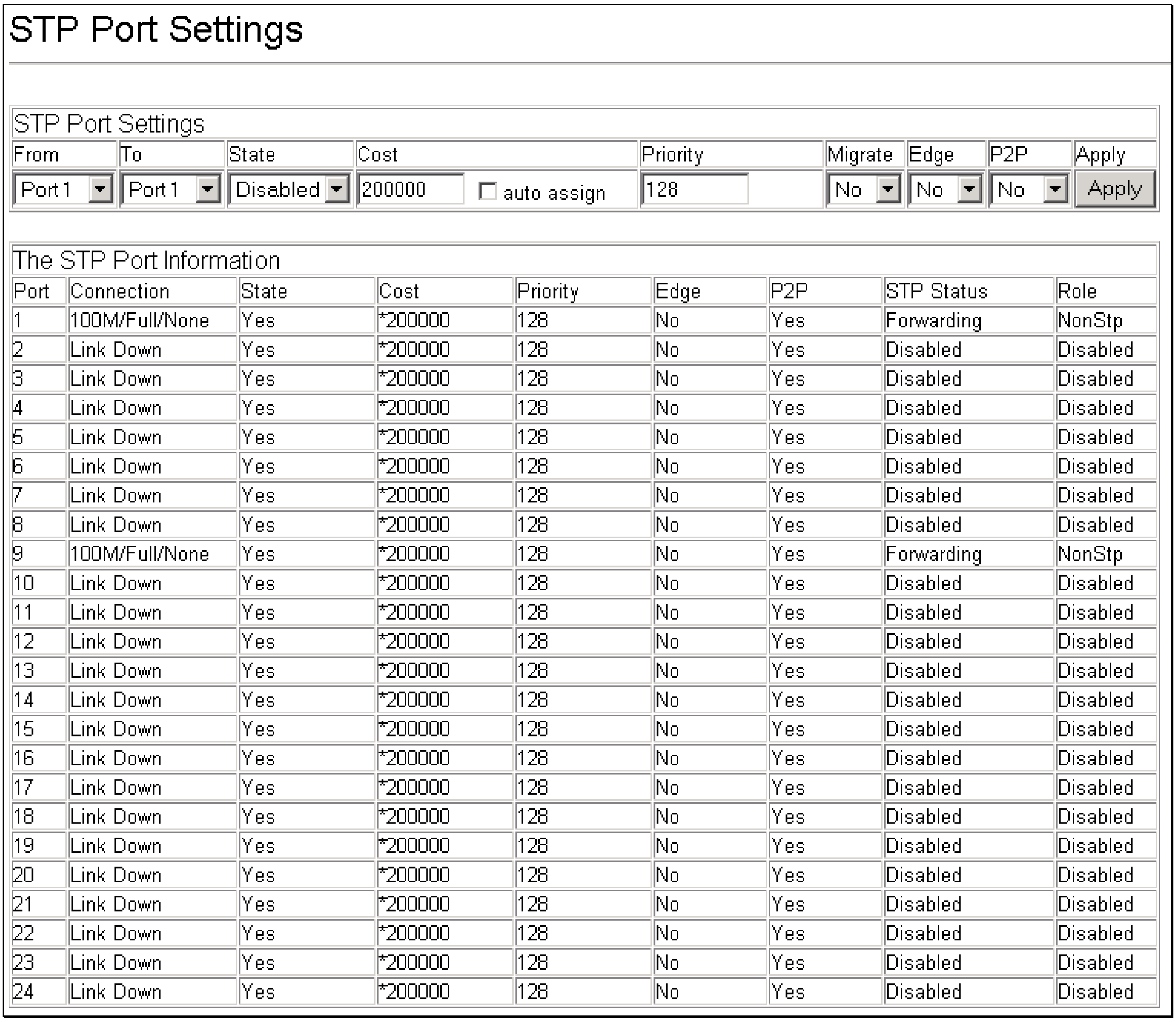
Priority (0-61440) <*32768*>
A Bridge Priority can be from *0* to *61440*. Zero is equal to the highest Bridge Priority.

STP Version
Choose *RSTP* (default) or *STP compatible*. Both versions use STP parameters in the same way. RSTP is fully compatible with IEEE 802.1d STP and will function with legacy equipment.

TX Hold Count (1-10) <*3*>
This is the maximum number of Hello packets transmitted per interval. The count can be specified from *1* to *10*. The default value is *3.*

Forwarding BPDU
This drop-down menu allows you to configure whether to forward BPDU when the Spanning Tree Protocol is disabled.

STP Port Settings



STP Port Settings

STP Port Settings

From	To	State	Cost	Priority	Migrate	Edge	P2P	Apply
Port 1	Port 1	Disabled	200000 □ auto assign	128	No	No	No	Apply

The STP Port Information

Port	Connection	State	Cost	Priority	Edge	P2P	STP Status	Role
1	100M/Full/None	Yes	*200000	128	No	Yes	Forwarding	NonStp
2	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
3	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
4	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
5	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
6	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
7	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
8	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
9	100M/Full/None	Yes	*200000	128	No	Yes	Forwarding	NonStp
10	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
11	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
12	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
13	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
14	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
15	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
16	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
17	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
18	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
19	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
20	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
21	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
22	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
23	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled
24	Link Down	Yes	*200000	128	No	Yes	Disabled	Disabled

Figure 6- 45. STP Port Settings window

To configure Spanning Tree Protocol functions for individual ports, enter the desired information in the fields on this window and then click **Apply**.

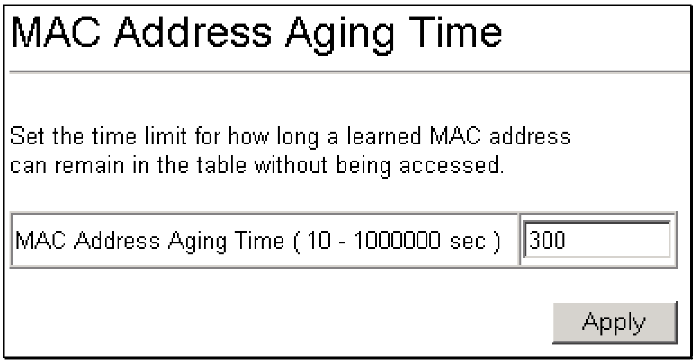
The STP Port settings are described as follows:

Parameter	Description
From __ To __	A consecutive group of ports may be configured starting with the selected port.
State	The Spanning Tree Protocol state for a selected port can either be *Enabled* or *Disabled*.
Cost	A Port Cost can be set from *1* to *200000000*. The lower the number, the greater the probability the port will be chosen to forward packets. Default port cost: 100Mbps port = 19, Gigabit ports = 4.
Priority	A Port Priority can be from *0* to *240*. The lower the number, the greater the probability the port will be chosen as the Root Port.
Migrate	Select *Yes* or *No*. Choosing *Yes* will enable the port to migrate from 802.1d STP status to 802.1w RSTP status. RSTP can coexist with standard STP, however the benefits of RSTP are not realized on a port where an 802.1d network connects to an 802.1w enabled network. Migration should be enabled (*Yes*) on ports connected to network stations or segments that will be upgraded to 802.1w RSTP on all or some portion of the segment
Edge	Select *Yes* or *No.* Choosing *Yes* 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. *No* indicates the port does not have edge port status.
P2P	Select *Yes*, *No,* or *Auto*. Choosing *Yes* indicates a point-to-point (p2p) shared link. These 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. The *Auto* setting instructs the switch to force a connection to a non-P2P port when it detects 1 or more BPDUs.

Forwarding

Configuration menus for MAC Address Forwarding including Multicast and Unicast forwarding can be found in the **Forwarding** folder. The MAC Address Aging Time and Broadcast/Multicast Storm Control menus are located here as well.

MAC Address Aging Time



MAC Address Aging Time

Set the time limit for how long a learned MAC address can remain in the table without being accessed.

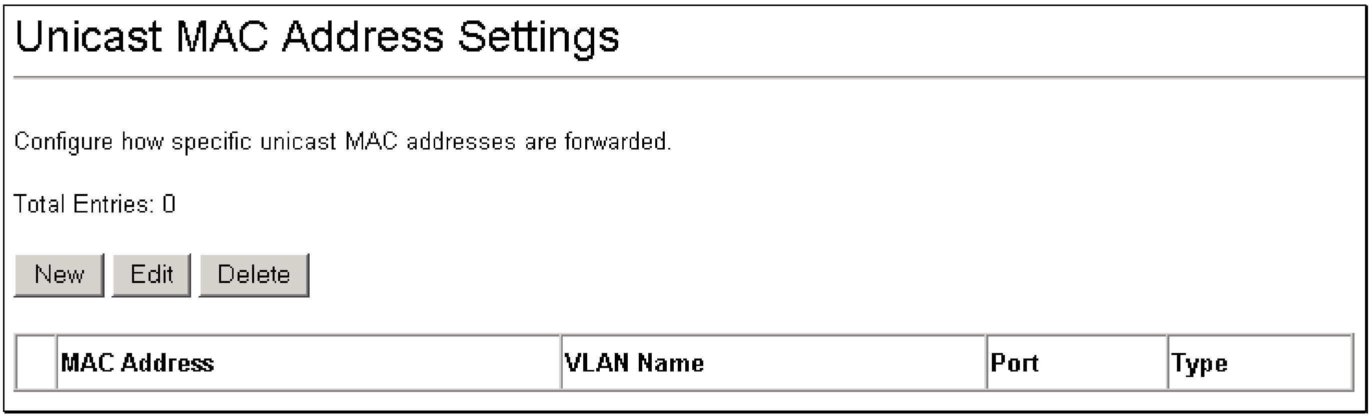
MAC Address Aging Time (10 - 1000000 sec) 300

Figure 6- 46. MAC Address Aging Time window

Set the MAC Address Aging Time and click the **Apply** button. MAC Address Aging Time specifies 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). The Aging Time can be set to any value between 10 and 1,000,000 seconds.

NOTE: A very long Aging Time can result with the out-of-date Dynamic Entries that may cause incorrect packet filtering/forwarding decisions. A very short aging time may cause entries to be aged out to soon, resulting in a high percentage of received packets whose source addresses cannot be found in the address table, in which case the switch will broadcast the packet to all ports, negating many of the benefits of having a switch.

Unicast MAC Address Settings



Unicast MAC Address Settings

Configure how specific unicast MAC addresses are forwarded.

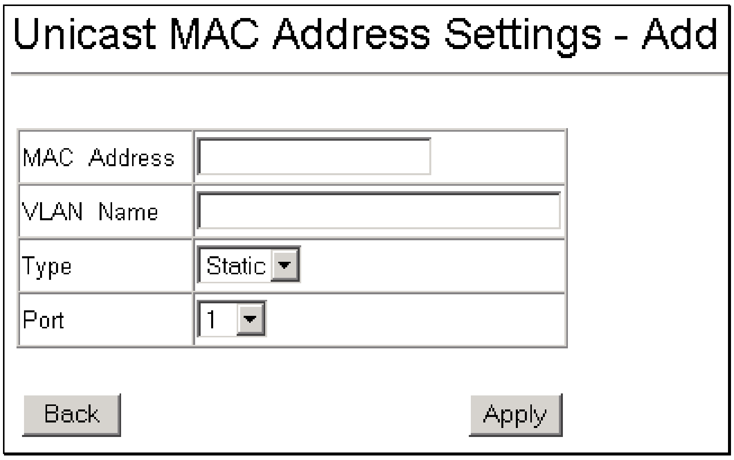
Total Entries: 0

	MAC Address	VLAN Name	Port	Type

Figure 6- 47. Unicast MAC Address Settings window

To modify a unicast MAC address on the table above, select it and then click **Edit**.

To add a unicast MAC address to the table above, click **New**.



Unicast MAC Address Settings - Add

MAC Address	
VLAN Name	
Type	Static
Port	1

Figure 6- 48. Unicast MAC Address Settings – Add window

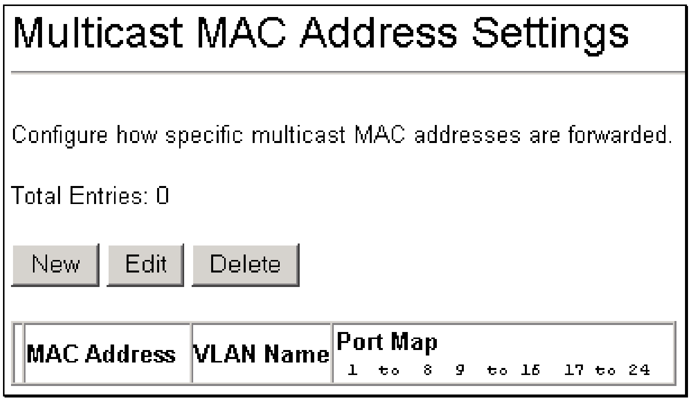
The following fields can be set:

Parameter	Description
MAC Address	Allows the entry of the MAC address of an end station that will be entered into the switch’s static forwarding table when adding a new entry. Displays the currently selected MAC address when editing.

VLAN Name	Allows the entry of the VLAN Name of the VLAN the MAC address below is a member of – when editing. Displays the VLAN the currently selected MAC address is a member of – when editing an existing entry.
Type	This is the type of the Unicast MAC Address entry.
Port	Allows the entry of the port number on which the MAC address entered above resides.

Multicast MAC Address Settings

Multicast MAC addresses can be statically entered into the switch's MAC Address Forwarding Table. These addresses will never age out.



Multicast MAC Address Settings

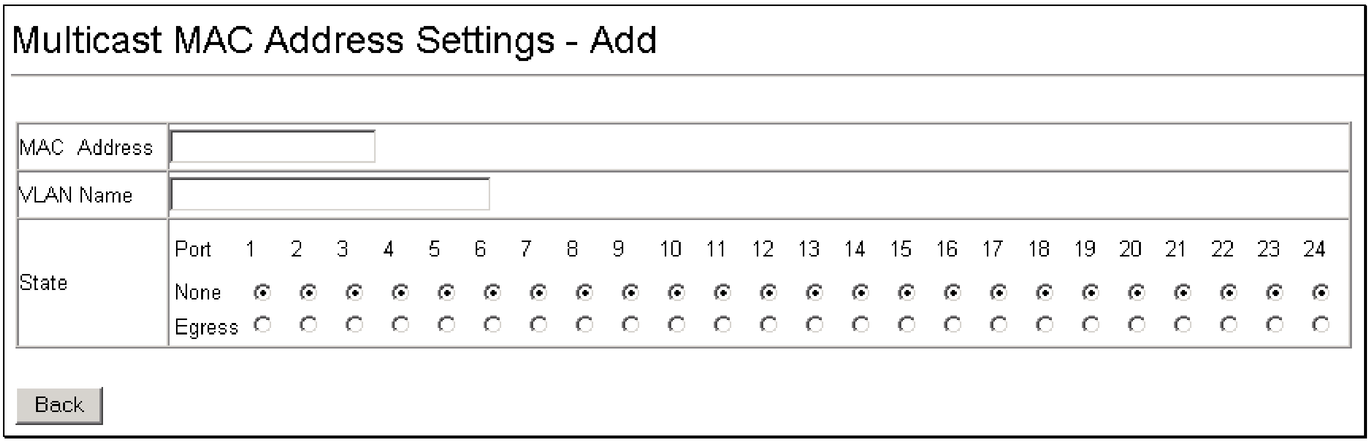
Configure how specific multicast MAC addresses are forwarded.

Total Entries: 0

MAC Address	VLAN Name	Port Map 1 to 8 9 to 16 17 to 24

Figure 6- 49. Multicast MAC Address Settings window

Click **New** to add multicast MAC addresses to the table above. To make changes to an existing entry, select the entry on the table above and click **Edit**.



Multicast MAC Address Settings - Add

MAC Address																								
VLAN Name																								
State	Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	None	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Egress	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Figure 6- 50. Multicast MAC Address Settings – Add window

The following fields can be set:

Parameter	Description
MAC Address	Allows the entry of the MAC address of an end station that will be entered into the switch's static forwarding table.
VLAN Name	Allows the entry of the VLAN name of the VLAN the MAC address below is a member of – when adding a new entry to the table. Displays the VLAN name of the VLAN the MAC address is a member of – when editing an existing entry.

Port Allows the entry of the port number on which the MAC address entered above resides.

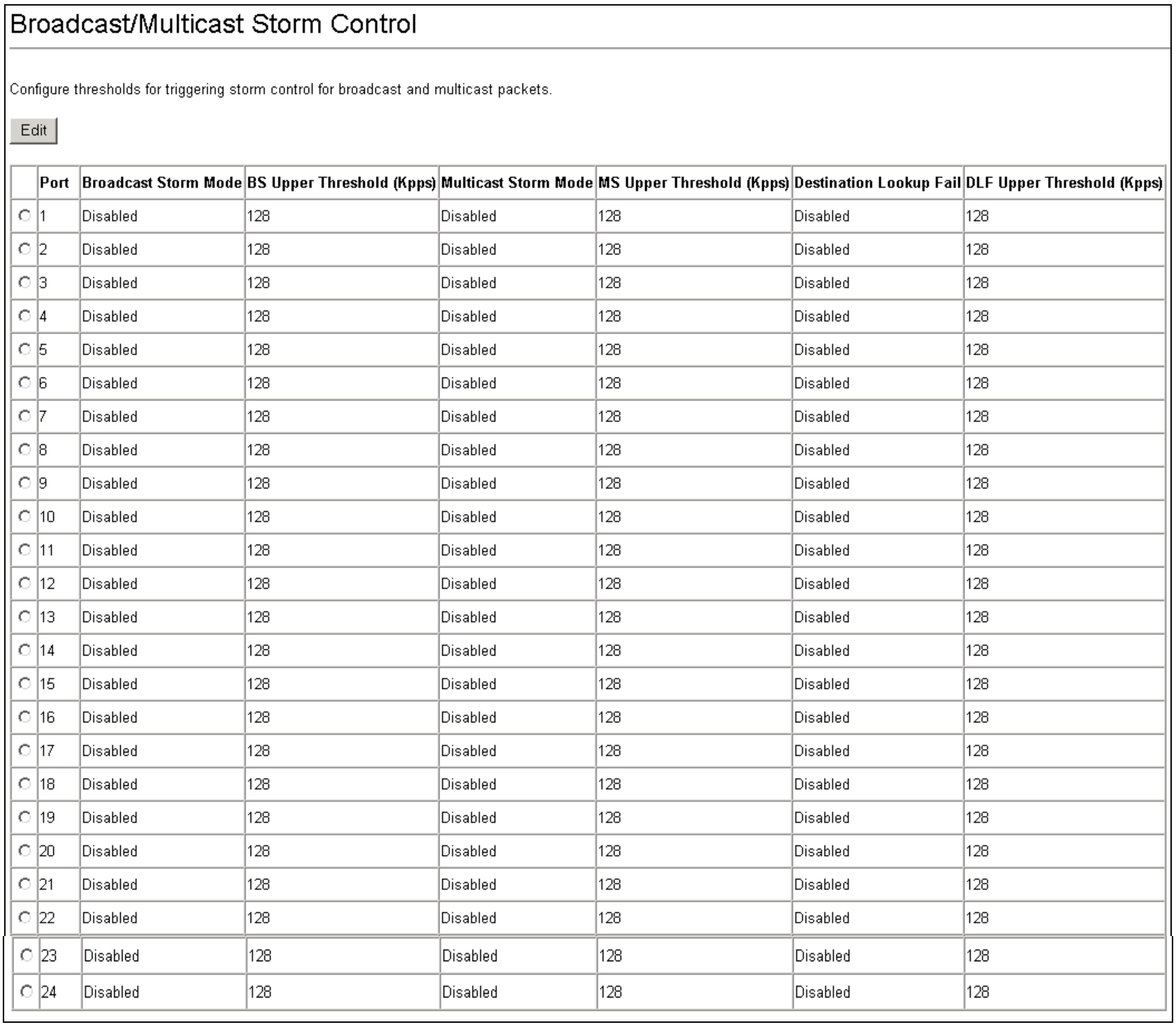
None Specifies the port as being none.

Egress Specifies the port as being a source of multicast packets originating from the MAC address specified above.

Broadcast/Multicast Storm Control

Broadcast and multicast storms consist of broadcast or multicast packets that flood and/or are looped on a network causing noticeable performance degradation and, in extreme cases, network failure.

The DGS-3224TGR allows some control over broadcast/multicast storms by setting thresholds on the number of broadcast/multicast packets received (in thousands of packets per second or Kpps), and then following a user-specified course of action when this threshold is exceeded.

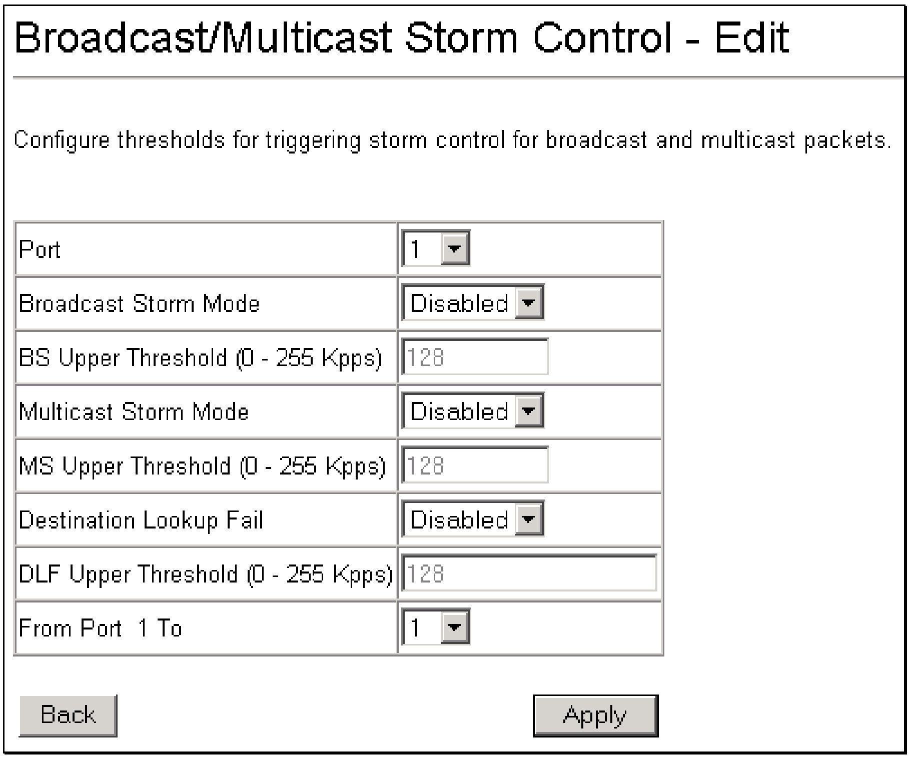


Broadcast/Multicast Storm Control

Configure thresholds for triggering storm control for broadcast and multicast packets.

	Port	Broadcast Storm Mode	BS Upper Threshold (Kpps)	Multicast Storm Mode	MS Upper Threshold (Kpps)	Destination Lookup Fail	DLF Upper Threshold (Kpps)
○	1	Disabled	128	Disabled	128	Disabled	128
○	2	Disabled	128	Disabled	128	Disabled	128
○	3	Disabled	128	Disabled	128	Disabled	128
○	4	Disabled	128	Disabled	128	Disabled	128
○	5	Disabled	128	Disabled	128	Disabled	128
○	6	Disabled	128	Disabled	128	Disabled	128
○	7	Disabled	128	Disabled	128	Disabled	128
○	8	Disabled	128	Disabled	128	Disabled	128
○	9	Disabled	128	Disabled	128	Disabled	128
○	10	Disabled	128	Disabled	128	Disabled	128
○	11	Disabled	128	Disabled	128	Disabled	128
○	12	Disabled	128	Disabled	128	Disabled	128
○	13	Disabled	128	Disabled	128	Disabled	128
○	14	Disabled	128	Disabled	128	Disabled	128
○	15	Disabled	128	Disabled	128	Disabled	128
○	16	Disabled	128	Disabled	128	Disabled	128
○	17	Disabled	128	Disabled	128	Disabled	128
○	18	Disabled	128	Disabled	128	Disabled	128
○	19	Disabled	128	Disabled	128	Disabled	128
○	20	Disabled	128	Disabled	128	Disabled	128
○	21	Disabled	128	Disabled	128	Disabled	128
○	22	Disabled	128	Disabled	128	Disabled	128
○	23	Disabled	128	Disabled	128	Disabled	128
○	24	Disabled	128	Disabled	128	Disabled	128

Figure 6- 51. Broadcast/Multicast Storm Control window



Broadcast/Multicast Storm Control - Edit

Configure thresholds for triggering storm control for broadcast and multicast packets.

Port	1
Broadcast Storm Mode	Disabled
BS Upper Threshold (0 - 255 Kpps)	128
Multicast Storm Mode	Disabled
MS Upper Threshold (0 - 255 Kpps)	128
Destination Lookup Fail	Disabled
DLF Upper Threshold (0 - 255 Kpps)	128
From Port 1 To	1

Figure 6- 52. Broadcast/Multicast Storm Control – Edit window

The BS/MS/DLF Upper Threshold sets the rate of broadcast/multicast/destination lookup fail packets received on a port or group of ports that will trigger the action to be taken by the switch, as detailed below. A range of thousands of packets received per second (Kpps) between 0 and 255 can be specified.

When a port or group of ports receives more broadcast, multicast, or destination lookup fail packets per second than is specified in the respective Upper Threshold (0-255 Kpps) field, the switch will take the actions specified in the Broadcast Storm Mode, Multicast Storm Mode, and the Destination Lookup Fail pull-down menus.

The Broadcast Storm Mode is *Enabled* or *Disabled* using a pull-down menu. When the Broadcast Storm Mode is *Enabled*, and a port contained within the corresponding port group receives more broadcast packets than specified in the Upper Threshold (0-255 Kpps) field, the switch will drop all broadcast packets received by any port in the port group until the rate of broadcast packets received by the port group falls.

The Multicast Storm Mode is *Enabled* or *Disabled* using a pull-down menu. When the Multicast Storm Mode is *Enabled*, and a port contained within the corresponding port group receives more multicast packets than specified in the Upper Threshold (0-255 Kpps) field, the switch will drop all multicast packets received by any port in the port group until the rate of multicast packets received by the port group falls.

The Destination Lookup Fail is *Enabled* or *Disabled* using a pull-down menu. When the Destination Lookup Fail is *Enabled*, and a port contained within the corresponding port group receives more destination lookup failed packets than specified in the Upper Threshold (0-255 Kpps) field, the switch will drop all destination lookup failed packets received by any port in the port group until the rate of destination lookup failed packets received by the port group falls.

Configure QOS

The DGS-3224TGR supports 802.1p priority queuing. The switch has eight priority queues. These priority queues are numbered from 0 — the lowest priority queue — to 7 — the highest priority queue. The eight priority queues specified in IEEE 802.1p (Q0 to Q7) are mapped to the switch's priority queues as follows:

Q0 is assigned to the switch's Q2 queue.

Q1 is assigned to the switch's Q0 queue.

Q2 is assigned to the switch's Q1 queue.

Q3 is assigned to the switch's Q3 queue.

Q4 is assigned to the switch's Q4 queue.

Q5 is assigned to the switch's Q5 queue.

Q6 is assigned to the switch's Q6 queue.

Q7 is assigned to the switch's Q7 queue.

For strict priority-based scheduling, any packets residing in the higher priority queues are transmitted first. Only when these queues are empty, are packets of lower priority transmitted.

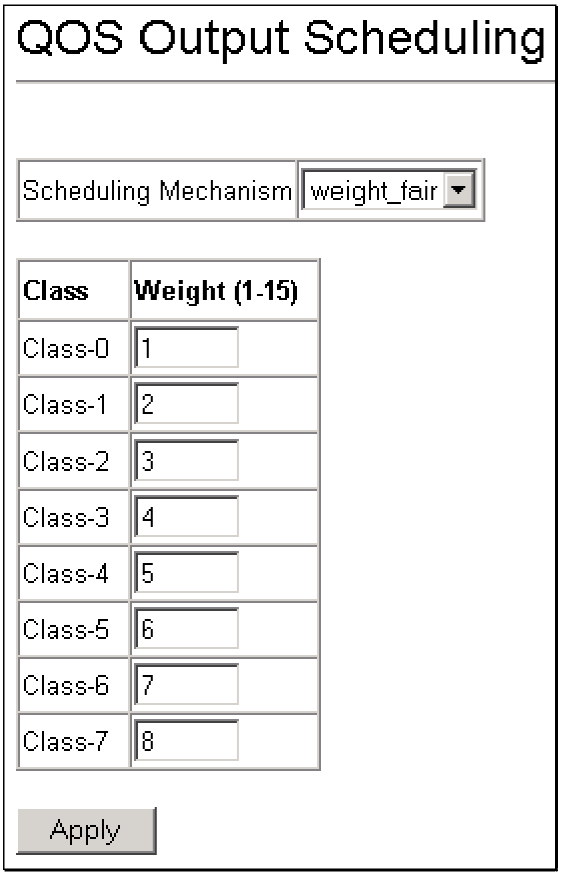
For weighted round-robin queuing, the number of packets sent from each priority queue depends upon the assigned weight. For a configuration of eight CoS queues, A~H with their respective weight value: 8~1, the packets are sent in the following sequence: A1, B1, C1, D1, E1, F1, G1, H1, A2, B2, C2, D2, 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.

For weighted round-robin queuing, if the weight for a CoS is set to 0, then it will continue processing the packets from this CoS until there are no more packets for this CoS. The other CoS queues that has been given a nonzero value, and depending upon the weight, they will follow a common weighted round-robin scheme.

Remember that the DGS-3224TGR has eight priority queues (and thus eight Classes of Service) for each port on the switch.

QOS Output Scheduling



QOS Output Scheduling

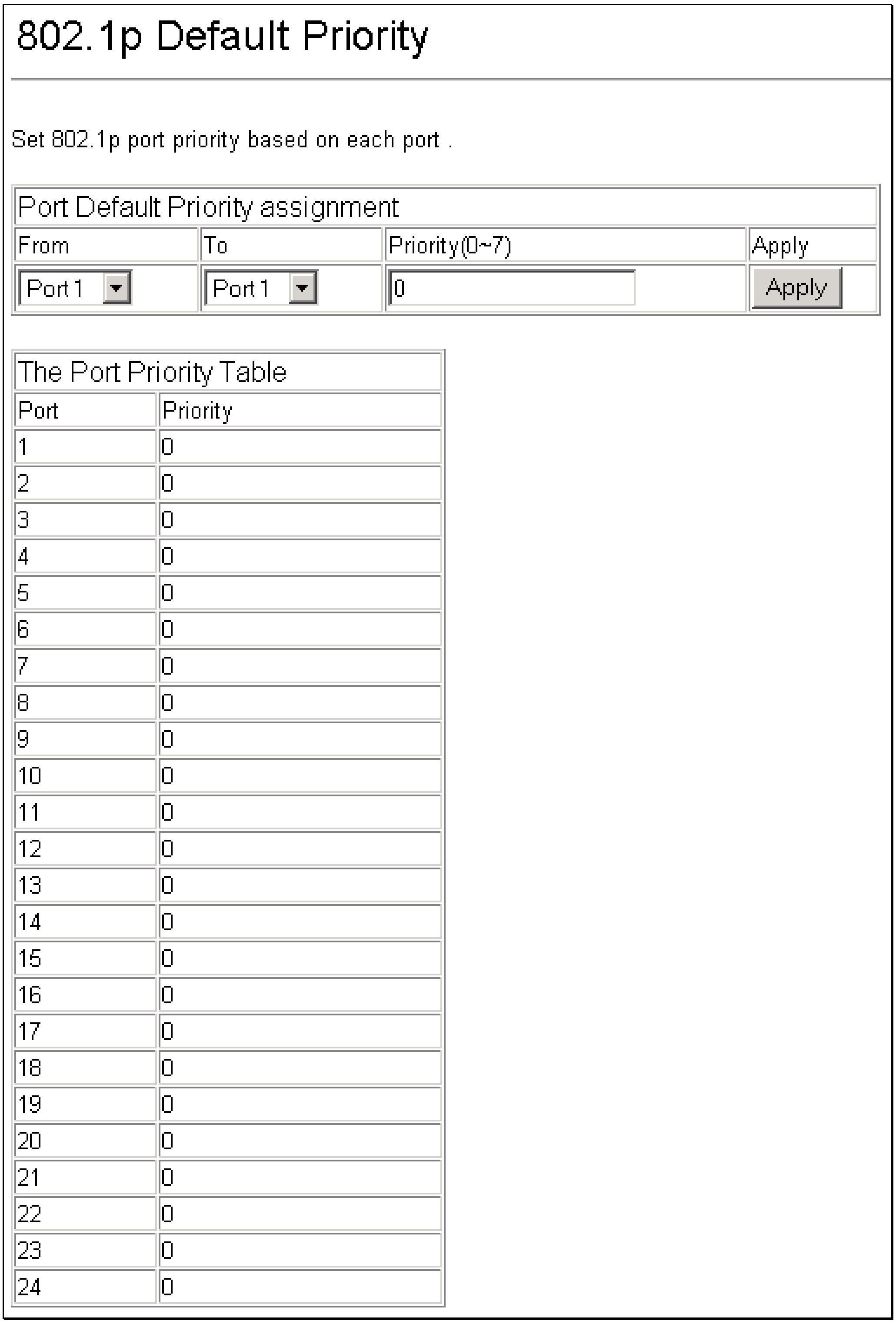
Scheduling Mechanism: weight_fair

Class	Weight (1-15)
Class-0	1
Class-1	2
Class-2	3
Class-3	4
Class-4	5
Class-5	6
Class-6	7
Class-7	8

Figure 6- 53. QOS Output Scheduling window

802.1p Default Priority

The switch allows the assignment of a default 802.1p priority to each port on the switch.



802.1p Default Priority

Set 802.1p port priority based on each port .

Port Default Priority assignment			
From	To	Priority(0~7)	Apply
Port 1	Port 1	0	Apply

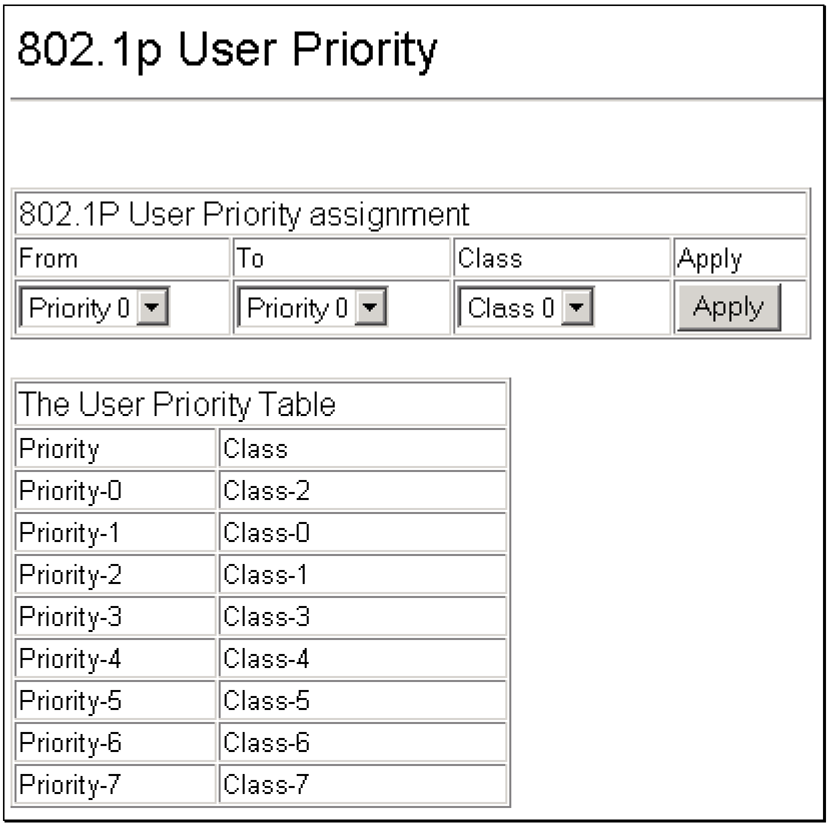
The Port Priority Table	
Port	Priority
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0
16	0
17	0
18	0
19	0
20	0
21	0
22	0
23	0
24	0

Figure 6- 54. 802.1p Default Priority window

This window allows you to assign a default 802.1p priority to any given port on the switch. The priority queues are numbered from 0 – the lowest priority – to 7 – the highest priority.

802.1p User Priority

The DGS-3224TGR allows the assignment of a User Priority to each of the 802.1p priorities.



802.1p User Priority

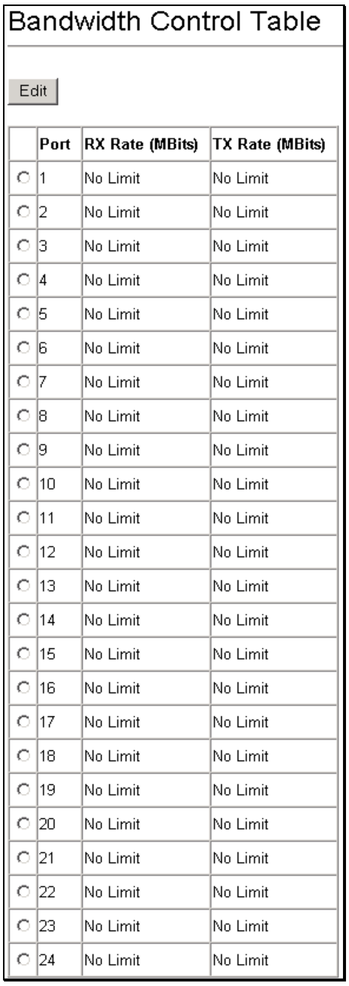
802.1P User Priority assignment			
From	To	Class	Apply
Priority 0	Priority 0	Class 0	Apply

The User Priority Table	
Priority	Class
Priority-0	Class-2
Priority-1	Class-0
Priority-2	Class-1
Priority-3	Class-3
Priority-4	Class-4
Priority-5	Class-5
Priority-6	Class-6
Priority-7	Class-7

Figure 6- 55. 802.1p User Priority window

Bandwidth Control Table

The bandwidth control settings are used to place a ceiling on the transmitting and receiving data bit rates for any port.

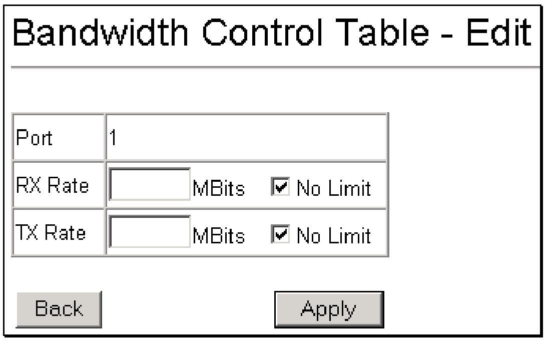


Bandwidth Control Table

	Port	RX Rate (MBits)	TX Rate (MBits)
○	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
○	13	No Limit	No Limit
○	14	No Limit	No Limit
○	15	No Limit	No Limit
○	16	No Limit	No Limit
○	17	No Limit	No Limit
○	18	No Limit	No Limit
○	19	No Limit	No Limit
○	20	No Limit	No Limit
○	21	No Limit	No Limit
○	22	No Limit	No Limit
○	23	No Limit	No Limit
○	24	No Limit	No Limit

Figure 6- 56. Bandwidth Control Table window

To change the maximum allowed bandwidth for a given port in the **Bandwidth Control Table** window, click the selection button in the far left column that corresponds to the port you want to configure and click the **Edit** button. A new window opens:



Bandwidth Control Table - Edit

Port	1
RX Rate	MBits ☑ No Limit
TX Rate	MBits ☑ No Limit

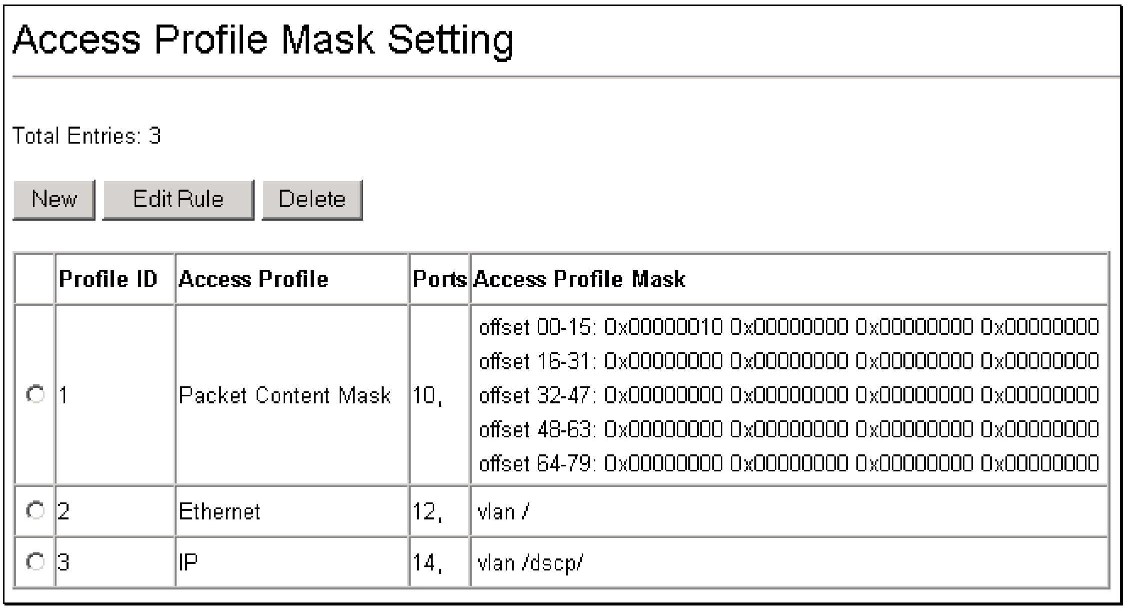
Figure 6- 57. Bandwidth Control Table – Edit window

To limit either the Rx or Tx rates, deselect the No Limit check box and enter the desired rate. Rates can be expressed using whole numbers up to the maximum available rate for the port.

Access Profile Mask Setting

Access profiles allow you to establish criteria to determine whether or not the switch will forward packets based on the information contained in each packet's header. These criteria can be specified on a basis of VLAN, MAC address or IP address.

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.



Access Profile Mask Setting

Total Entries: 3

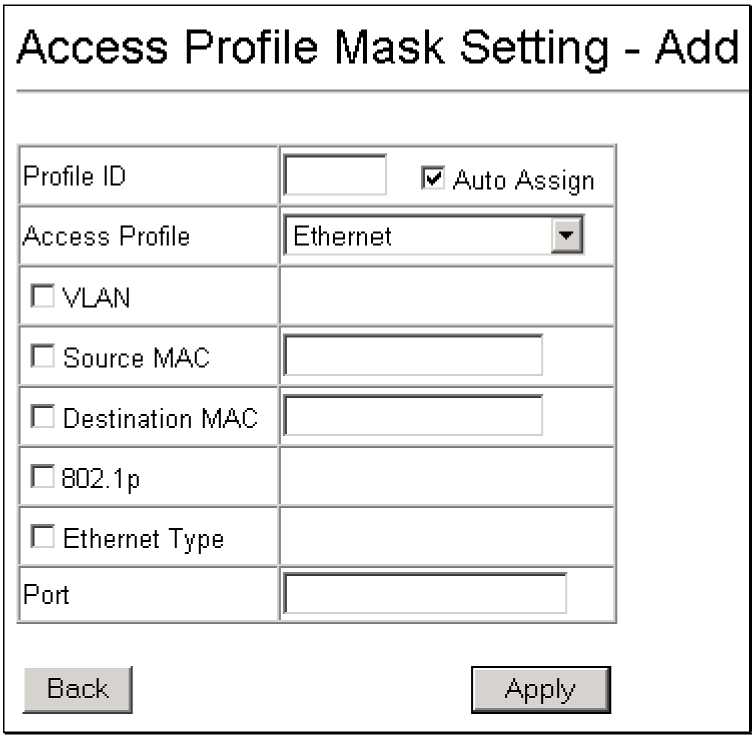
	Profile ID	Access Profile	Ports	Access Profile Mask
○	1	Packet Content Mask	10,	offset 00-15: 0x00000010 0x00000000 0x00000000 0x00000000 offset 16-31: 0x00000000 0x00000000 0x00000000 0x00000000 offset 32-47: 0x00000000 0x00000000 0x00000000 0x00000000 offset 48-63: 0x00000000 0x00000000 0x00000000 0x00000000 offset 64-79: 0x00000000 0x00000000 0x00000000 0x00000000
○	2	Ethernet	12,	vlan /
○	3	IP	14,	vlan /dscp/

Figure 6- 58. Access Profile Mask Setting window

To create an Access Profile Mask:

To add an entry to the **Access Profile Mask Setting** window, click the **New** button. This will open an **Access Profile Mask Setting – Add** window, as shown below. There are three **Access Profile Mask Setting – Add** windows; one for Ethernet (or MAC address-based) profile configuration, one for IP address-based profile configuration and one for the Packet Content Mask. You can switch among the three windows by using the Access Profile drop-down menu.

Use the **Access Profile Mask Setting – Add** windows to create access profiles and specify what criteria are used to examine frames. Once a profile has been created, you can set up the rule applied to the profile as described later in this section.



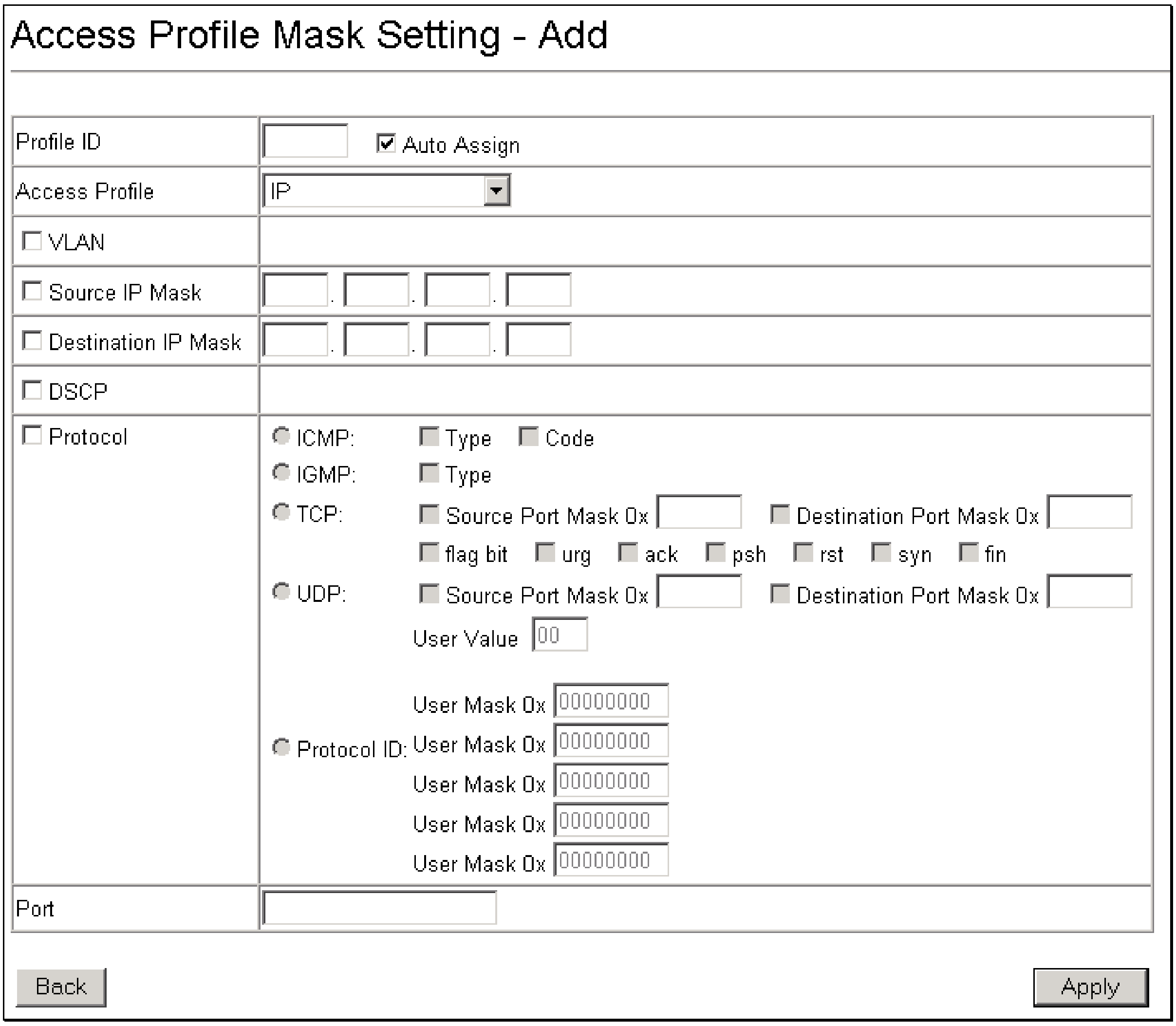
Access Profile Mask Setting - Add

Profile ID	☑ Auto Assign
Access Profile	Ethernet
☐ VLAN	
☐ Source MAC	
☐ Destination MAC	
☐ 802.1p	
☐ Ethernet Type	
Port	

Figure 6- 59. Access Profile Mask Setting – Add (Ethernet) window

The following parameters can be set, for the Ethernet type:

Parameter	Description
Profile ID	Type in a unique identifier number for this profile set. This value can be set from *1* to *8*.
Auto Assign	Checking this box instructs the Switch to automatically assign a Profile ID.
Access Profile	Select profile based on Ethernet (MAC Address), IP address or packet content mask. This will change the window according to the requirements for the type of profile. *Ethernet* instructs the Switch to examine the layer 2 part of each packet header. Select *IP* to instruct the Switch to examine the IP address in each frame's header. Select *Packet Content Mask* to specify a mask to hide the content of the packet header.
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.
Source MAC	Source MAC Mask - Enter a MAC address mask for the source MAC address.
Destination MAC	Destination MAC Mask - Enter a MAC address mask for the destination MAC address.
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.
Port	The user may set the **Access Profile Mask Setting** window on a per-port basis by entering a port number in this field. The port list is specified by listing the beginning port number on that switch and the highest port number of the range. The beginning and end of the port list range are separated by a dash. For example, 3-8 specifies all of the ports between port 3 and port 8 – in numerical order. Entering *all* will denote all ports on the Switch.



Access Profile Mask Setting - Add

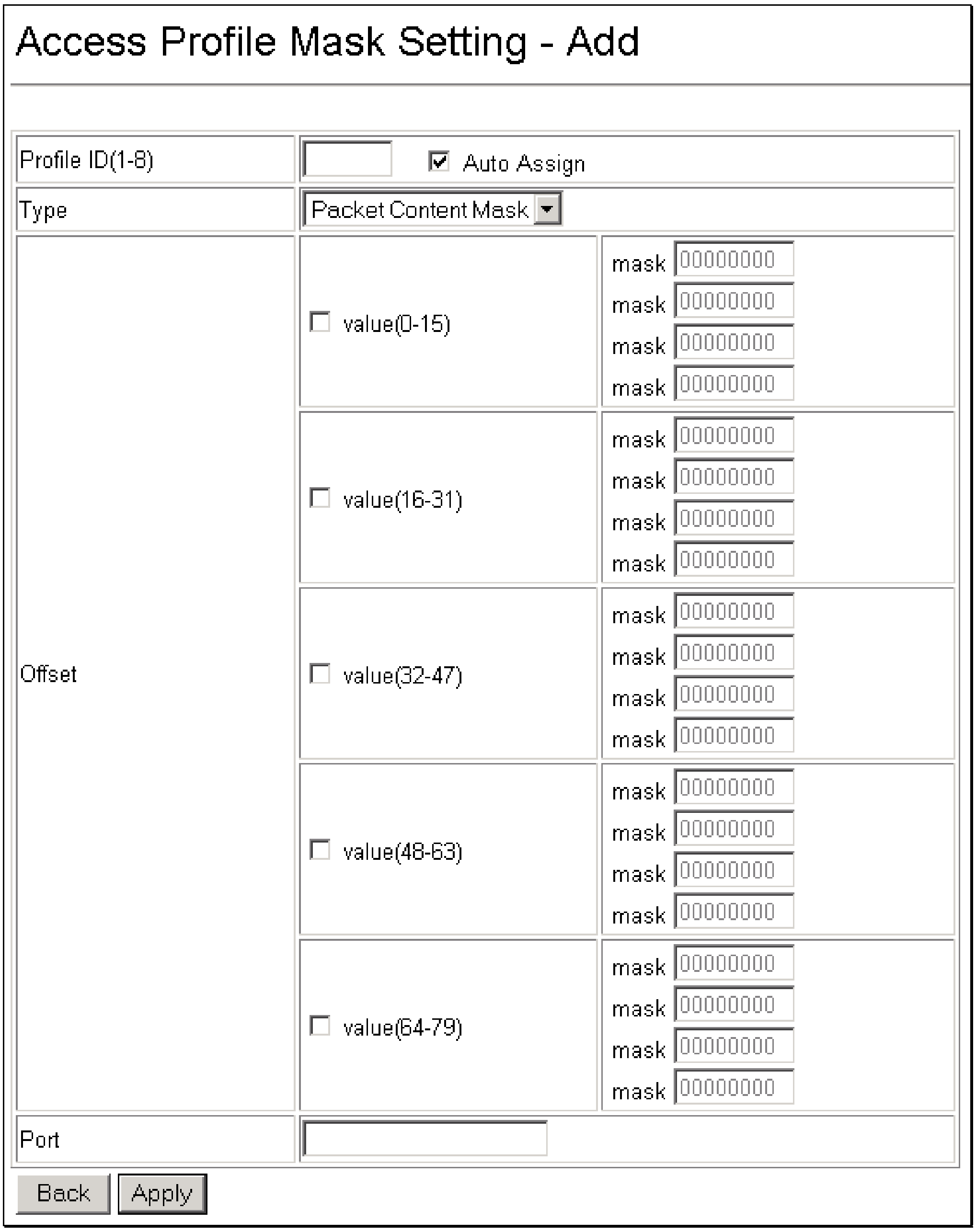
Profile ID	☑ Auto Assign
Access Profile	IP
□ VLAN	
□ Source IP Mask	. . .
□ Destination IP Mask	. . .
□ DSCP	
□ Protocol	○ ICMP: □ Type □ Code ○ IGMP: □ Type ○ TCP: □ Source Port Mask 0x □ Destination Port Mask 0x □ flag bit □ urg □ ack □ psh □ rst □ syn □ fin ○ UDP: □ Source Port Mask 0x □ Destination Port Mask 0x User Value 00 ○ Protocol ID: User Mask 0x 00000000 User Mask 0x 00000000 User Mask 0x 00000000 User Mask 0x 00000000 User Mask 0x 00000000
Port	

Figure 6- 60. Access Profile Mask Setting – Add (IP) window

The following parameters can be set, for IP:

Parameter	Description
Profile ID	Type in a unique identifier number for this profile set. This value can be set from *1* to *8*.
Auto Assign	Checking this box instructs the Switch to automatically assign a Profile ID.
Type	Select profile based on Ethernet (MAC Address), IP address or packet content mask. This will change the window according to the requirements for the type of profile. *IP* instructs the Switch to examine the IP address in each frame's header. Select *Ethernet* to instruct the Switch to examine the layer 2 part of each packet header. Select *Packet Content Mask* to specify a mask to hide the content of the packet header.
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.

Source IP Mask	Enter an IP address mask for the source IP address.
Destination IP Mask	Enter an IP address mask for the destination IP address.
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.
Protocol	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: Select ICMP to instruct the Switch to examine the Internet Control Message Protocol (ICMP) field in each frame's header. Select Type to further specify that the access profile will apply an ICMP type value, or specify Code to further specify that the access profile will apply an ICMP code value. Select IGMP to instruct the Switch to examine the Internet Group Management Protocol (IGMP) field in each frame's header. Select Type to further specify that the access profile will apply an IGMP type value Select TCP 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. The user may also identify which flag bits to filter by checking the flag bit box. 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 among urg (urgent), ack (acknowledgement), psh (push), rst (reset), syn (synchronize), and fin (finish). Source Port Mask 0x - Specify a TCP port mask for the source port in hex form (hex 0x0-0xffff), which you wish to filter. Destination Port Mask 0x - Specify a TCP port mask for the destination port in hex form (hex 0x0-0xffff) which you wish to filter. Select UDP 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. Source Port Mask 0x - Specify a TCP port mask for the source port in hex form (hex 0x0-0xffff). Destination Port Mask 0x - Specify a TCP port mask for the destination port in hex form (hex 0x0-0xffff). Protocol ID - Enter a value defining the protocol ID in the packet header to mask. Specify the protocol ID mask in hex form (hex 0x0-0xffffffff).
Port	The user may set the **Access Profile Mask Setting** window on a per-port basis by entering a port number in this field. The port list is specified by listing the beginning port number on that switch and the highest port number of the range. The beginning and end of the port list range are separated by a dash. For example, 3-8 specifies all of the ports between port 3 and port 8 – in numerical order. Entering *all* will denote all ports on the Switch.



Access Profile Mask Setting - Add

Profile ID(1-8)	☑ Auto Assign	
Type	Packet Content Mask	
Offset	□ value(0-15)	mask 00000000 mask 00000000 mask 00000000 mask 00000000
	□ value(16-31)	mask 00000000 mask 00000000 mask 00000000 mask 00000000
	□ value(32-47)	mask 00000000 mask 00000000 mask 00000000 mask 00000000
	□ value(48-63)	mask 00000000 mask 00000000 mask 00000000 mask 00000000
	□ value(64-79)	mask 00000000 mask 00000000 mask 00000000 mask 00000000
Port		

Figure 6- 61. Access Profile Mask Setting – Add (Package Content Mask) window

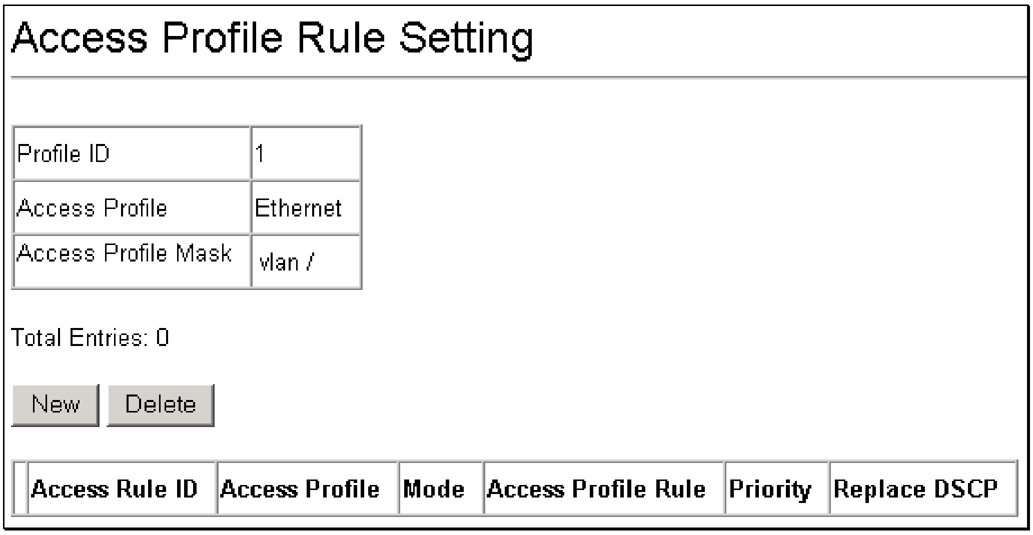
This window will aid the user in configuring the Switch to mask packet headers beginning with the offset value specified. The following fields are used to configure the Packet Content Mask:

Parameter	Description
Profile ID (1-8)	Type in a unique identifier number for this profile set. This value can be set from 1 - 8.
Auto Assign	Checking this box instructs the Switch to automatically assign a Profile ID.
Type	Select profile based on Ethernet (MAC Address), IP address or packet content mask. This will change the menu according to the requirements for the type of profile. *Packet Content Mask* specifies a mask to hide the content of the packet header.

	Select *Ethernet* to instruct the Switch to examine the layer 2 part of each packet header. Select *IP* to instruct the Switch to examine the IP address in each frame's header.
Offset	This field will instruct the Switch to mask the packet header beginning with the offset value specified: *value (0-15)* - Enter a value in hex form to mask the packet from the beginning of the packet to the 15th byte. *value (16-31)* – Enter a value in hex form to mask the packet from byte 16 to byte 31. *value (32-47)* – Enter a value in hex form to mask the packet from byte 32 to byte 47. *value (48-63)* – Enter a value in hex form to mask the packet from byte 48 to byte 63. *value (64-79)* – Enter a value in hex form to mask the packet from byte 64 to byte 79.
Port	The user may set the **Access Profile Mask Setting** window on a per-port basis by entering a port number in this field. The port list is specified by listing the beginning port number on that switch and the highest port number of the range. The beginning and end of the port list range are separated by a dash. For example, 3-8 specifies all of the ports between port 3 and port 8 – in numerical order. Entering *all* will denote all ports on the Switch.

To establish the rule for a previously created Access Profile Mask:

Select the Access Profile from the **Access Profile Mask Setting** window and click the **Edit Rule** button.



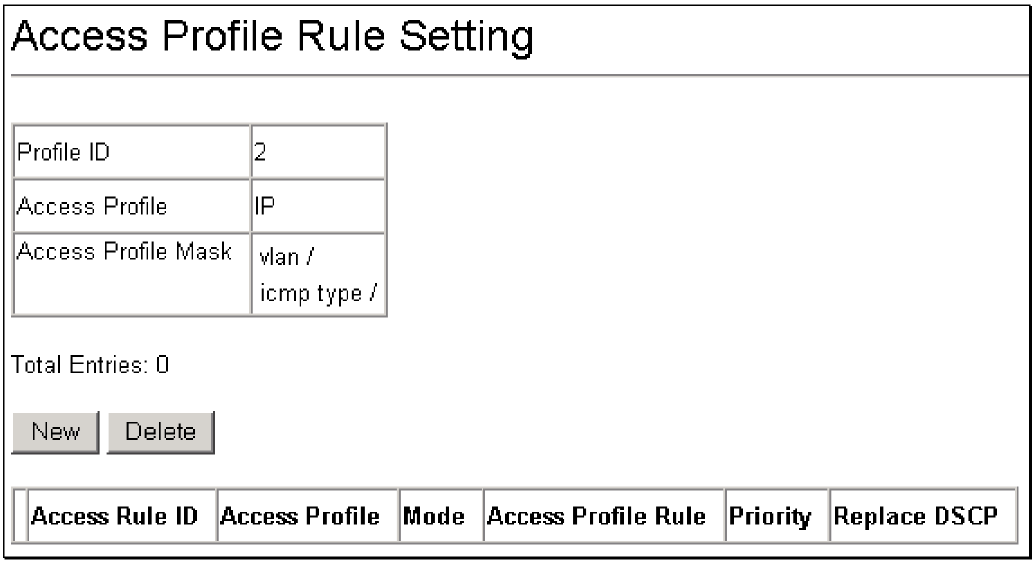
Access Profile Rule Setting

Profile ID	1
Access Profile	Ethernet
Access Profile Mask	vlan /

Total Entries: 0

	Access Rule ID	Access Profile	Mode	Access Profile Rule	Priority	Replace DSCP

Figure 6- 62. Access Profile Rule Setting (Ethernet) window



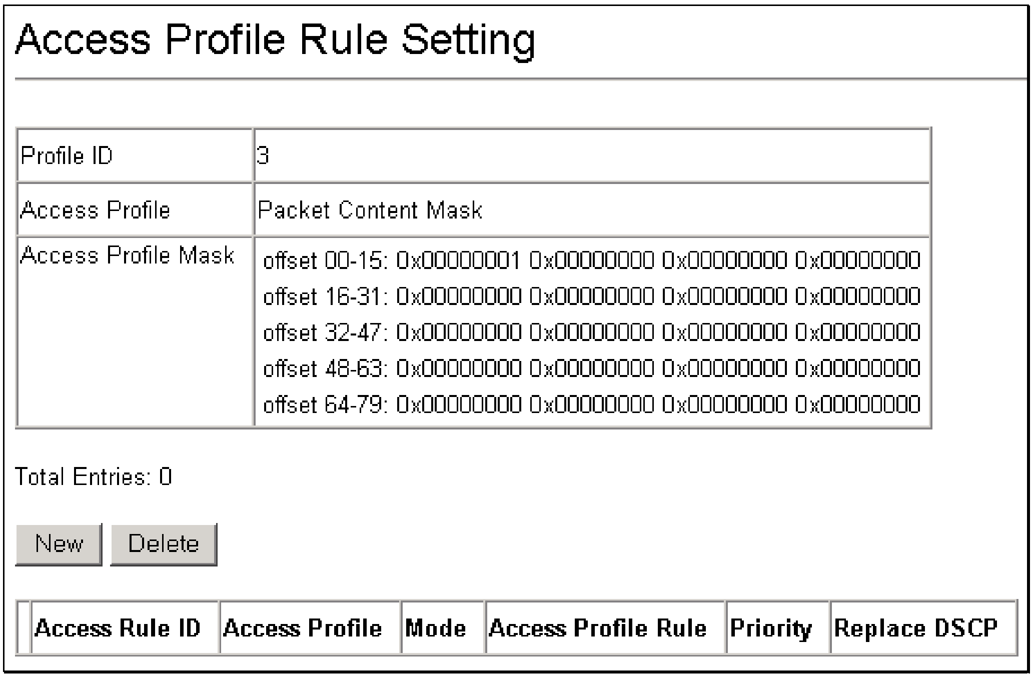
Access Profile Rule Setting

Profile ID	2
Access Profile	IP
Access Profile Mask	vlan / icmp type /

Total Entries: 0

	Access Rule ID	Access Profile	Mode	Access Profile Rule	Priority	Replace DSCP

Figure 6- 63. Access Profile Rule Setting (IP) window



Access Profile Rule Setting

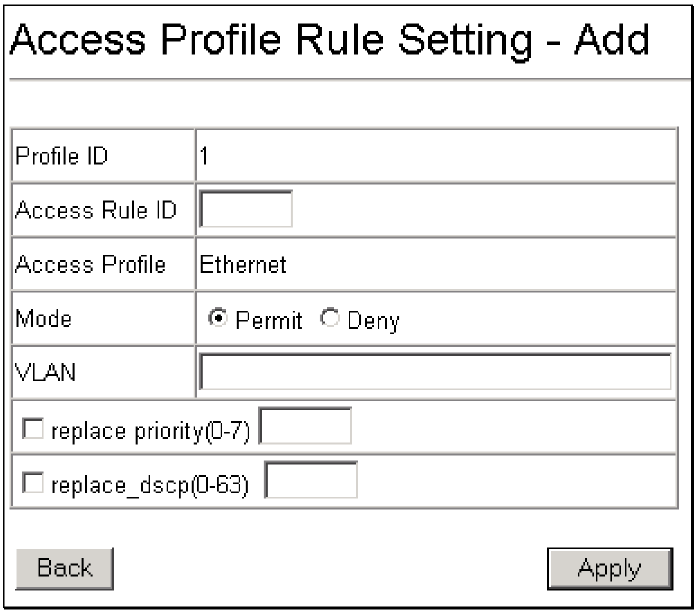
Profile ID	3
Access Profile	Packet Content Mask
Access Profile Mask	offset 00-15: 0x00000001 0x00000000 0x00000000 0x00000000 offset 16-31: 0x00000000 0x00000000 0x00000000 0x00000000 offset 32-47: 0x00000000 0x00000000 0x00000000 0x00000000 offset 48-63: 0x00000000 0x00000000 0x00000000 0x00000000 offset 64-79: 0x00000000 0x00000000 0x00000000 0x00000000

Total Entries: 0

	Access Rule ID	Access Profile	Mode	Access Profile Rule	Priority	Replace DSCP

Figure 6- 64. Access Profile Rule Setting (Packet Content Mask) window

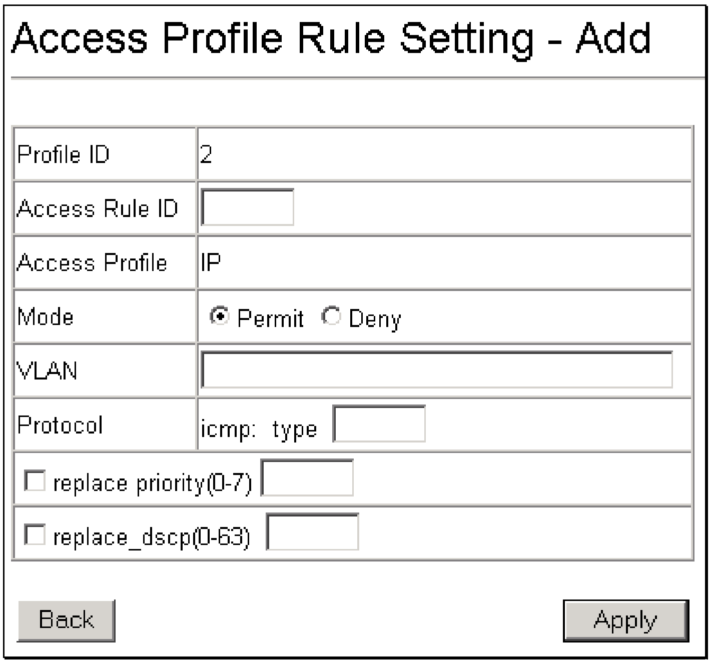
To create a new rule set for an access profile, click the **New** button. A new window is displayed. To remove a previously created rule, select it and click the **Delete** button.



Access Profile Rule Setting - Add

Profile ID	1
Access Rule ID	
Access Profile	Ethernet
Mode	● Permit ○ Deny
VLAN	
□ replace priority(0-7)	
□ replace_dscp(0-63)	

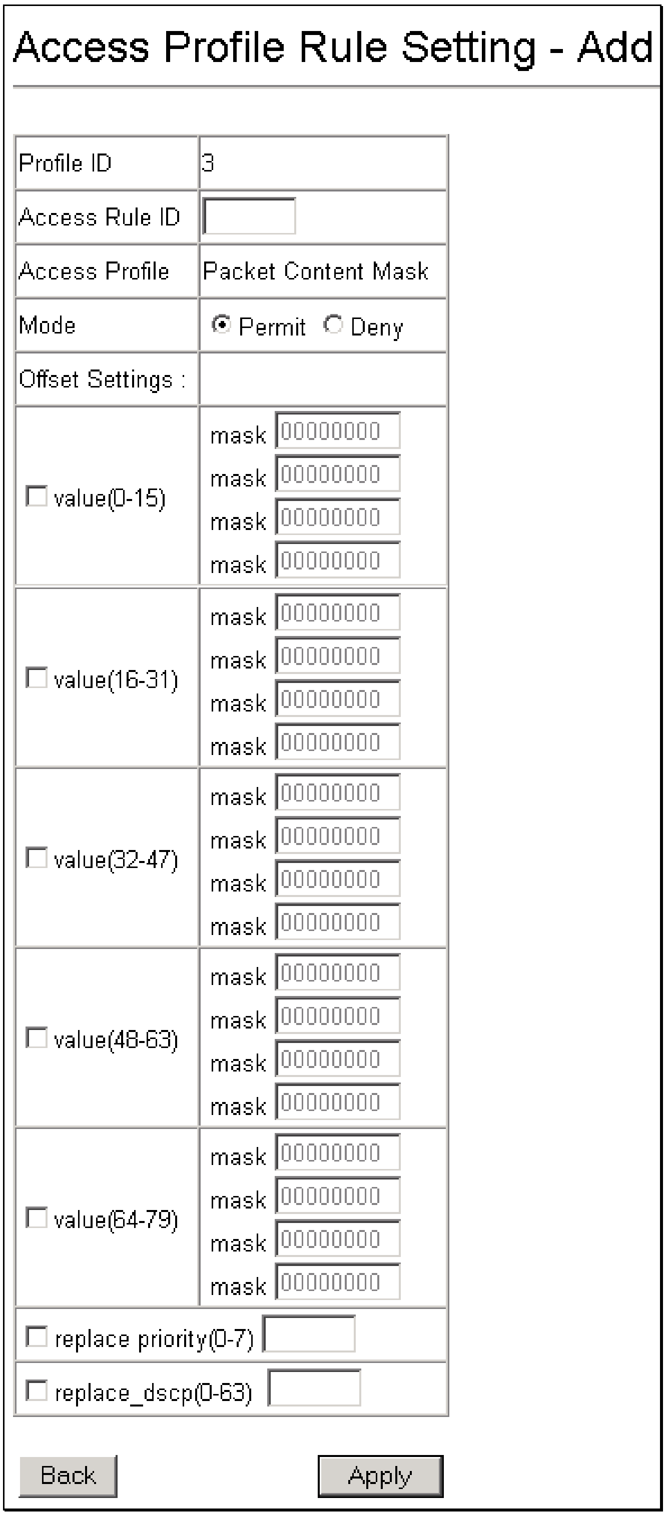
Figure 6- 65. Access Profile Rule Setting – Add (Ethernet) window



Access Profile Rule Setting - Add

Profile ID	2
Access Rule ID	
Access Profile	IP
Mode	● Permit ○ Deny
VLAN	
Protocol	icmp: type
□ replace priority(0-7)	
□ replace_dscp(0-63)	

Figure 6- 66. Access Profile Rule Setting – Add (IP) window



Access Profile Rule Setting - Add

Profile ID	3
Access Rule ID	
Access Profile	Packet Content Mask
Mode	● Permit ○ Deny
Offset Settings :	
□ value(0-15)	mask 00000000 mask 00000000 mask 00000000 mask 00000000
□ value(16-31)	mask 00000000 mask 00000000 mask 00000000 mask 00000000
□ value(32-47)	mask 00000000 mask 00000000 mask 00000000 mask 00000000
□ value(48-63)	mask 00000000 mask 00000000 mask 00000000 mask 00000000
□ value(64-79)	mask 00000000 mask 00000000 mask 00000000 mask 00000000
□ replace priority(0-7)	
□ replace_dscp(0-63)	

Figure 6- 67. Access Profile Rule Setting – Add (Package Content Mask) window

Configure the following Access Profile Rule Settings:

Parameter	Description
Profile ID	This is the identifier number for this profile set.
Access Rule ID	Type in a unique identifier number for this access. This value can be set from 0 to 255.

Access Profile Selected profile based on Ethernet (MAC Address), IP address, or Packet Content Mask.

Ethernet instructs the Switch to examine the layer 2 part of each packet header.

IP instructs the Switch to examine the IP address in each frame's header.

Packet Content Mask instructs the Switch to examine the packet header

Mode 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).

Select Deny to specify that packets that do not match the access profile are not forwarded by the Switch and will be filtered.

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.

replace priority (0-7) Select this option to instruct the switch to replace the 802.1p value (in a packet that meets the selected criteria). In this way, packets meeting the criteria can have their priority handling modified for use within the switch, and then have a different priority value assigned when they leave the switch.

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.

Protocol 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:

Select ICMP to instruct the Switch to examine the Internet Control Message Protocol (ICMP) field in each frame's header.

Offset Settings: This field will instruct the Switch to mask the packet header beginning with the offset value specified:

value (0-15) - Enter a value in hex form to mask the packet from the beginning of the packet to the 15th byte.

value (16-31) - Enter a value in hex form to mask the packet from byte 16 to *byte 31.*

value (32-47) - Enter a value in hex form to mask the packet from byte 32 to byte 47.

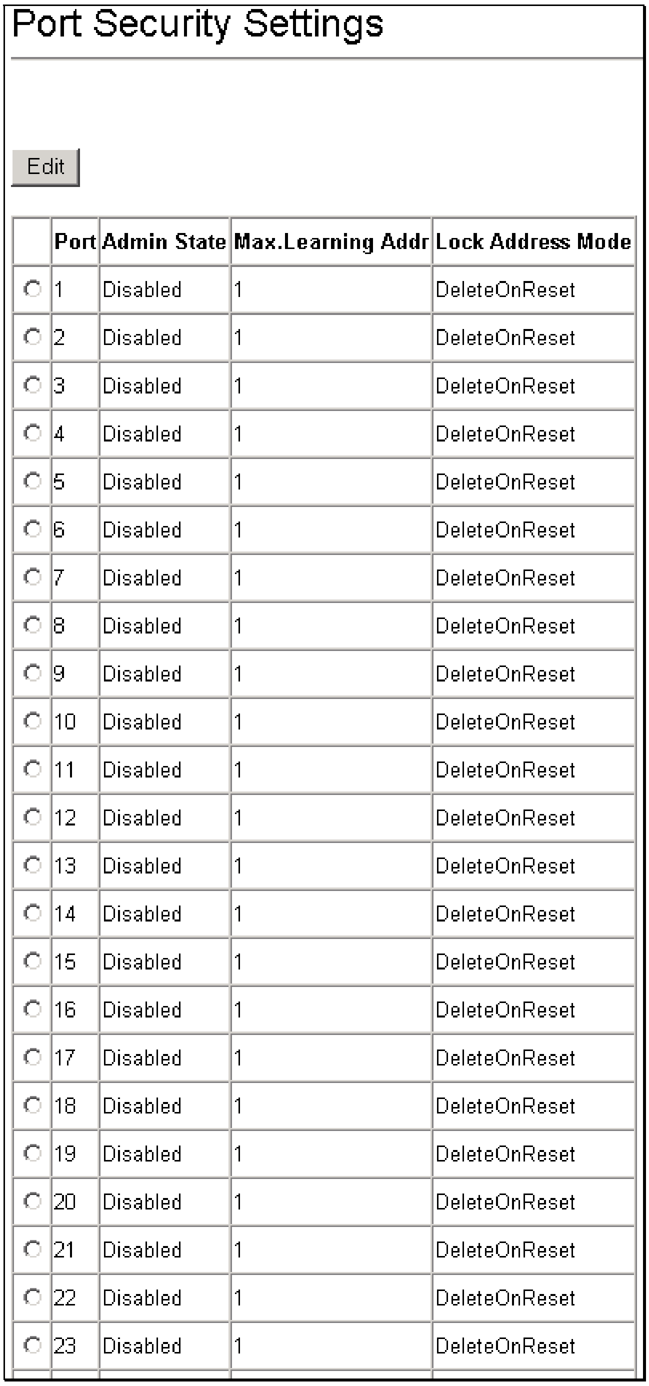
value (48-63) - Enter a value in hex form to mask the packet from byte 48 to byte 63.

value (64-79) - Enter a value in hex form to mask the packet from byte 64 to byte 79.

Port Security

A given port's (or a range of port's) dynamic MAC address learning can be locked such that the current source MAC addresses entered into the MAC address forwarding table can not be changed once the port lock is enabled. The port can be locked by changing the Admin State pull-down menu to *Enabled* on the **Port Security Settings – Edit** window, shown below, and clicking **Apply**.

This 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.

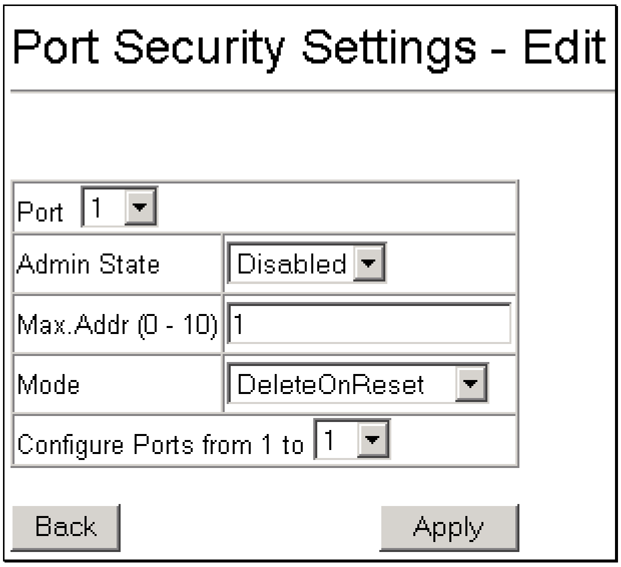


Port Security Settings

	Port	Admin State	Max.Learning Addr	Lock Address Mode
○	1	Disabled	1	DeleteOnReset
○	2	Disabled	1	DeleteOnReset
○	3	Disabled	1	DeleteOnReset
○	4	Disabled	1	DeleteOnReset
○	5	Disabled	1	DeleteOnReset
○	6	Disabled	1	DeleteOnReset
○	7	Disabled	1	DeleteOnReset
○	8	Disabled	1	DeleteOnReset
○	9	Disabled	1	DeleteOnReset
○	10	Disabled	1	DeleteOnReset
○	11	Disabled	1	DeleteOnReset
○	12	Disabled	1	DeleteOnReset
○	13	Disabled	1	DeleteOnReset
○	14	Disabled	1	DeleteOnReset
○	15	Disabled	1	DeleteOnReset
○	16	Disabled	1	DeleteOnReset
○	17	Disabled	1	DeleteOnReset
○	18	Disabled	1	DeleteOnReset
○	19	Disabled	1	DeleteOnReset
○	20	Disabled	1	DeleteOnReset
○	21	Disabled	1	DeleteOnReset
○	22	Disabled	1	DeleteOnReset
○	23	Disabled	1	DeleteOnReset

Figure 6- 68. Port Security Settings window

Click **Edit** to open the following window:



Port Security Settings - Edit

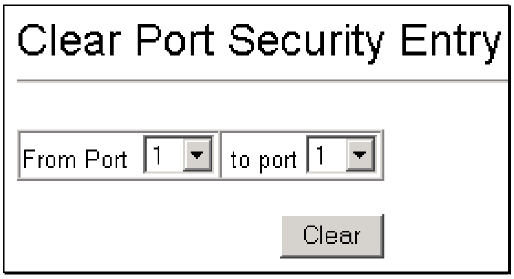
Port	1
Admin State	Disabled
Max.Addr (0 - 10)	1
Mode	DeleteOnReset
Configure Ports from 1 to	1

Figure 6- 69. Port Security Settings – Edit window

The following fields can be set:

Parameter	Description
Admin State <*Disabled*>	Allows the selected port(s) dynamic MAC address learning to be locked such that new source MAC addresses cannot be entered into the MAC address table for the locked port or group of ports. It can be changed by toggling between *Disabled* and *Enabled*.
Max. Addr (0 - 10) <*1* >	Select the maximum number of addresses that may be learned for the port. The port can be restricted to 10 or less MAC addresses that are allowed for dynamically learned MAC addresses in the forwarding table.
Mode<*DeleteOnReset*>	Select *DeleteOnTimeout* to clear dynamic entries for the ports on timeout of the Forwarding Data Base (FDB). When *DeleteOnReset* is selected, the locked addresses will not age out until the Switch has been reset. Select *Permanent* to automatically save the new learned address and never age out even if the system rebooting. You can use the **Port Security** menu to either clear or delete port security entries.
Configure Ports from __ to	Use this to specify a consecutively numbered group of ports on the switch for configuration.

Click **Clear Port Security Entry** in the **Port Security** folder to access the following window:



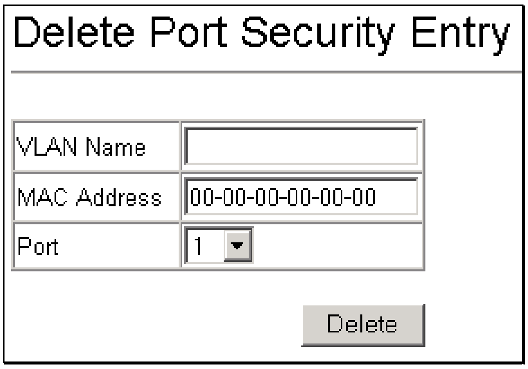
Clear Port Security Entry

From Port 1 to port 1

Figure 6- 70. Clear Port Security Entry window

Select the range of port security entries and then click **Clear**.

Click **Delete Port Security Entry** in the **Port Security** folder to access the following window:



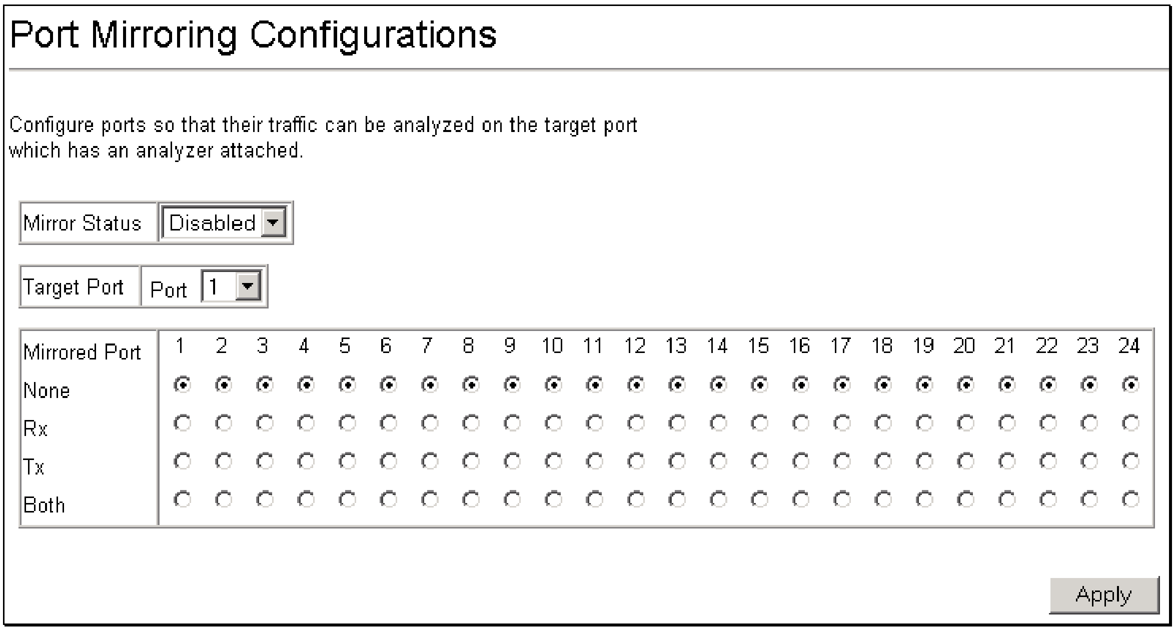
Delete Port Security Entry

VLAN Name	
MAC Address	00-00-00-00-00-00
Port	1

Figure 6- 71. Delete Port Security Entry window

Enter the VLAN Name, MAC Address, and port, and then click **Delete** to remove a port security entry.

Port Mirroring Configurations



Port Mirroring Configurations

Configure ports so that their traffic can be analyzed on the target port which has an analyzer attached.

Mirror Status	Disabled
Target Port	Port 1

Mirrored Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
None	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Rx	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Tx	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Both	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Figure 6- 72. Port Mirroring Configurations window

The target port is the port where information will be duplicated and sent for capture and network analysis. This is the port where a network analyzer would be attached to capture packets duplicated from the source port.

Up to 25 entries can be made to the port mirroring table, but it should be noted that a faster port (a 1000 Mbps Gigabit Ethernet port, for example) should not be mirrored to a slower port, because many packets will be dropped.

The following fields can be set:

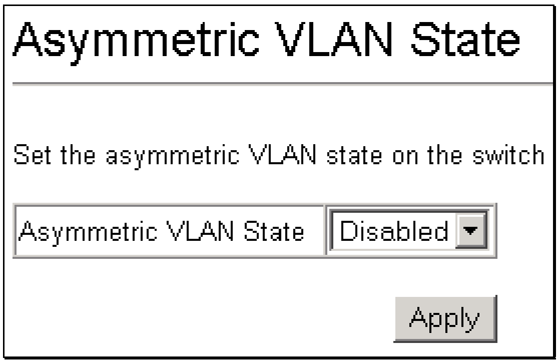
Parameter	Description
Mirror Status	This enables or disables mirroring.
Target Port	This is the port where information will be duplicated and sent for capture and network analysis.

Mirrored Port	This field can be toggled among *None*, *Both*, *Rx* and *Tx*. *Rx* mirrors only received packets, while *Tx* mirrors only transmitted packets.

VLAN Configurations

This section includes **Asymmetric VLAN State**, **Switch GVRP**, **802.1Q VLANs**, and **IEEE 802.1Q Settings**.

Asymmetric VLAN State



Asymmetric VLAN State

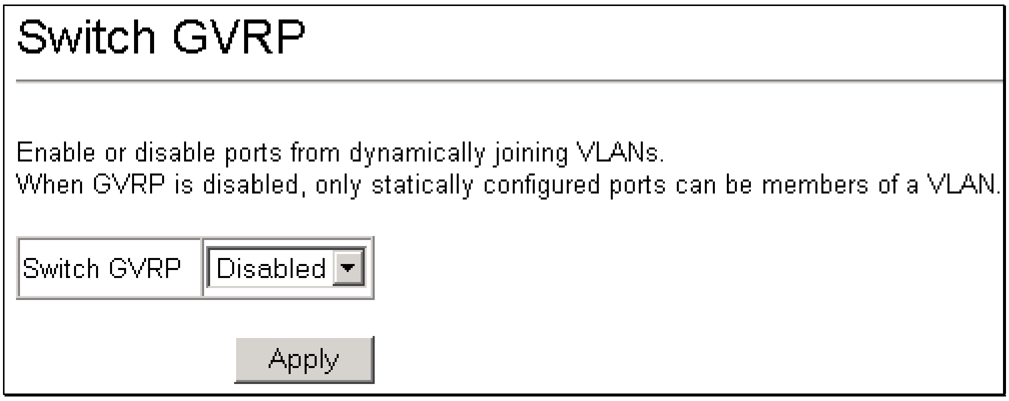
Set the asymmetric VLAN state on the switch

Asymmetric VLAN State: Disabled

Figure 6- 73. Asymmetric VLAN State window

To set Asymmetric VLANs on the DGS-3224TGR, select *Enabled* from the drop-down menu and then click **Apply**.

Switch GVRP



Switch GVRP

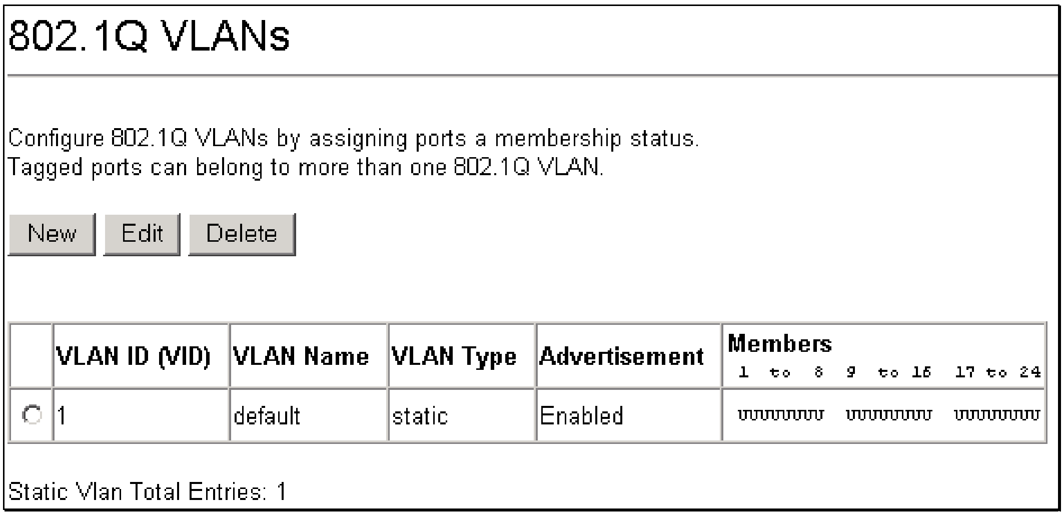
Enable or disable ports from dynamically joining VLANs.
When GVRP is disabled, only statically configured ports can be members of a VLAN.

Switch GVRP: Disabled

Figure 6- 74. Switch GVRP window

To enable ports from dynamically joining VLANs, select *Enabled* from the drop-down menu and then click **Apply**.

802.1Q VLANs



802.1Q VLANs

Configure 802.1Q VLANs by assigning ports a membership status.
Tagged ports can belong to more than one 802.1Q VLAN.

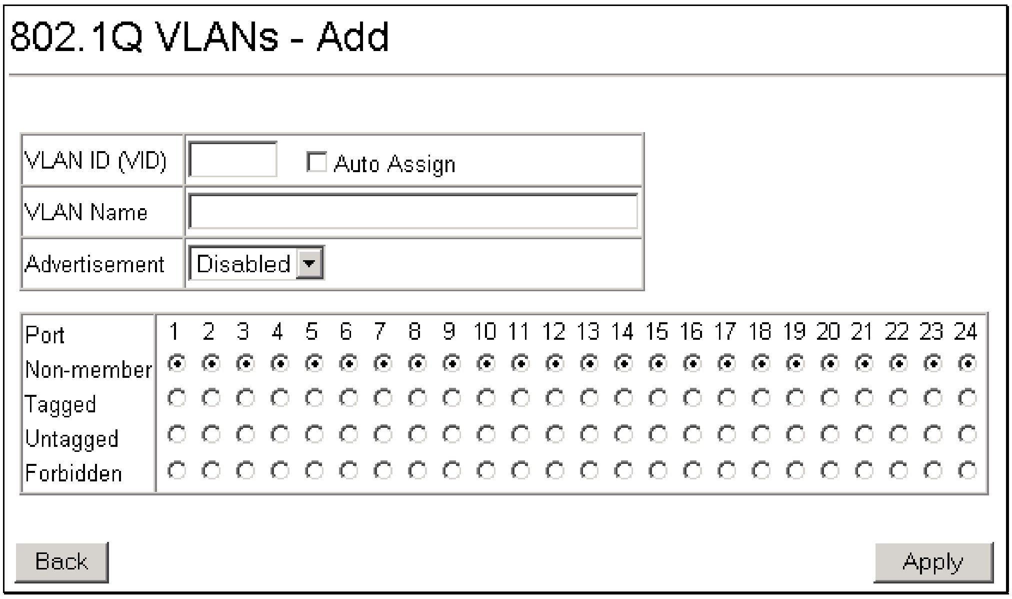
	VLAN ID (VID)	VLAN Name	VLAN Type	Advertisement	Members 1 to 8 9 to 16 17 to 24
○	1	default	static	Enabled	uuuuuuuu uuuuuuuu uuuuuuuu

Static Vlan Total Entries: 1

Figure 6- 75. 802.1Q VLANs window

To delete an existing 802.1Q VLAN, click the corresponding click-box to the left of the VLAN you want to delete from the switch and then click the **Delete** button.

To create a new 802.1Q VLAN, click the New button:



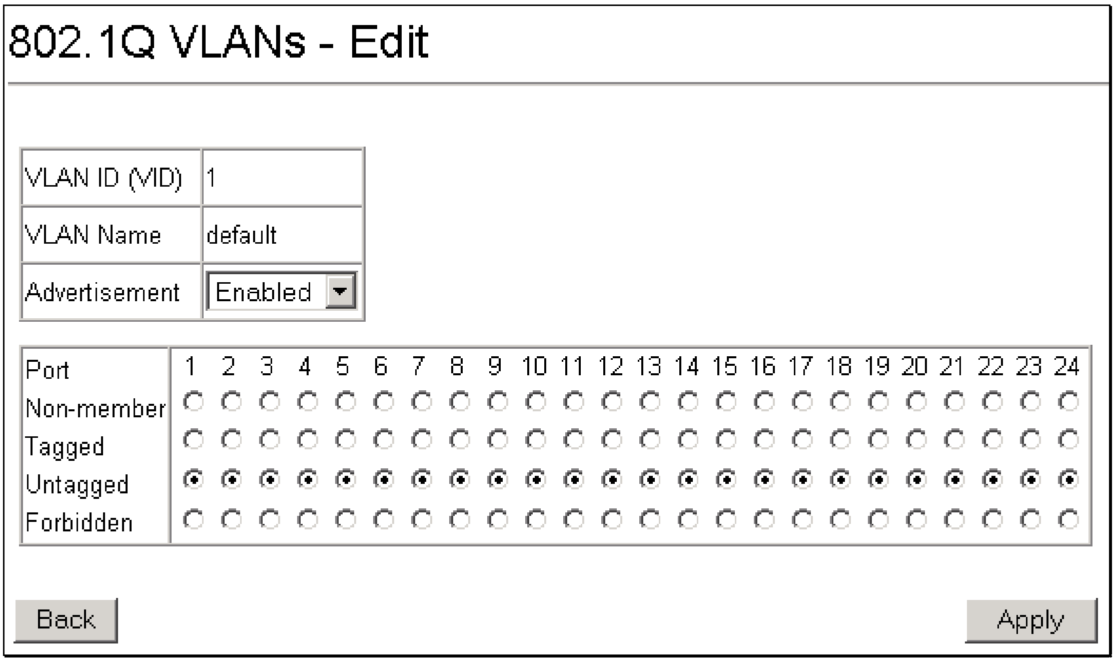
802.1Q VLANs - Add

VLAN ID (VID)	☐ Auto Assign
VLAN Name	
Advertisement	Disabled

Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Non-member	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tagged	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Untagged	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Forbidden	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Figure 6- 76. 802.1Q VLANs – Add window

To edit an existing 802.1Q VLAN, select an entry and then click the Edit button:



802.1Q VLANs - Edit

VLAN ID (VID)	1
VLAN Name	default
Advertisement	Enabled ▾

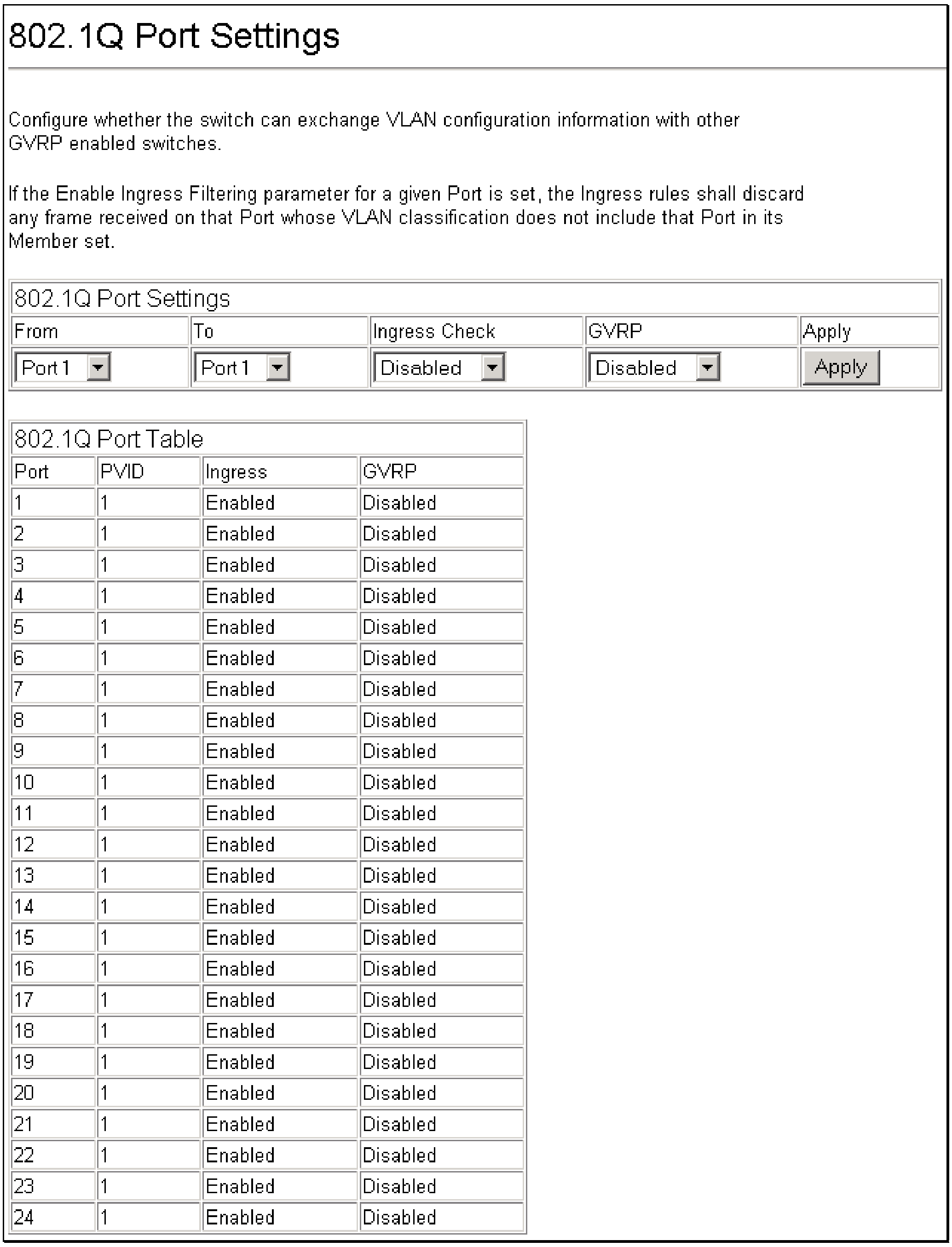
Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Non-member	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Tagged	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Untagged	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Forbidden	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Figure 6- 77. 802.1Q VLANs – Edit window

The following fields can then be set in either of the two **802.1Q Static VLAN** windows:

Parameter	Description
VLAN ID (VID)	Allows the entry of a VLAN ID in the Add window, or displays the VLAN ID of an existing VLAN in the Modify window. VLANs can be identified by either the VID or the VLAN name.
VLAN Name	Allows the entry of a name for the new VLAN in the Add window.
Advertisement	Advertising can be enabled or disabled using this pull-down menu. If advertising is disabled, the switch does not send any GARP/GVRP messages of the VLAN.
Port	Allows an individual port to be specified as member of a VLAN.
Non-member	Allows an individual port to be specified as a non-VLAN member.
Tagged/Untagged	Allows an individual port to be specified as Tagged or Untagged. A check in the Tagged field specifies the port as a Tagging member of the VLAN. When an untagged packet is transmitted by the port, the packet header is changed to include the 32-bit tag associated with the VID (VLAN Identifier – see below). When a tagged packet exits the port, the packet header is unchanged. A check in the Untagged field specifies the port as an Un-tagging member of the VLAN. When an untagged packet is transmitted by the port, the packet header remains unchanged. When a tagged packet exits the port, the tag is stripped and the packet is changed to an untagged packet.
Forbidden	Forbidden Non-Member - specifies the port as not being a member of the VLAN and that the port is forbidden from becoming a member of the VLAN dynamically.

802.1Q Port Settings



802.1Q Port Settings

Configure whether the switch can exchange VLAN configuration information with other GVRP enabled switches.

If the Enable Ingress Filtering parameter for a given Port is set, the Ingress rules shall discard any frame received on that Port whose VLAN classification does not include that Port in its Member set.

802.1Q Port Settings				
From	To	Ingress Check	GVRP	Apply
Port 1	Port 1	Disabled	Disabled	Apply

802.1Q Port Table			
Port	PVID	Ingress	GVRP
1	1	Enabled	Disabled
2	1	Enabled	Disabled
3	1	Enabled	Disabled
4	1	Enabled	Disabled
5	1	Enabled	Disabled
6	1	Enabled	Disabled
7	1	Enabled	Disabled
8	1	Enabled	Disabled
9	1	Enabled	Disabled
10	1	Enabled	Disabled
11	1	Enabled	Disabled
12	1	Enabled	Disabled
13	1	Enabled	Disabled
14	1	Enabled	Disabled
15	1	Enabled	Disabled
16	1	Enabled	Disabled
17	1	Enabled	Disabled
18	1	Enabled	Disabled
19	1	Enabled	Disabled
20	1	Enabled	Disabled
21	1	Enabled	Disabled
22	1	Enabled	Disabled
23	1	Enabled	Disabled
24	1	Enabled	Disabled

Figure 6- 78. 802.1Q Port Settings window

This window allows you to see a Port VLAN ID (PVID) number, enable or disable the ingress filtering check, and enable or disable GVRP for individual ports.

Ingress filtering means that a receiving port will check to see if it is a member of the VLAN ID in the packet before forwarding the packet. GARP VLAN Registration Protocol (GVRP) is a Generic Attribute Registration Protocol (GARP) application that provides 802.1Q-compliant VLAN pruning and dynamic VLAN creation on 802.1Q ports. With GVRP, the switch can exchange VLAN configuration information with other GVRP switches, prune unnecessary broadcast and unknown unicast traffic, and dynamically create and manage VLANs on switches connected through 802.1Q ports. Click **Apply** to let your changes take effect.

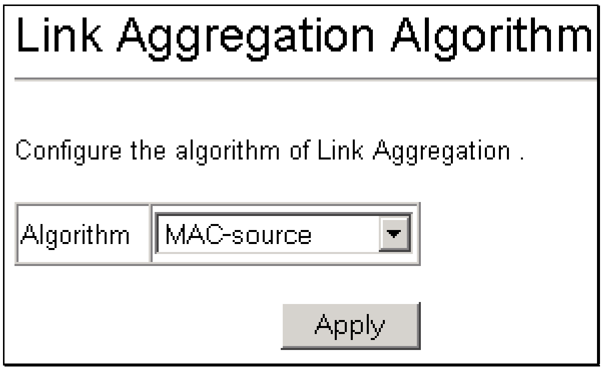
The information on the window is described as follows:

Parameter	Description
PVID	PVID is used to decide whether received untagged packets belong to a VLAN.
GVRP	For each corresponding port, GARP VLAN Registration Protocol can be *Enabled*, *Disabled*, or *NoChange*.
Ingress Check	Ingress filtering is used to check if the received port is a member port of the VLAN whose VID is equal to the VID of incoming packets. The settings include *Enabled*, *Disabled*, and *NoChange*.

Link Aggregation

From the Link Aggregation directory you can access three windows for selecting the Link Aggregation Algorithm, configuring the Link Aggregation Group, and LACP Port Settings.

Link Aggregation Algorithm



Link Aggregation Algorithm

Configure the algorithm of Link Aggregation .

Algorithm: MAC-source

Figure 6- 79. Link Aggregation Algorithm window

The information on the algorithm settings is described as follows:

Parameter	Description
MAC source	Indicates that the switch should examine the MAC source address.
MAC destination	Indicates that the switch should examine the MAC destination address.
MAC source dest	Indicates that the switch should examine the MAC source and destination addresses.
IP source	Indicates that the switch should examine the IP source address.
IP destination	Indicates that the switch should examine the IP destination address.
IP source dest	Indicates that the switch should examine the IP source and destination addresses.

Link Aggregation Group

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.

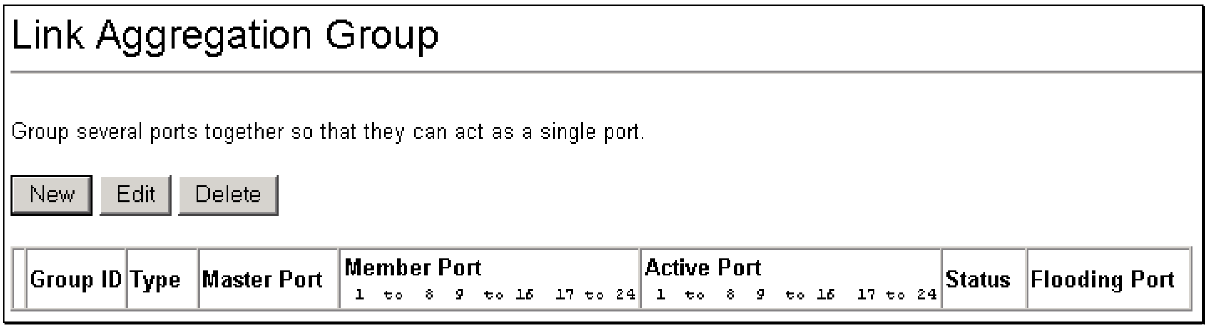
Link aggregation is most commonly used to link a bandwidth intensive network device or devices – such as a server – to the backbone of a network.

The switch allows the creation of up to 32 link aggregation groups, each group consisting of up of up to eight links (ports). The four mini-GBIC ports can only belong to a single link aggregation group. A link aggregation group may not cross an eight-port boundary, starting with port 1 (a group may not contain ports 8 and 9, for example) and all of the ports in the group must be members of the same VLAN. Further, the aggregated links must all be of the same speed and should be configured as full duplex.

Each port in an aggregation group can be configured as the Master Port of the group, and all configuration options, including the VLAN configuration that can be applied to the Master Port, are applied to the entire link aggregation group (except mirror, 802.1p, and traffic segmentation, which can be configured to individual ports).

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.



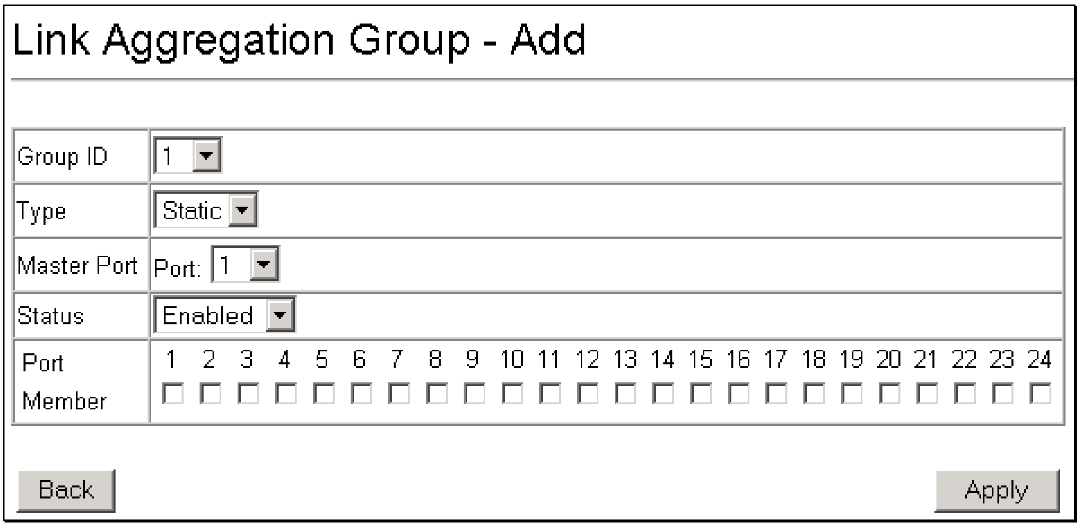
Link Aggregation Group

Group several ports together so that they can act as a single port.

	Group ID	Type	Master Port	Member Port 1 to 8 9 to 16 17 to 24	Active Port 1 to 8 9 to 16 17 to 24	Status	Flooding Port

Figure 6- 80. Link Aggregation Group window

Click **New** to create a new link aggregation:



Link Aggregation Group - Add

Group ID	1
Type	Static
Master Port	Port: 1
Status	Enabled
Port Member	1 □ 2 □ 3 □ 4 □ 5 □ 6 □ 7 □ 8 □ 9 □ 10 □ 11 □ 12 □ 13 □ 14 □ 15 □ 16 □ 17 □ 18 □ 19 □ 20 □ 21 □ 22 □ 23 □ 24 □

Figure 6- 81. Link Aggregation Group – Add window

The same window is also used to edit an existing link aggregation.

The following fields can be set:

Parameter	Description
Group ID	Allows the entry of a number used to identify the link aggregation group – when adding a new group. Displays the Group ID of the currently selected link aggregation group – when editing and existing entry.

Type	Select from *Static* or *LACP* (Link Aggregation Control Protocol).
Master Port <*1*>	The Master port of link aggregation group.
Status <*Disabled*>	This field can be toggled between *Enabled* and *Disabled*. This is used to turn a link aggregation group on or off. This is useful for diagnostics, to quickly isolate a bandwidth intensive network device or to have an absolute backup link aggregation group that is not under automatic control.
Port Member	Allows the specification of the ports that will make up the link aggregation group.

LACP Port Settings

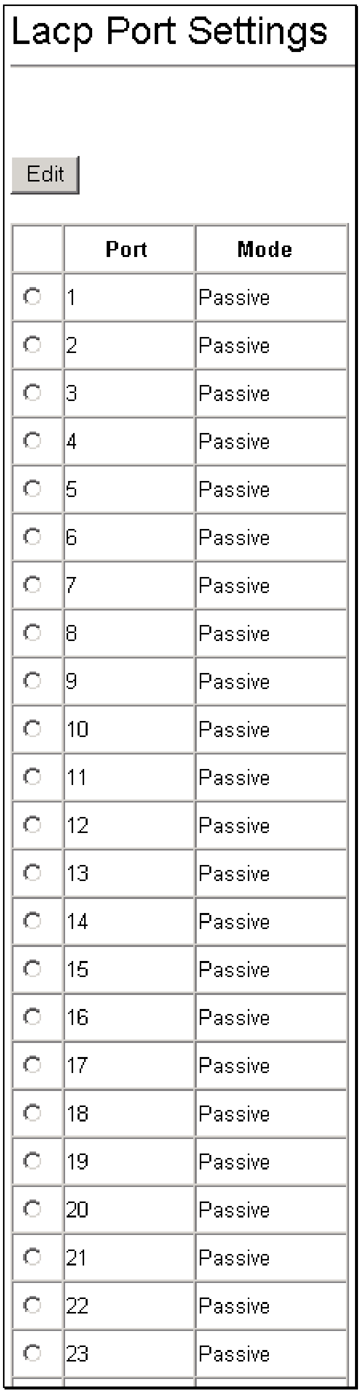
LACP supports the automatic creation of link aggregation by exchanging LACP packets between LAN ports. LACP packets are exchanged only between ports in passive and active modes. Both the passive and active modes allow LACP to negotiate between LAN ports to determine if they can form a link aggregation.

- Passive – LACP mode that places a port into a passive negotiating state, in which the port responds to LACP packets it receives but does not initiate LACP negotiation. This is the default.
- Active – LACP mode that places a port into an active negotiating state, in which the port initiates negotiations with other ports by sending LACP packets.

LAN ports can form a trunk group when they are in different LACP modes as long as the modes are compatible. For example:

- A LAN port in active mode can form a trunk group successfully with another LAN port that is in active mode.
- A LAN port in active mode can form a trunk group with another LAN port in passive mode.

A LAN port in passive mode cannot form a trunk with another LAN port that is also in passive mode, because neither port will initiate negotiation.

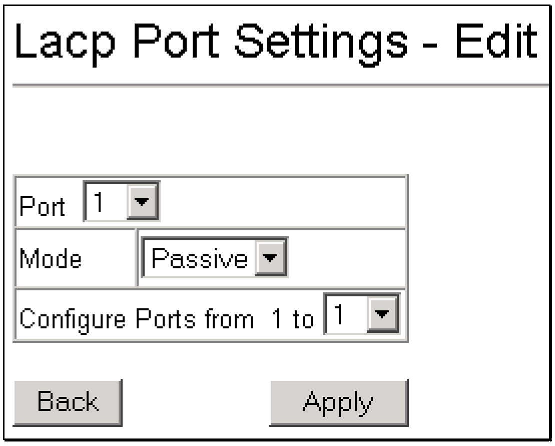


Lacp Port Settings

	Port	Mode
○	1	Passive
○	2	Passive
○	3	Passive
○	4	Passive
○	5	Passive
○	6	Passive
○	7	Passive
○	8	Passive
○	9	Passive
○	10	Passive
○	11	Passive
○	12	Passive
○	13	Passive
○	14	Passive
○	15	Passive
○	16	Passive
○	17	Passive
○	18	Passive
○	19	Passive
○	20	Passive
○	21	Passive
○	22	Passive
○	23	Passive

Figure 6- 82. LACP Port Settings window

To edit a LACP Port Table entry, select it and then click **Edit**.



Lacp Port Settings - Edit

Port 1

Mode Passive

Configure Ports from 1 to 1

Figure 6- 83. LACP Port Settings - Edit window

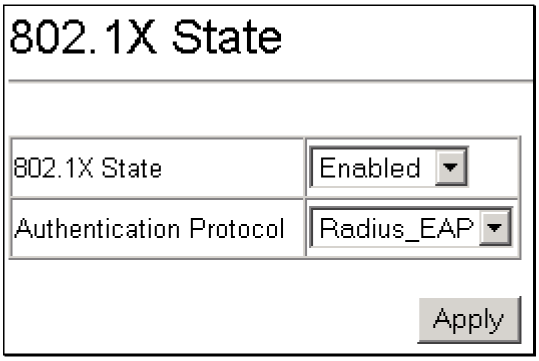
Select the desired port, mode, and range of ports to be configured and then click **Apply**.

802.1X

The DGS-3224TGR implements the server-side of the IEEE 802.1x Port-based Network Access Control. This mechanism is intended to allow only authorized users, or other network devices, access to network resources by establishing criteria for each port on the switch that a user or network device must meet before allowing that port to forward or receive frames.

IEEE 802.1X operation must be enabled on the switch before it will function. This is done using the **802.1X State** window. 802.1X settings can be configured before it is enabled switch wide.

802.1X State



802.1X State

802.1X State Enabled

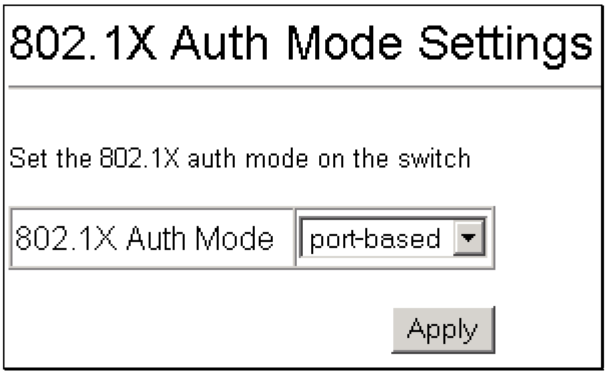
Authentication Protocol Radius_EAP

Figure 6- 84. 802.1X State window

The following fields are described below:

Parameter	Description
802.1X State	The 802.1x State can be set to *Enabled* or *Disabled*.
Authentication Protocol	This can be set to *Local* or *Radius_EAP*. RADIUS Extensible Authentication Protocol (EAP) supports multiple authentication mechanisms that are negotiated during the authentication phase.

802.1X Auth Mode Settings



802.1X Auth Mode Settings

Set the 802.1X auth mode on the switch

802.1X Auth Mode: port-based

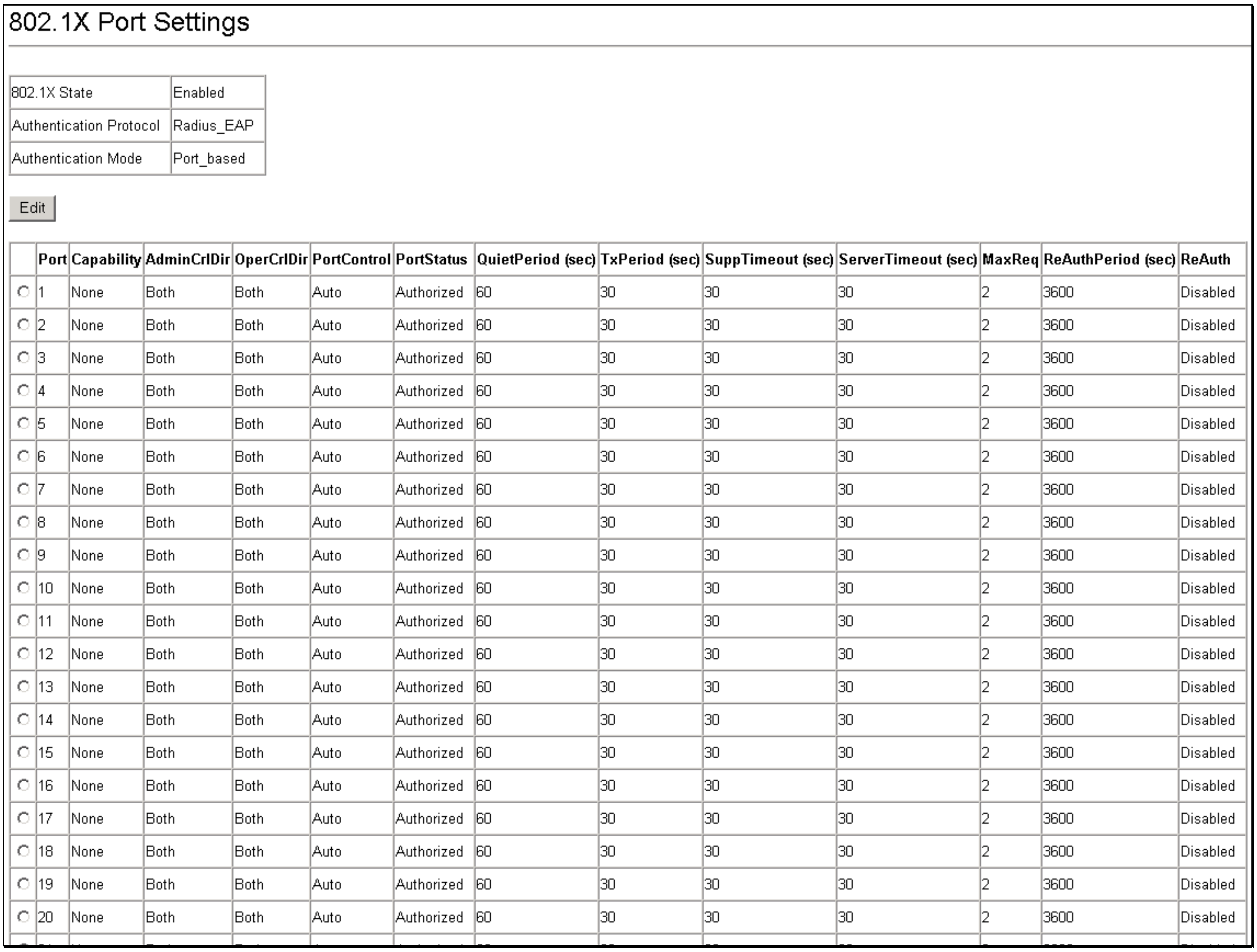
Figure 6- 85. 802.1X Auth Mode Settings window

The following fields are described below:

Parameter	Description
802.1X Auth Mode	Set the 802.1X Auth Mode to either *port-based* or *mac-based*.

802.1X Port Settings

Existing 802.1X port settings are displayed and can be configured using the windows below.



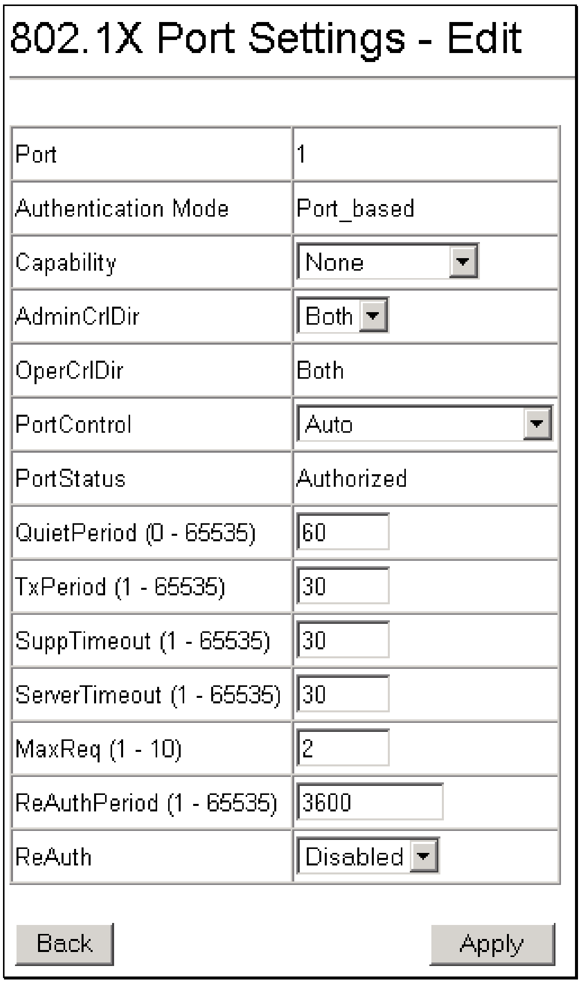
802.1X Port Settings

802.1X State	Enabled
Authentication Protocol	Radius_EAP
Authentication Mode	Port_based

	Port	Capability	AdminCrlDir	OperCrlDir	PortControl	PortStatus	QuietPeriod (sec)	TxPeriod (sec)	SuppTimeout (sec)	ServerTimeout (sec)	MaxReq	ReAuthPeriod (sec)	ReAuth
○	1	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	2	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	3	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	4	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	5	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	6	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	7	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	8	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	9	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	10	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	11	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	12	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	13	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	14	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	15	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	16	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	17	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	18	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	19	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled
○	20	None	Both	Both	Auto	Authorized	60	30	30	30	2	3600	Disabled

Figure 6- 86. 802.1X Port Settings window

Click the selection button on the far left that corresponds to the port you want to configure and click the **Edit** button. The following window will appear:



802.1X Port Settings - Edit

Port	1
Authentication Mode	Port_based
Capability	None
AdminCrlDir	Both
OperCrlDir	Both
PortControl	Auto
PortStatus	Authorized
QuietPeriod (0 - 65535)	60
TxPeriod (1 - 65535)	30
SuppTimeout (1 - 65535)	30
ServerTimeout (1 - 65535)	30
MaxReq (1 - 10)	2
ReAuthPeriod (1 - 65535)	3600
ReAuth	Disabled

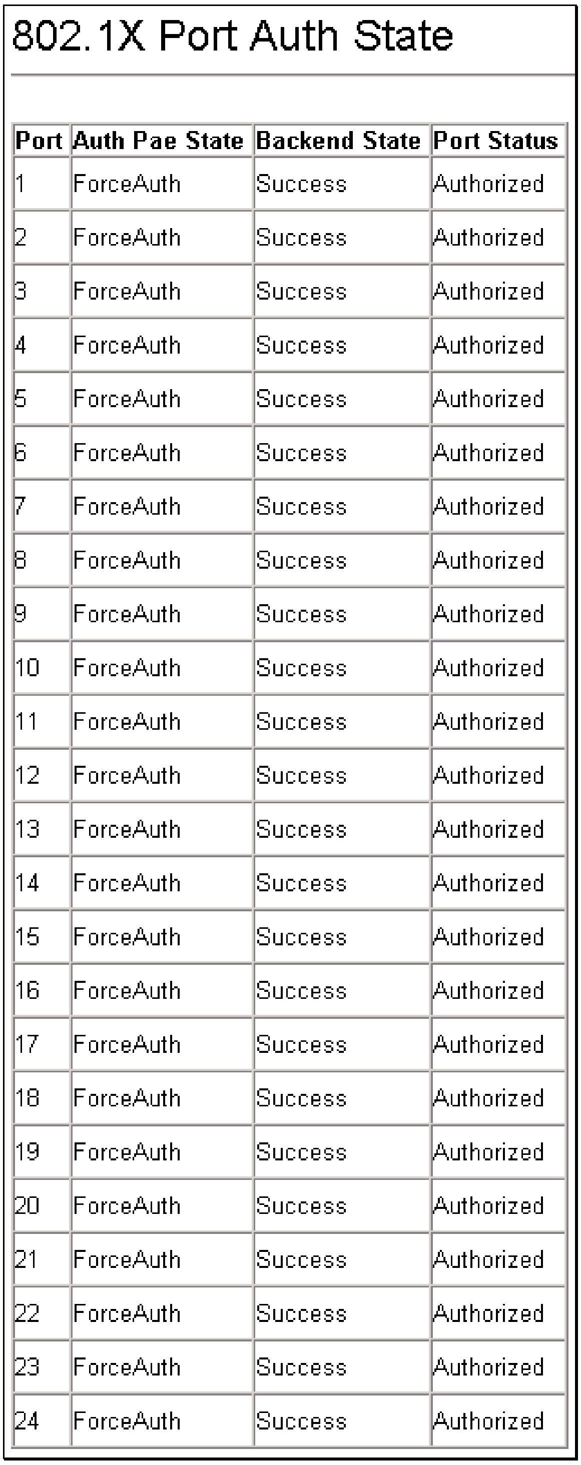
Figure 6- 87. 802.1X Port Settings – Edit window

Configure the following 802.1x port settings:

Parameter	Description
Port	Port being configured for 802.1x settings.
Authentication Mode	Either Port_based or Mac-based.
Capability	Two role choices can be selected: *Authenticator* – A user must pass the authentication process to gain access to the network. *None* – The port is not controlled by the 802.1x functions.
AdminCrlDir	From the pull-down menu, select whether a controlled Port that is unauthorized will exert control over communication in both receiving and transmitting directions, or just the receiving direction.
OperCrlDir	This displays whether a controlled Port that is unauthorized will exert control over communication in both receiving and transmitting directions, or just the receiving direction.
Port Control	Displays the administrative control over the port's authorization status. *Force_Authorized* forces the Authenticator of the port to become

	Authorized. *Force_Unauthorized* forces the port to become Unauthorized. *Auto* means the port state reflects the outcome of the authentication exchange between supplicant, authenticator, and authentication.
PortStatus	Lists the current status of port, Authorized or Unauthorized.
QuietPeriod (0-65535)	Select the time interval between authentication failure and the start of a new authentication attempt.
TxPeriod (1-65535)	Select the time to wait for a response from a supplicant (user) to send EAP Request/Identity packets.
SuppTimeout (1-65535)	Select the time to wait for a response from a supplicant (user) for all EAP packets, except for the Request/Identity packets.
ServerTimeout (1-65535)	Select the length of time to wait for a response from a RADIUS server.
MaxReq (1-10)	Select the maximum number of times to retry sending packets to the supplicant.
ReAuthPeriod (1-65535)	Select the time interval between successive re-authentications.
ReAuth	Enable or disable reauthentication.

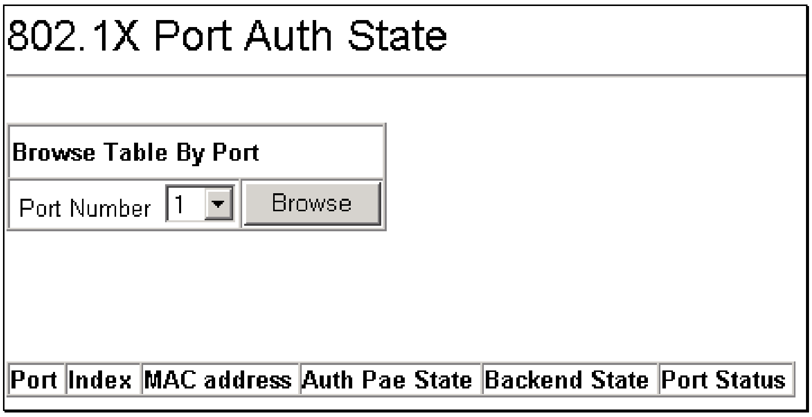
802.1X Port Auth State



802.1X Port Auth State

Port	Auth Pae State	Backend State	Port Status
1	ForceAuth	Success	Authorized
2	ForceAuth	Success	Authorized
3	ForceAuth	Success	Authorized
4	ForceAuth	Success	Authorized
5	ForceAuth	Success	Authorized
6	ForceAuth	Success	Authorized
7	ForceAuth	Success	Authorized
8	ForceAuth	Success	Authorized
9	ForceAuth	Success	Authorized
10	ForceAuth	Success	Authorized
11	ForceAuth	Success	Authorized
12	ForceAuth	Success	Authorized
13	ForceAuth	Success	Authorized
14	ForceAuth	Success	Authorized
15	ForceAuth	Success	Authorized
16	ForceAuth	Success	Authorized
17	ForceAuth	Success	Authorized
18	ForceAuth	Success	Authorized
19	ForceAuth	Success	Authorized
20	ForceAuth	Success	Authorized
21	ForceAuth	Success	Authorized
22	ForceAuth	Success	Authorized
23	ForceAuth	Success	Authorized
24	ForceAuth	Success	Authorized

Figure 6- 88. 802.1x Port Auth State (Port-based) window



802.1X Port Auth State

Browse Table By Port

Port Number 1 Browse

Port	Index	MAC address	Auth Pae State	Backend State	Port Status

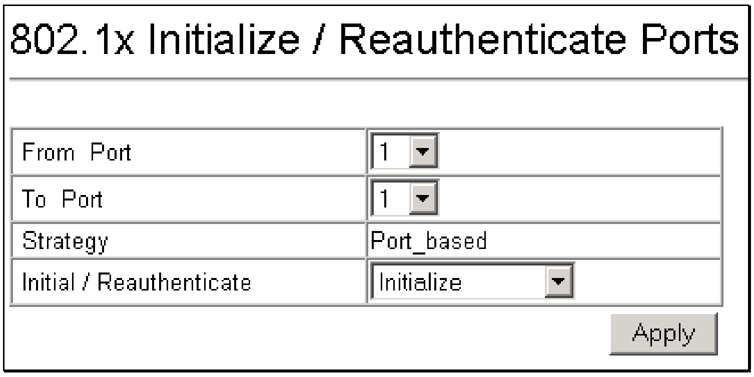
Figure 6- 89. 802.1x Port Auth State (MAC-based) window

This window displays the following information:

Parameter	Description
Port	A read-only field indicating a port on the Switch.
Auth PAE State	The Authenticator PAE State will display one of the following: *Initialize, Disconnected, Connecting, Authenticating, Authenticated, Aborting, Held, ForceAuth, ForceUnauth,* and *N/A.*
Backend State	The Backend Authentication State will display one of the following: *Request, Response, Success, Fail, Timeout, Idle, Initialize,* and *N/A.*
Port Status	The status of the controlled port can be *Authorized, Unauthorized,* or *N/A.*
MAC address	The MAC address of the Switch connected to the corresponding port, if any.

802.1X Initialize / Reauthenticate Ports

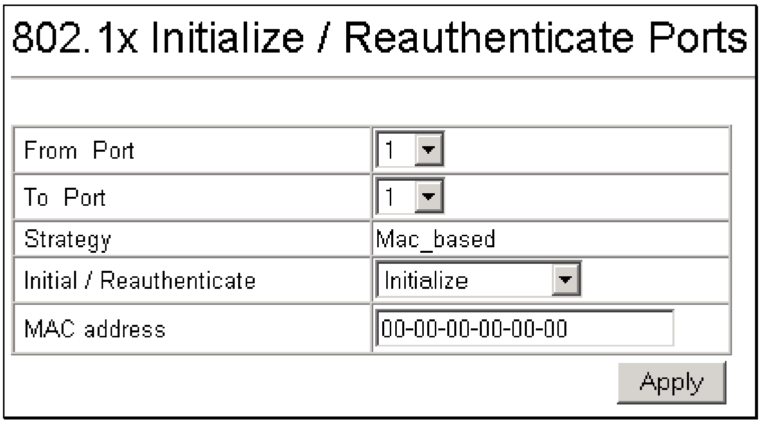
Use this window to initialize and reauthenticate ports, and update the current port state.



802.1x Initialize / Reauthenticate Ports

From Port	1
To Port	1
Strategy	Port_based
Initial / Reauthenticate	Initialize

Figure 6- 90. 802.1x Initialize / Reauthenticate Ports (Port-based) window



802.1x Initialize / Reauthenticate Ports

From Port	1
To Port	1
Strategy	Mac_based
Initial / Reauthenticate	Initialize
MAC address	00-00-00-00-00-00

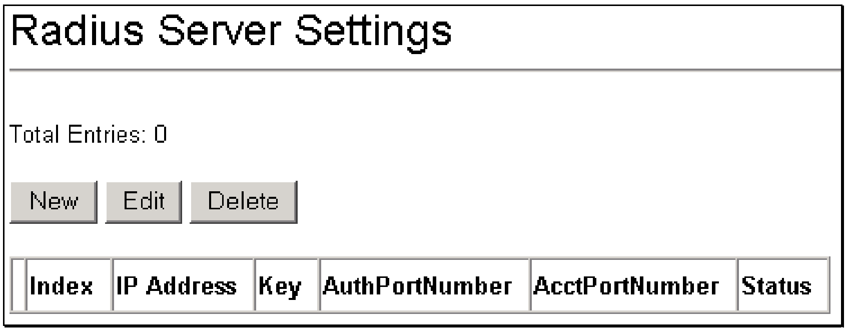
Figure 6- 91. 802.1x Initialize / Reauthenticate Ports (MAC-based) window

Select ports to be initialized/reauthenticated and then use the drop-down menu to select *Initialize* or *Reauthenticate*. Click **Apply** to let your change take effect.

The port number is the only parameter to be configured.

RADIUS Server Settings

Use this window to configure the settings the switch will use to communicate with a RADIUS server.



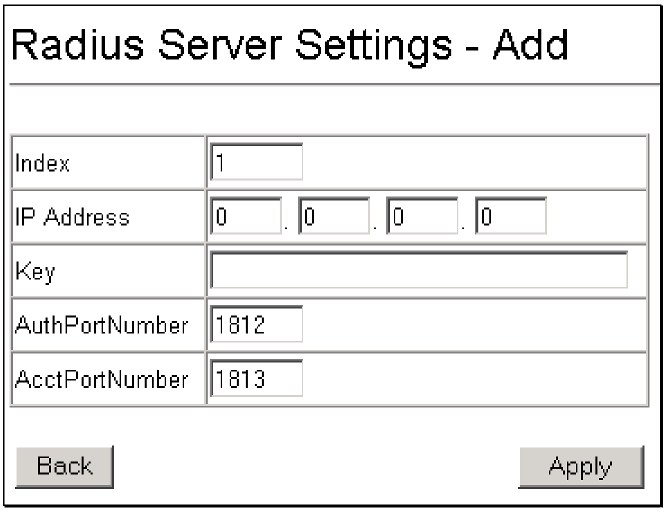
Radius Server Settings

Total Entries: 0

	Index	IP Address	Key	AuthPortNumber	AcctPortNumber	Status

Figure 6- 92. RADIUS Server Settings window

To add RADIUS server settings click the **New** button, a separate configuration window appears. To edit an existing RADIUS settings index, select it and click the **Edit** button.



Radius Server Settings - Add

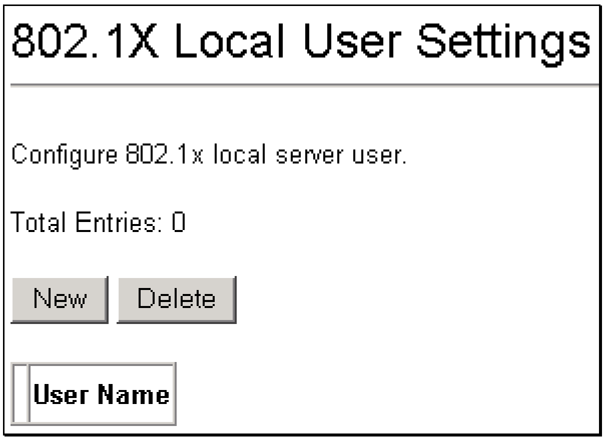
Index	1
IP Address	0 . 0 . 0 . 0
Key	
AuthPortNumber	1812
AcctPortNumber	1813

Figure 6- 93. RADIUS Server Settings – Add window

Configure the following RADIUS server settings for both the Add and Edit windows:

Parameter	Description
Index	RADIUS server settings index.
IP Address	Type in the IP address of the RADIUS server.
Key	Type the shared-secret key used by the RADIUS server and the switch. Up to 32 characters can be used.
AuthPortNumber	Type the UDP port number for authentication requests. The default is 1812.
AcctPortNumber	Type the UDP port number for accounting requests (if accounting server is being used). The default is 1813.

802.1X Local User Settings



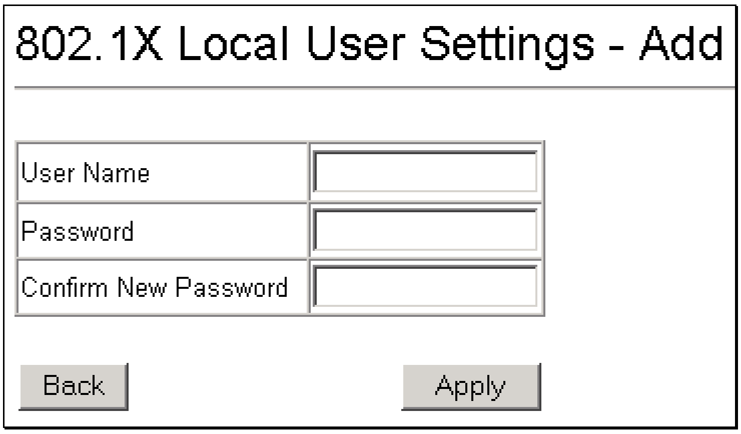
802.1X Local User Settings

Configure 802.1x local server user.

Total Entries: 0

Figure 6- 94. 802.1X Local User Settings window

Click **New** to add an 802.1X local server user:

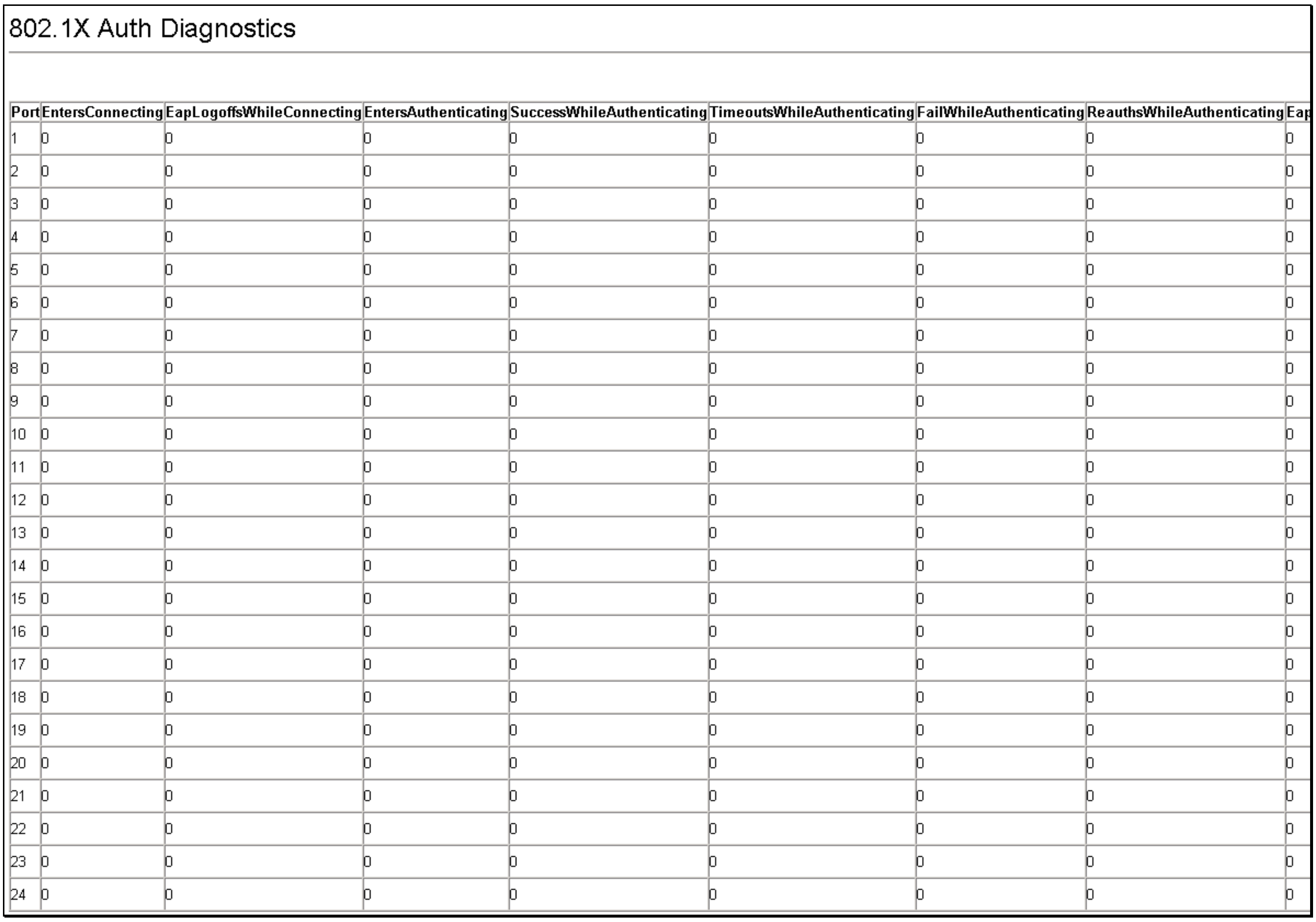


802.1X Local User Settings - Add

User Name	
Password	
Confirm New Password	

Figure 6- 95. 802.1X Local User Settings – Add window

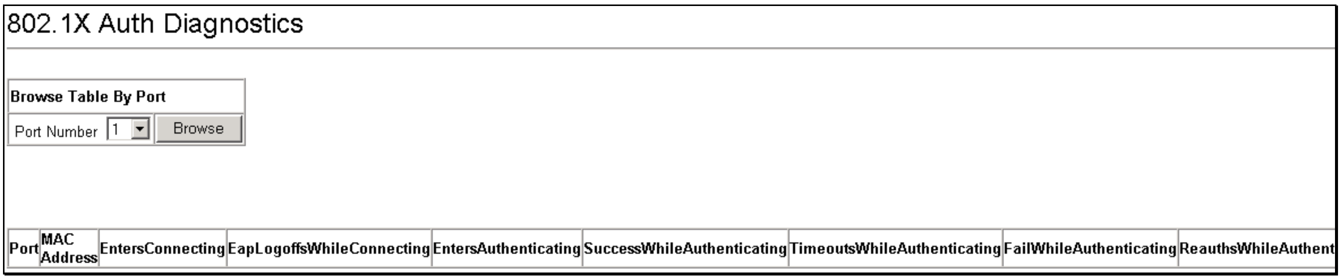
802.1X Auth Diagnostics



802.1X Auth Diagnostics

Port	EntersConnecting	EapLogoffsWhileConnecting	EntersAuthenticating	SuccessWhileAuthenticating	TimeoutsWhileAuthenticating	FailWhileAuthenticating	ReauthsWhileAuthenticating	Eap
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0

Figure 6- 96. 802.1X Auth Diagnostics (Port-based) window



802.1X Auth Diagnostics

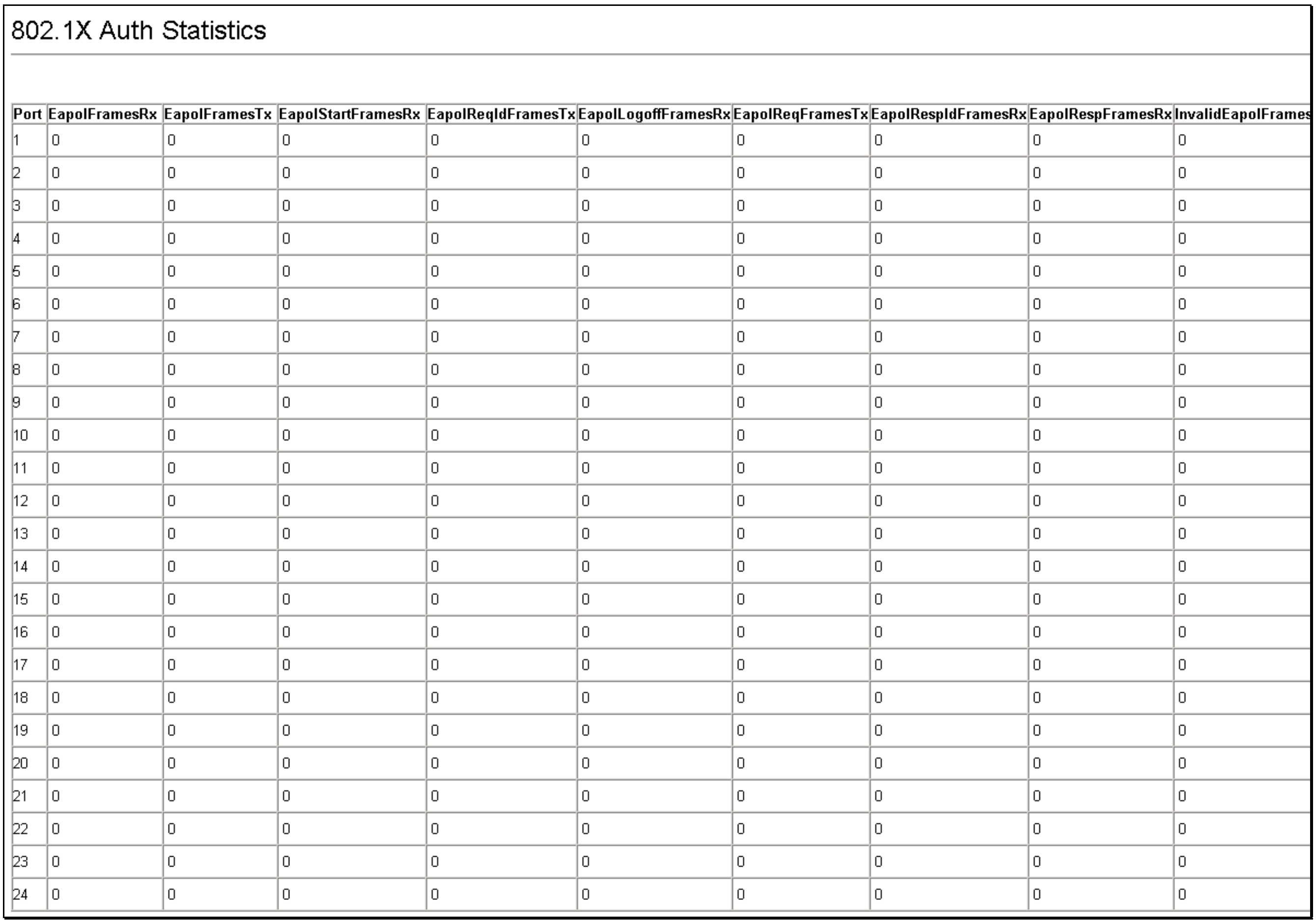
Browse Table By Port

Port Number 1 ▾ Browse

Port	MAC Address	EntersConnecting	EapLogoffsWhileConnecting	EntersAuthenticating	SuccessWhileAuthenticating	TimeoutsWhileAuthenticating	FailWhileAuthenticating	ReauthsWhileAuthent

Figure 6- 97. 802.1X Auth Diagnostics (MAC-based) window

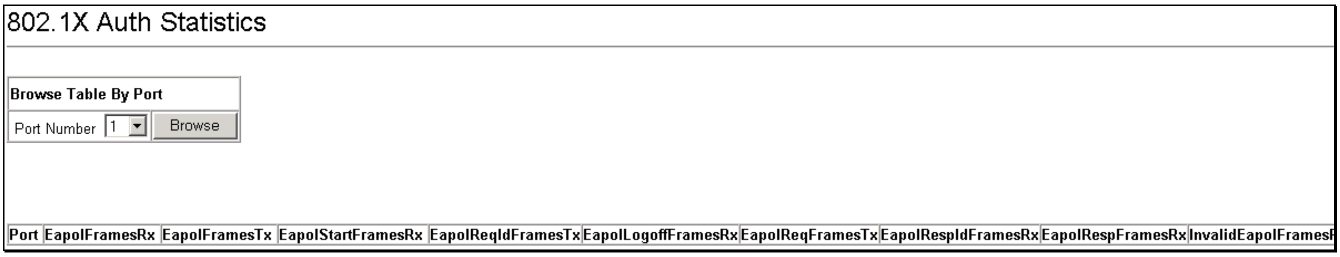
802.1X Auth Statistics



802.1X Auth Statistics

Port	EapolFramesRx	EapolFramesTx	EapolStartFramesRx	EapolReqIdFramesTx	EapolLogoffFramesRx	EapolReqFramesTx	EapolRespIdFramesRx	EapolRespFramesRx	InvalidEapolFrames
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0

Figure 6- 98. 802.1X Auth Statistics (Port-based) window



802.1X Auth Statistics

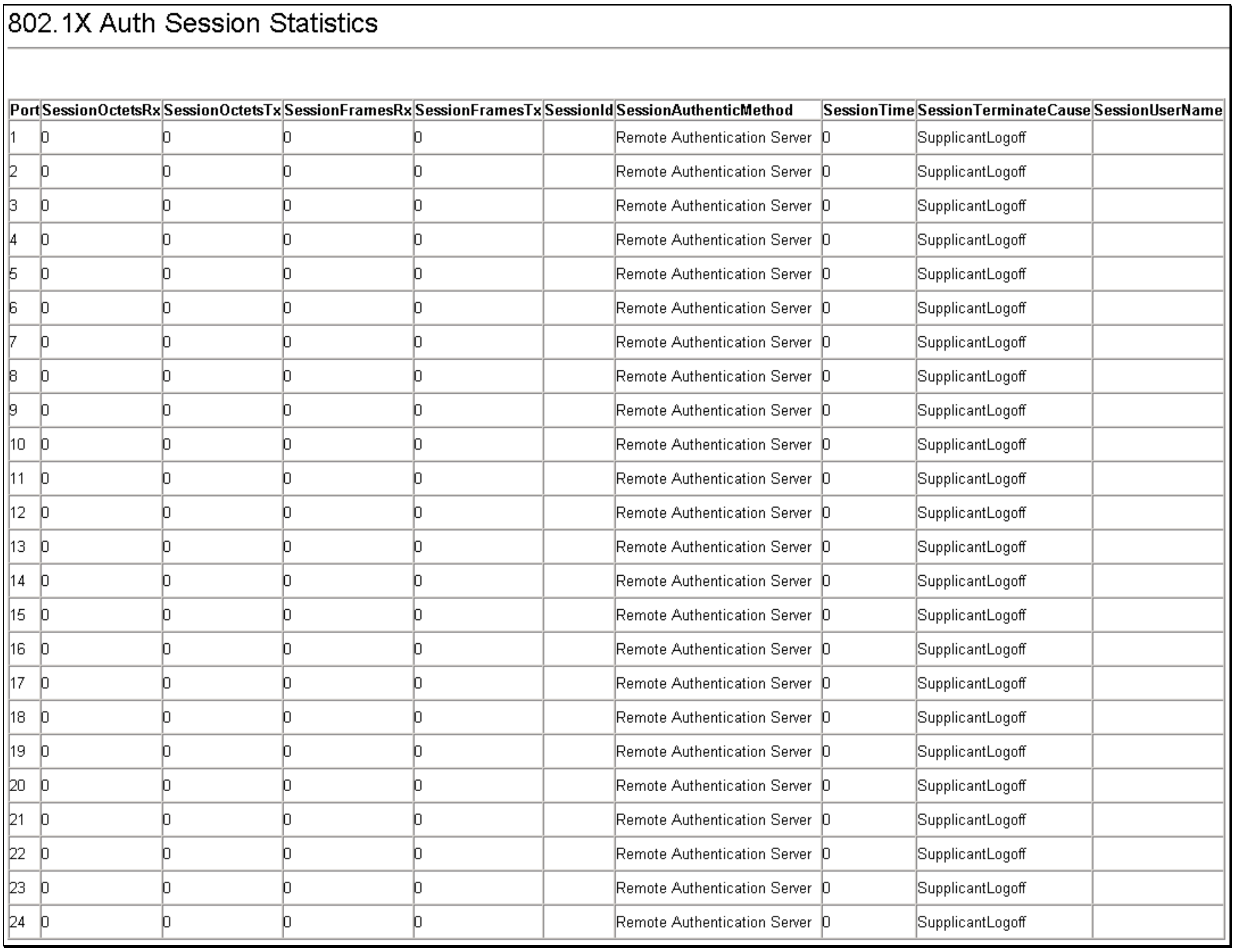
Browse Table By Port

Port Number: 1

Port	EapolFramesRx	EapolFramesTx	EapolStartFramesRx	EapolReqIdFramesTx	EapolLogoffFramesRx	EapolReqFramesTx	EapolRespIdFramesRx	EapolRespFramesRx	InvalidEapolFrames

Figure 6- 99. 802.1X Auth Statistics (MAC-based) window

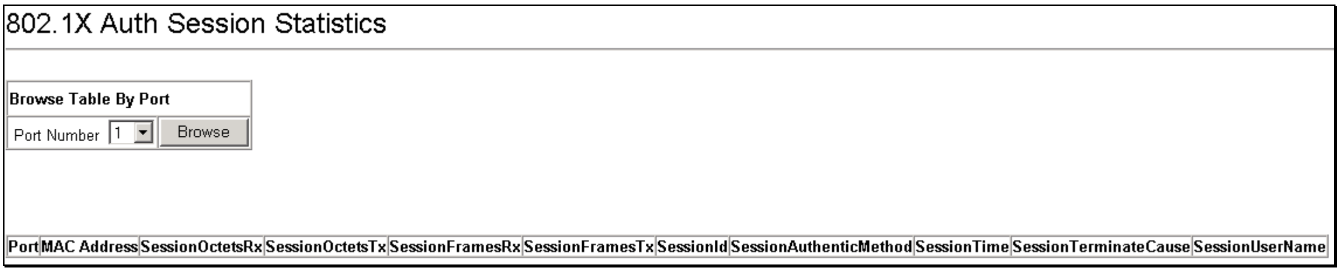
802.1X Auth Session Statistics



802.1X Auth Session Statistics

Port	SessionOctetsRx	SessionOctetsTx	SessionFramesRx	SessionFramesTx	SessionId	SessionAuthenticMethod	SessionTime	SessionTerminateCause	SessionUserName
1	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
2	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
3	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
4	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
5	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
6	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
7	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
8	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
9	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
10	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
11	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
12	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
13	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
14	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
15	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
16	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
17	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
18	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
19	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
20	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
21	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
22	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
23	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	
24	0	0	0	0		Remote Authentication Server	0	SupplicantLogoff	

Figure 6- 100. 802.1X Auth Session Statistics (Port-based) window



802.1X Auth Session Statistics

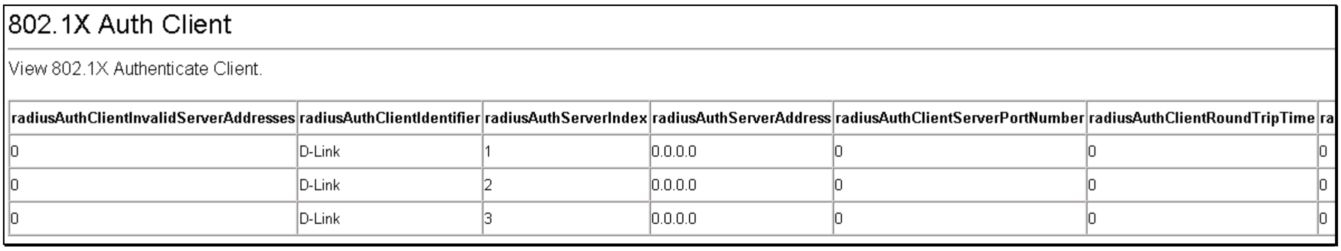
Browse Table By Port

Port Number: 1

Port	MAC Address	SessionOctetsRx	SessionOctetsTx	SessionFramesRx	SessionFramesTx	SessionId	SessionAuthenticMethod	SessionTime	SessionTerminateCause	SessionUserName

Figure 6- 101. 802.1X Auth Session Statistics (MAC-based) window

802.1X Auth Client



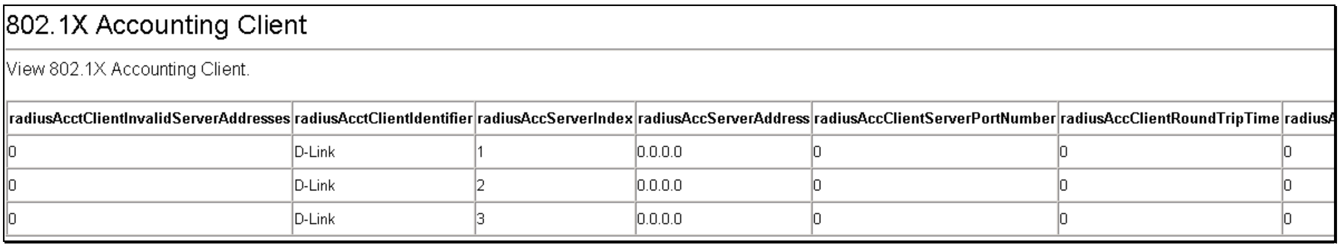
802.1X Auth Client

View 802.1X Authenticate Client.

radiusAuthClientInvalidServerAddresses	radiusAuthClientIdentifier	radiusAuthServerIndex	radiusAuthServerAddress	radiusAuthClientServerPortNumber	radiusAuthClientRoundTripTime	ra
0	D-Link	1	0.0.0.0	0	0	0
0	D-Link	2	0.0.0.0	0	0	0
0	D-Link	3	0.0.0.0	0	0	0

Figure 6- 102. 802.1X Auth Client window

802.1X Accounting Client



802.1X Accounting Client

View 802.1X Accounting Client.

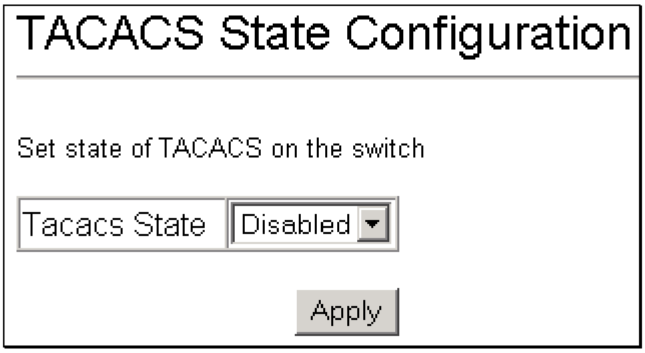
radiusAcctClientInvalidServerAddresses	radiusAcctClientIdentifier	radiusAccServerIndex	radiusAccServerAddress	radiusAccClientServerPortNumber	radiusAccClientRoundTripTime	radiusA
0	D-Link	1	0.0.0.0	0	0	0
0	D-Link	2	0.0.0.0	0	0	0
0	D-Link	3	0.0.0.0	0	0	0

Figure 6- 103. 802.1X Accounting Client window

TACACS

The DGS-3224TGR provides a way to centrally validate users attempting to gain access to the switch using one of three implementations of the Terminal Access Controller Access Control System (TACACS) protocol: TACACS, TACACS+, and XTACACS. TACACS/TACACS+/XTACACS is implemented in the switch's software to allow centralized control over access to servers. Authentication can also be provided for administrative tasks on the server and access server user interfaces. With TACACS/TACACS+/XTACACS enabled, the access server prompts the user accessing the switch for a username and password, and then verifies the password with TACACS/TACACS+/XTACACS.

TACACS State Configuration



TACACS State Configuration

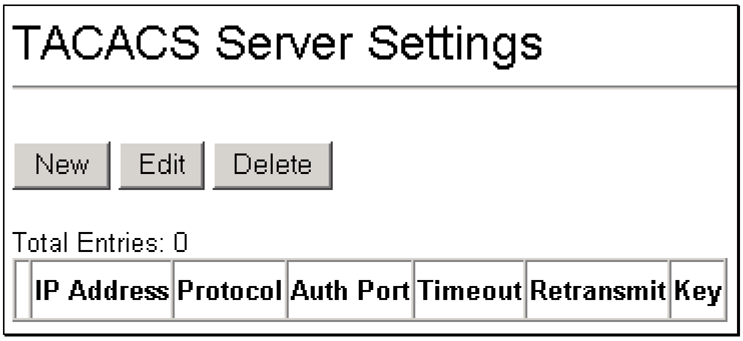
Set state of TACACS on the switch

Tacacs State: Disabled

Figure 6- 104. TACACS State Configuration window

To enable the TACACS/TACACS+/XTACACS protocol, use the drop-down menu to select *Enabled* and then click **Apply**.

TACACS Server Settings



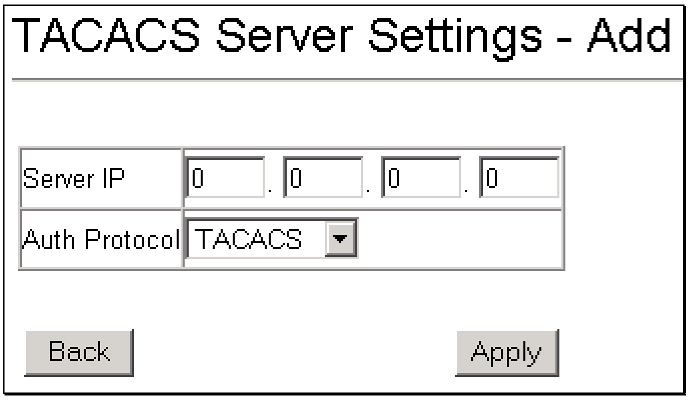
TACACS Server Settings

Total Entries: 0

	IP Address	Protocol	Auth Port	Timeout	Retransmit	Key

Figure 6- 105. TACACS Server Settings window

To add an entry to this table, click **New**. To modify an entry, select it and then click **Edit**.

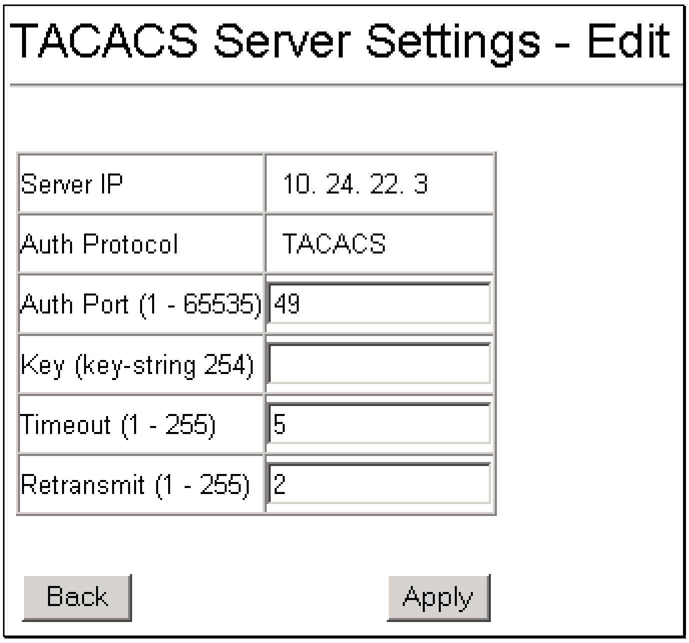


TACACS Server Settings - Add

Server IP	0 . 0 . 0 . 0
Auth Protocol	TACACS

Figure 6- 106. TACACS Server Settings – Add window

To modify an entry on the **TACACS Server Settings** window, select it and then click **Edit**.

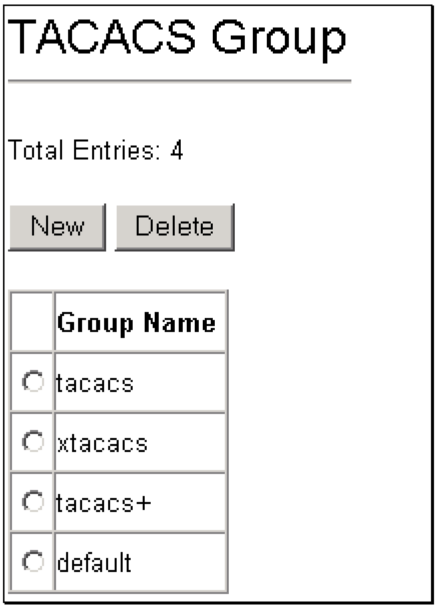


TACACS Server Settings - Edit

Server IP	10. 24. 22. 3
Auth Protocol	TACACS
Auth Port (1 - 65535)	49
Key (key-string 254)	
Timeout (1 - 255)	5
Retransmit (1 - 255)	2

Figure 6- 107. TACACS Server Settings – Edit window

TACACS Group



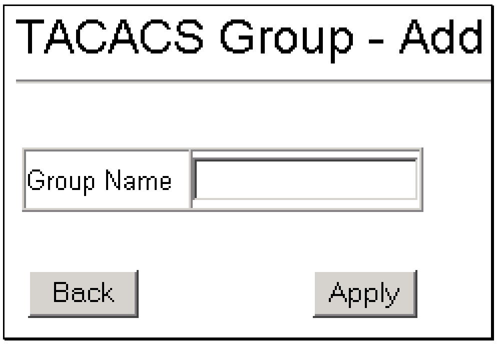
TACACS Group

Total Entries: 4

	Group Name
○	tacacs
○	xtacacs
○	tacacs+
○	default

Figure 6- 108. TACACS Group window

To add an entry to this table, click **New**. To remove an entry, select it and then click **Delete**.

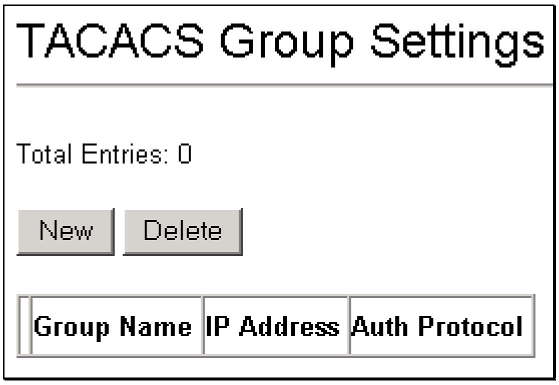


TACACS Group - Add

Group Name

Figure 6- 109. TACACS Group – Add window

TACACS Group Settings



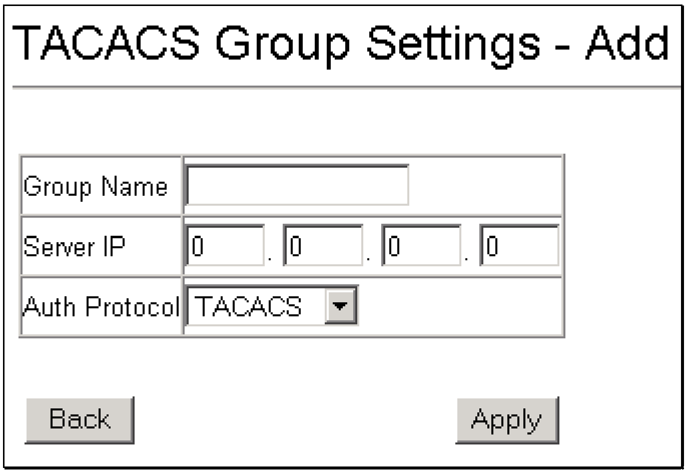
TACACS Group Settings

Total Entries: 0

	Group Name	IP Address	Auth Protocol

Figure 6- 110. TACACS Group Settings window

To add an entry to this table, click **New**. To remove an entry, select it and then click **Delete**.

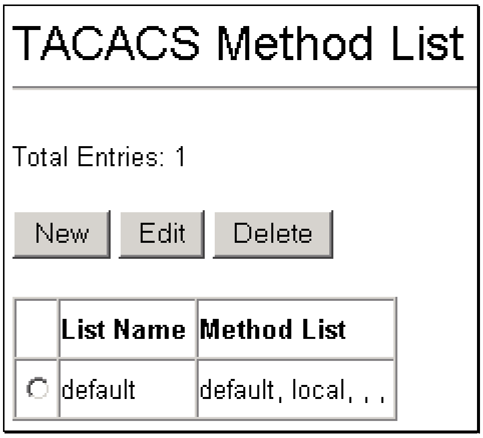


TACACS Group Settings - Add

Group Name	
Server IP	0 . 0 . 0 . 0
Auth Protocol	TACACS

Figure 6- 111. TACACS Group Settings – Add window

TACACS Method List



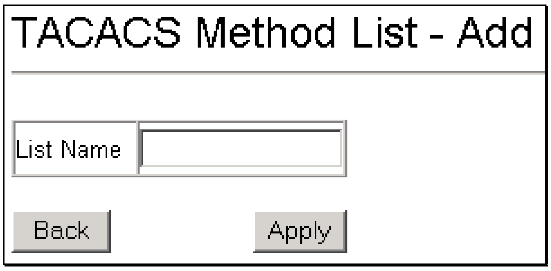
TACACS Method List

Total Entries: 1

	List Name	Method List
○	default	default, local, , ,

Figure 6- 112. TACACS Method List window

To add an entry to this table, click **New**. To modify an entry on this table, select it and then click **Edit**. To remove an entry, select it and then click **Delete**.

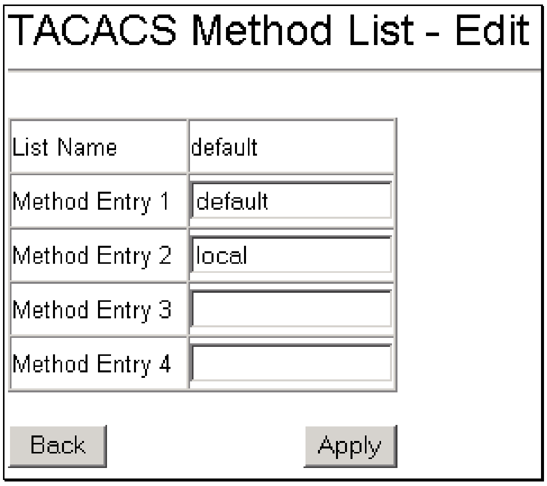


TACACS Method List - Add

List Name	

Figure 6- 113. TACACS Method List – Add window

Enter a TACACS/TACACS+/XTACACS method list name and then click **Apply**.

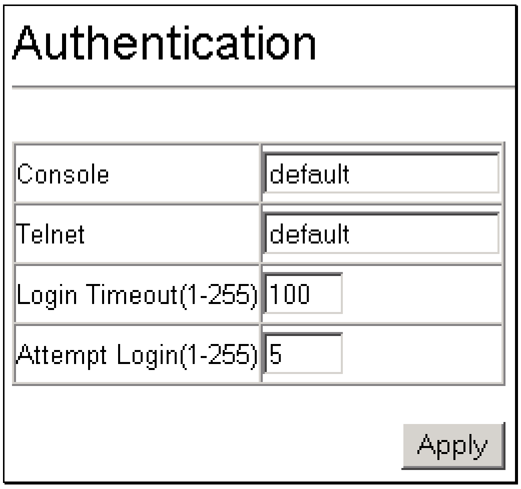

TACACS Method List - Edit

List Name	default
Method Entry 1	default
Method Entry 2	local
Method Entry 3	
Method Entry 4	

Figure 6- 114. TACACS Method List – Edit window

Enter a TACACS/TACACS+/XTACACS method list name and then click **Apply**.

Authentication


Authentication

Console	default
Telnet	default
Login Timeout(1-255)	100
Attempt Login(1-255)	5

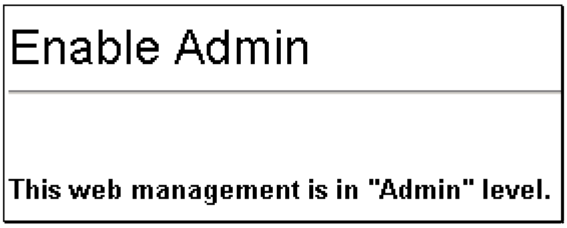
Figure 6- 115. Authentication window

Fill in the TACACS/TACACS+/XTACACS Authentication settings and then click **Apply** to let your changes take effect.

Enable Admin

The **Enable Admin** window is for users who have logged on to the Switch on the normal user level, and wish to be promoted to the administrator level. 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.

When the **Enable Admin** window appears, click the **Enable Admin** button revealing a window for the user to enter authentication (password, username). A successful entry will promote the user to Administrator level privileges on the Switch and the following window will be displayed.



Enable Admin

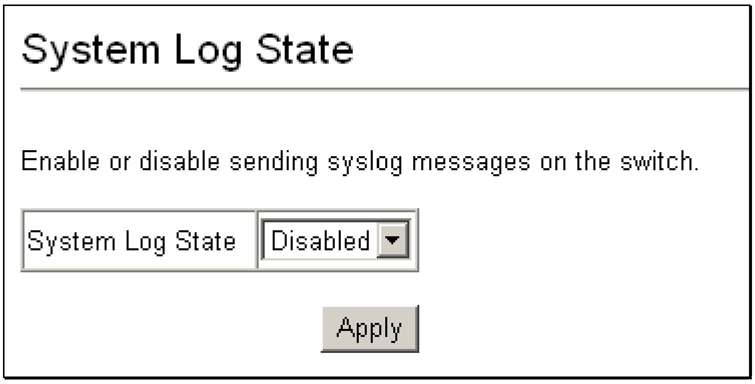
This web management is in "Admin" level.

Figure 6- 116. Enable Admin window

System Log

The switch can send Syslog messages to up to four designated servers. Use the System Log Server.

System Log State



System Log State

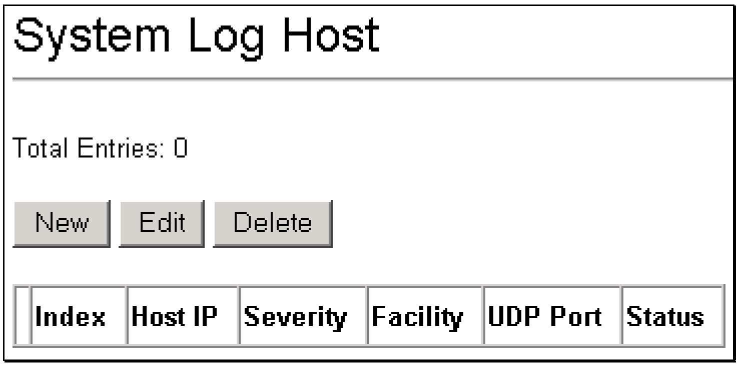
Enable or disable sending syslog messages on the switch.

System Log State	Disabled

Figure 6- 117. System Log State window

To enable the System Log Server settings you have chosen on the System Log Server windows, select *Enabled* and click the **Apply** button.

System Log Host



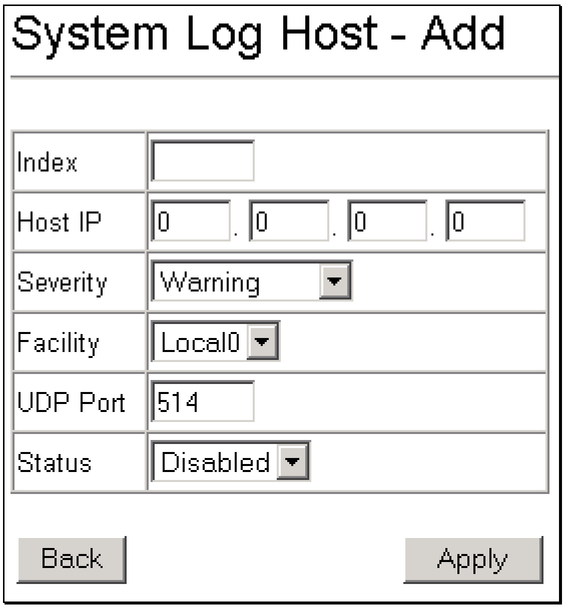
System Log Host

Total Entries: 0

	Index	Host IP	Severity	Facility	UDP Port	Status

Figure 6- 118. System Log Host window

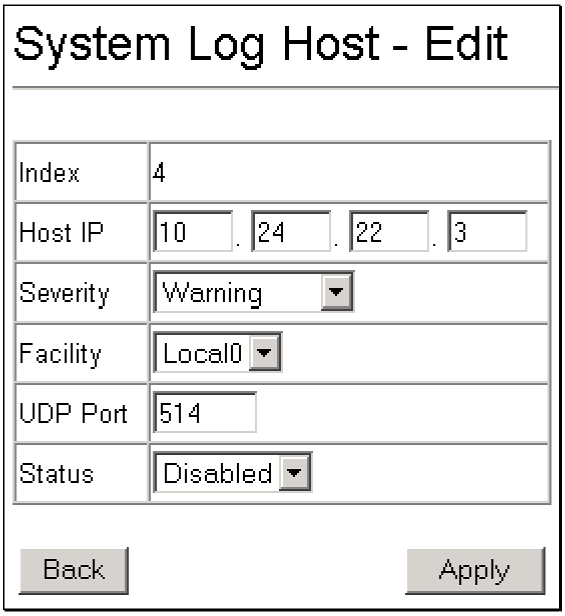
Click **New** to add an entry to this table. Configure the System Log Server settings in the **System Log Server - Add** menu.



System Log Host - Add

Index	
Host IP	0 . 0 . 0 . 0
Severity	Warning
Facility	Local0
UDP Port	514
Status	Disabled

Figure 6- 119. System Log Host – Add window



System Log Host - Edit

Index	4
Host IP	10 . 24 . 22 . 3
Severity	Warning
Facility	Local0
UDP Port	514
Status	Disabled

Figure 6- 120. System Log Host – Edit window

See the table below for a description of the message types.

Parameter	**Description**
Index	Syslog server settings index (1-4).
Host IP	Type in the IP address of the Syslog server receiving the message.
Severity	Select the level of message sent, select: *Warning*, *Informational* or *All*.
Facility	Some of the operating system daemons and processes have been assigned Facility values. Processes and daemons that have not been explicitly assigned a Facility may use any of the "local use" facilities or they may use the "user-level" Facility. Those Facilities that have been designated are shown in the following: Bold font means the

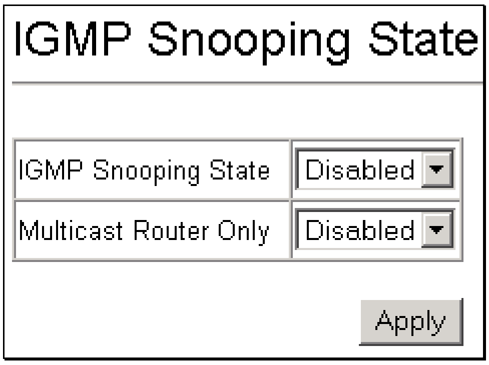
facility values the switch supports now.

Numerical Code	Facility
0	kernel messages
1	user-level messages
2	mail system
3	system daemons
4	security/authorization messages
5	messages generated internally by syslog line printer subsystem
7	network news subsystem
8	UUCP subsystem
9	clock daemon
10	security/authorization messages
11	FTP daemon
12	NTP subsystem
13	log audit
14	log alert
15	clock daemon
16	local use 0 (local0)
17	local use 1 (local1)
18	local use 2 (local2)
19	local use 3 (local3)
20	local use 4 (local4)
21	local use 5 (local5)
22	local use 6 (local6)
23	local use 7 (local7)

UDP Port	Type the UDP port number used for sending Syslog messages. The default is *514*.
Status	Choose *Enabled* or *Disabled* to activate or deactivate this.

Multicast Configuration

IGMP Snooping Global



IGMP Snooping State

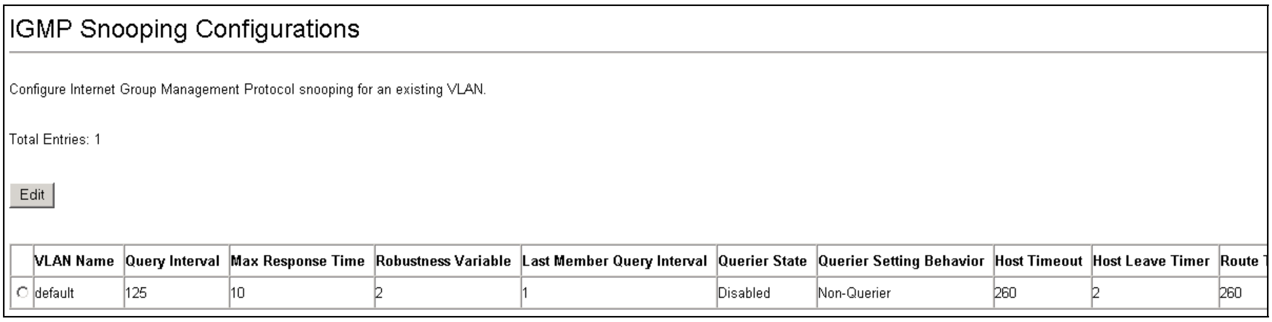
IGMP Snooping State: Disabled

Multicast Router Only: Disabled

Figure 6- 121. IGMP Snooping State window

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 Configurations



IGMP Snooping Configurations

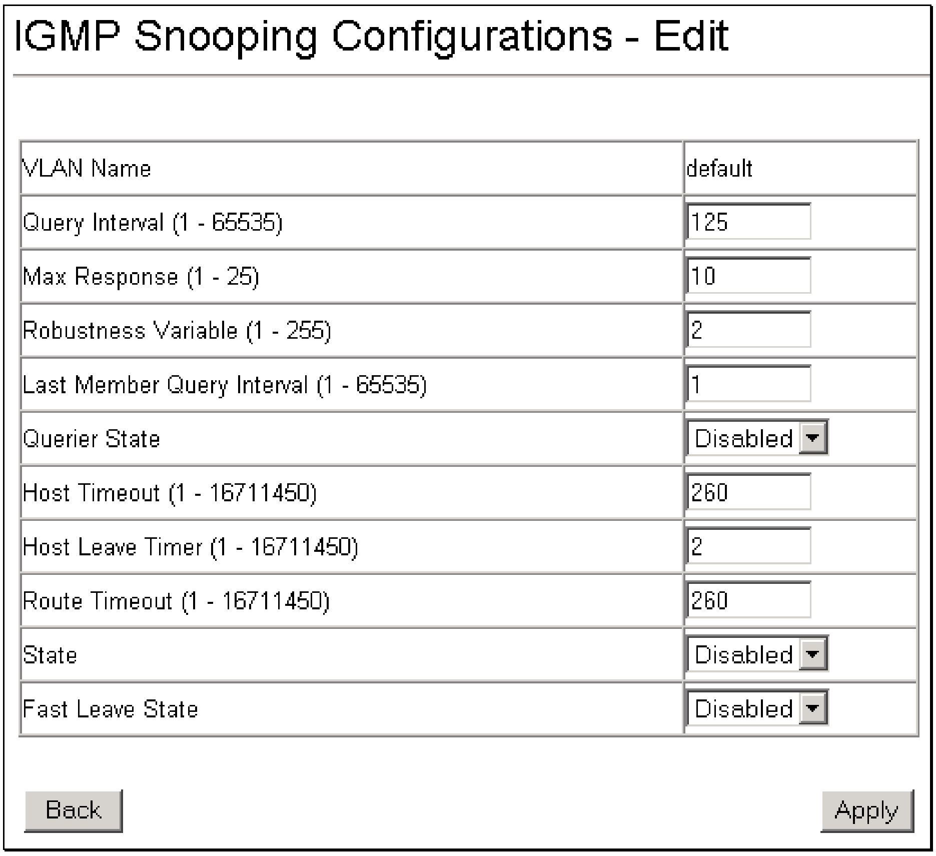
Configure Internet Group Management Protocol snooping for an existing VLAN.

Total Entries: 1

	VLAN Name	Query Interval	Max Response Time	Robustness Variable	Last Member Query Interval	Querier State	Querier Setting Behavior	Host Timeout	Host Leave Timer	Route
○	default	125	10	2	1	Disabled	Non-Querier	260	2	260

Figure 6- 122. IGMP Snooping Configurations window

Select the desired IGMP snooping configuration and click **Edit** to open the following window:



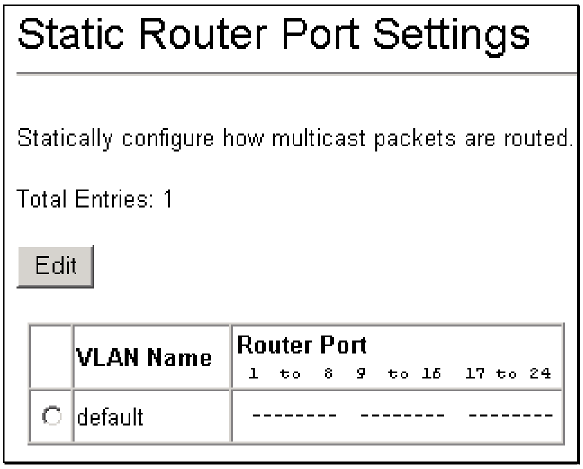
IGMP Snooping Configurations - Edit

VLAN Name	default
Query Interval (1 - 65535)	125
Max Response (1 - 25)	10
Robustness Variable (1 - 255)	2
Last Member Query Interval (1 - 65535)	1
Querier State	Disabled
Host Timeout (1 - 16711450)	260
Host Leave Timer (1 - 16711450)	2
Route Timeout (1 - 16711450)	260
State	Disabled
Fast Leave State	Disabled

Figure 6- 123. IGMP Snooping Configurations – Edit window

To set up IGMP snooping, first change the IGMP Snooping State field to *Enabled* on the IGMP Snooping State window. Next, enter the desired IGMP snooping configuration settings in the window above. The Query Interval (1-65535) can be set between *1* and *65,535* seconds and determines the time between IGMP queries. The Max Response (1-25) value allows a setting between *1* and *25* seconds and specifies the maximum amount of time allowed before sending a response report. A value between *1* and *255* can be entered for the Robustness Variable (1-255) (the default is *2*). Enabling the Fast Leave State allows the switch to reduce Leave Delays. Fast Leave operates on a port if an IGMP client connects to the port and there are no other end nodes detected on that port. In this case, when the client leaves a multicast group, Fast Leave automatically accelerates the blocking of further, unnecessary multicast traffic from that group to the former IGMP client. This improves performance by reducing the amount of multicast traffic going through the port to the IGMP client after the client leaves a multicast group. Once you have finished making your IGMP snooping configuration settings, click **Apply** to make the settings effective.

Static Router Port Settings



Static Router Port Settings

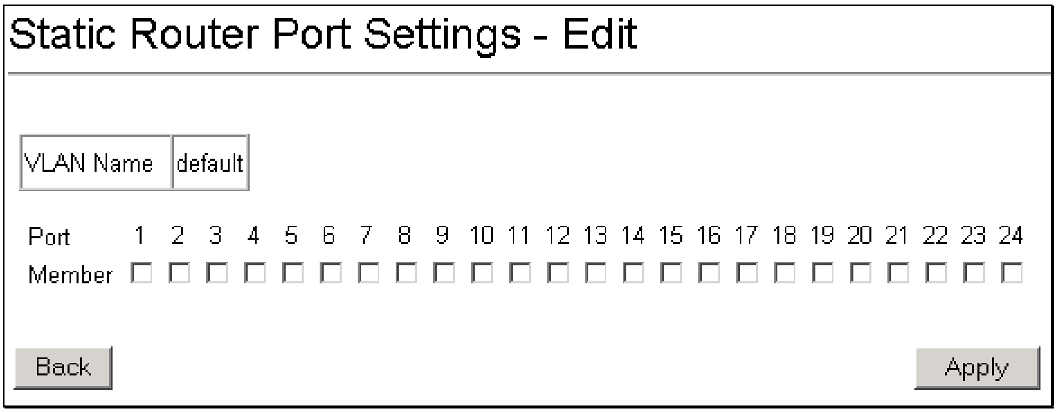
Statically configure how multicast packets are routed.

Total Entries: 1

	VLAN Name	Router Port 1 to 8 9 to 16 17 to 24
○	default	-------- -------- --------

Figure 6- 124. Static Router Port Settings window

Select an entry and click **Edit** to access the following window:



Static Router Port Settings - Edit

VLAN Name	default

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

Figure 6- 125. Static Router Port Settings – Edit window

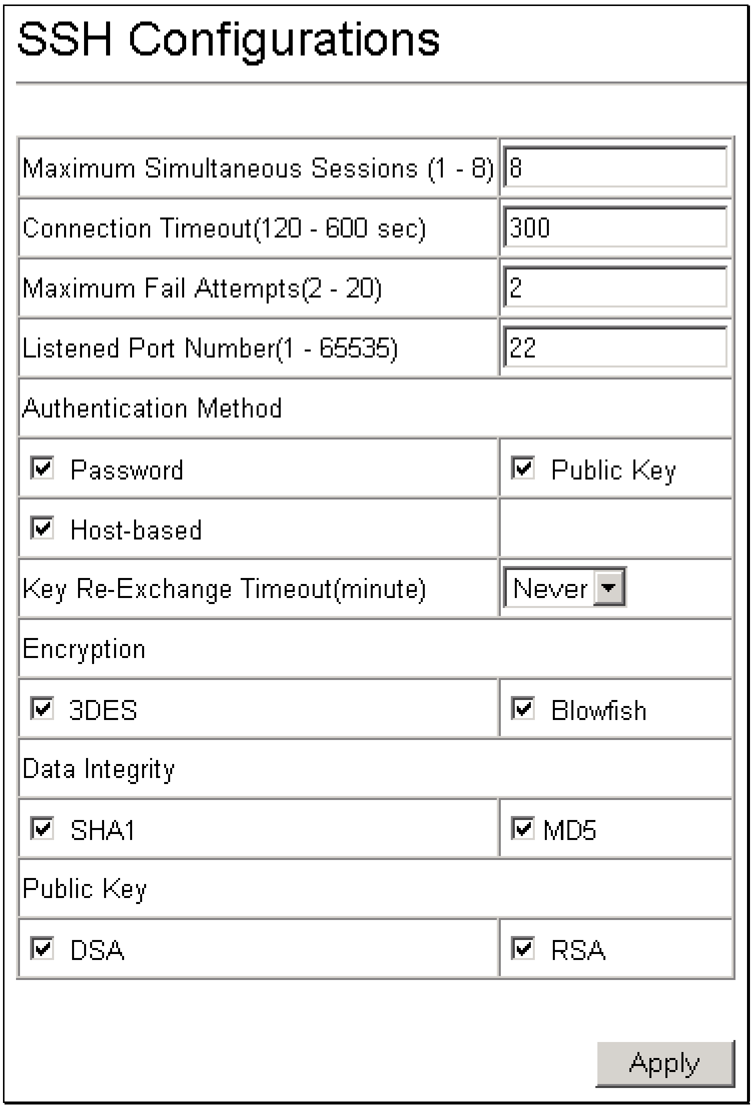
SSH Management

SSH is the abbreviation of Secure Shell, which is a program allowing secure remote login and secure network services over an insecure network. It allows you to securely login to remote host computers, to execute commands safely in a remote computer and so forth, and to provide secure encrypted and authenticated communications between two non-trusted hosts.

SSH with its array of unmatched security features is an essential tool in today's network environment.

It is a powerful guardian against the numerous security hazards that nowadays threaten network communications.

SSH Configurations



SSH Configurations

Maximum Simultaneous Sessions (1 - 8)	8
Connection Timeout(120 - 600 sec)	300
Maximum Fail Attempts(2 - 20)	2
Listened Port Number(1 - 65535)	22
Authentication Method	
☑ Password	☑ Public Key
☑ Host-based	
Key Re-Exchange Timeout(minute)	Never
Encryption	
☑ 3DES	☑ Blowfish
Data Integrity	
☑ SHA1	☑ MD5
Public Key	
☑ DSA	☑ RSA

Figure 6- 126. SSH Configurations window

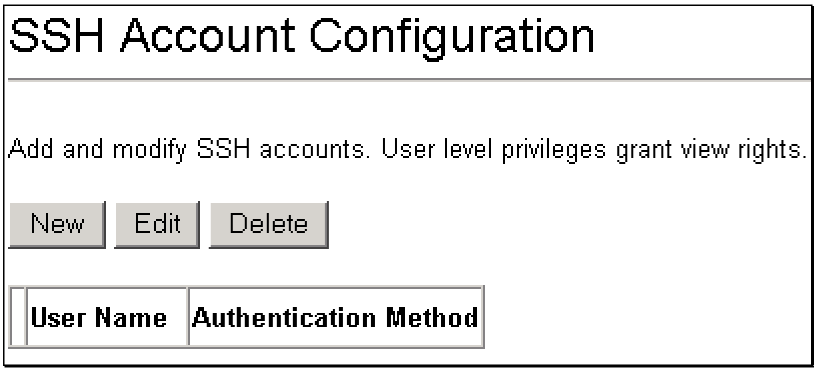
The SSH configure window contains the global server setting: maximum simultaneous sessions, connection timeout, maximum fail attempts, authentication method, key re-exchange timeout, the encryption algorithms, data integrality algorithms and public key algorithms.

The information is described as follows:

Parameter	Description
Maximum Simultaneous Sessions (1 – 8)	Specify how many sessions at most the server program will handle simultaneously.
Connection Timeout (120 - 600 sec)	Specify how many seconds the connection can survive before the server automatically ends the connection.
Maximum Fail Attempts (2 – 20)	Specify the maximum number of allowed authentication attempts before access being denied.
Listened Port Number (1 – 65535)	Specify the TCP port number. TCP ports are numbered between 1 and 65535. The "well-known" TCP port for the SSH

	protocol is 22.
Authentication Method	Specify the methods of user authentication supported by server.
Key Re-Exchange Timeout (minute)	Specify how many minutes the parties must process key re-exchange.
Encryption	Specify the algorithm to use for encryption supported by server. 3DES: Use 3DES encryption. Blowfish: Use Blowfish encryption.
Data Integrity	Specify the desired MAC algorithm to use for the data integrity verification. SHA-1: Use the hmac-sha1 MAC. MD5: Use the hmac-md5 MAC.
Public Key	Specify the algorithm to use for the public key. DSA: Use the DSA algorithm. RSA: Use the RSA algorithm.

SSH Account Configuration



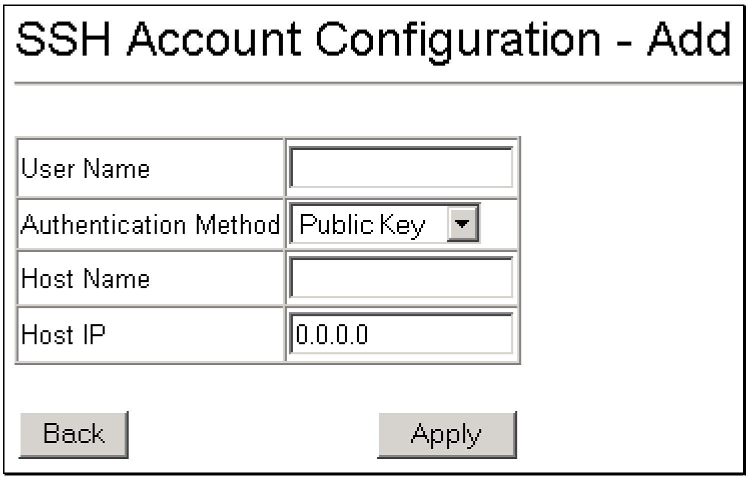
SSH Account Configuration

Add and modify SSH accounts. User level privileges grant view rights.

	User Name	Authentication Method

Figure 6- 127. SSH Account Configuration window

Click **New** to open the **SSH Account Configuration – Add** window:



SSH Account Configuration - Add

User Name	
Authentication Method	Public Key
Host Name	
Host IP	0.0.0.0

Figure 6- 128. SSH Account Configuration – Add window

This window can be used to specify user name, authentication method, host name, and host IP.

SSL Management

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 *ciphersuite*, 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 cyphersuite 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 ciphersuite that includes the encryption used for encrypting the messages sent between client and host. The Switch supports two types of cryptology algorithms:

   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.

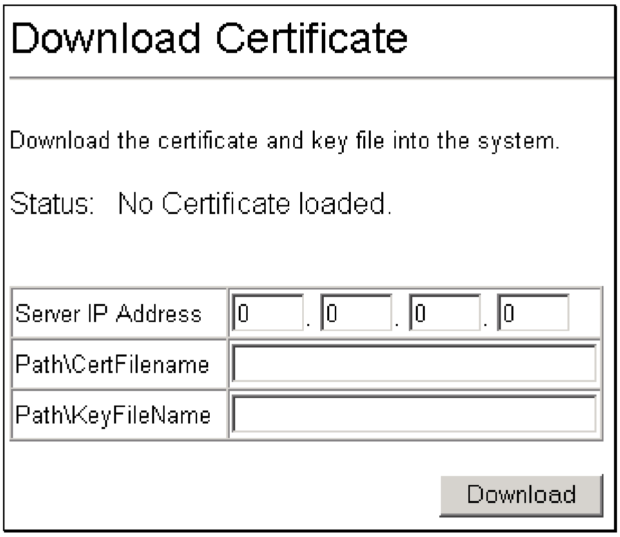
   CBC Block Ciphers – CBC refers to Cipher Block Chaining, which means that a portion of the previously encrypted block of encrypted text is used in the encryption of the current block. The Switch supports the *3DES EDE* encryption code defined by the Data Encryption Standard (DES) to create the encrypted text.

3. **Hash Algorithm**: This part of the ciphersuite allows the user to choose a message digest function that 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 ciphersuites available, yet different ciphersuites will affect the security level and the performance of the secured connection. The information included in the ciphersuites 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 and TLS v1. 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

Download Certificate

This window is used to 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.



Download Certificate

Download the certificate and key file into the system.

Status: No Certificate loaded.

Server IP Address	0 . 0 . 0 . 0
Path\CertFilename	
Path\KeyFileName	

Figure 6- 129. Download Certificate window

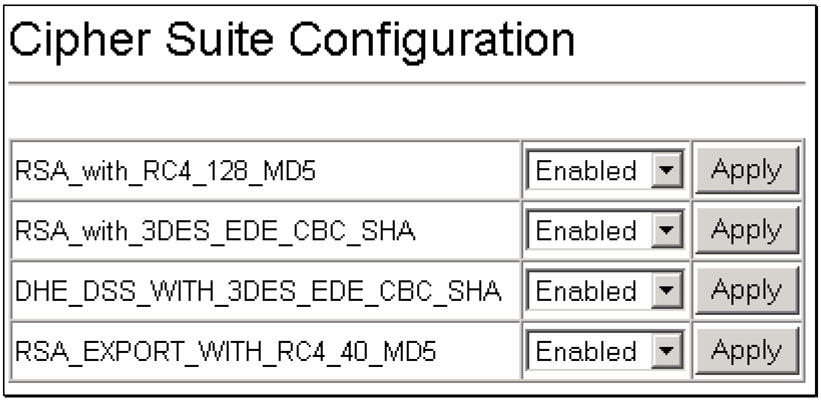
To download certificates, set the following parameters and click **Download**.

Parameter	Description
Server IP Address	Enter the IP address of the TFTP server where the certificate files are located.
Path\CertFilename	Enter the path and the file name of the certificate file to download. This file must have a .der extension. (Ex. c:/cert.der)
Path\Key FileName	Enter the path and the file name of the key file to download. This file must have a .der extension (Ex. c:/pkey.der)

Cipher Suite Configuration

This window will allow the user to implement any one or combination of listed ciphersuites on the Switch. A *ciphersuite* 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 ciphersuites for the SSL function, which are all enabled by default. To utilize a particular ciphersuite, disable the unwanted ciphersuites, 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://10.90.90.90) Any other method will result in an error and no access can be authorized for the web-based management.



Cipher Suite Configuration

RSA_with_RC4_128_MD5	Enabled	Apply
RSA_with_3DES_EDE_CBC_SHA	Enabled	Apply
DHE_DSS_WITH_3DES_EDE_CBC_SHA	Enabled	Apply
RSA_EXPORT_WITH_RC4_40_MD5	Enabled	Apply

Figure 6- 130. Cipher Suite Configuration window

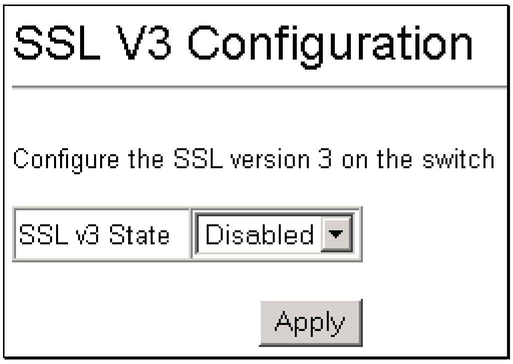
To set up the SSL function on the Switch, configure the following parameters and click **Apply**.

Parameter	Description
RSA_with_RC4_128_ MD5	This ciphersuite combines the RSA key exchange, stream cipher RC4 encryption with 128-bit keys and the MD5 Hash Algorithm. Use the pull-down menu to enable or disable this ciphersuite. This field is *Enabled* by default.
RSA_with_3DES_EDE_ CBC_SHA	This ciphersuite combines the RSA key exchange, CBC Block Cipher 3DES_EDE encryption and the SHA Hash Algorithm. Use the pull-down menu to enable or disable this ciphersuite. This field is *Enabled* by default.
DHS_DSS_WITH_3DES _ EDE_CBC_SHA	This ciphersuite combines the DSA Diffie Hellman key exchange, CBC Block Cipher 3DES_EDE encryption and SHA Hash Algorithm. Use the pull-down menu to enable or disable this ciphersuite. This field is *Enabled* by default.
RSA_EXPORT_WITH_ RC4_40_MD5	This ciphersuite combines the RSA Export key exchange and stream cipher RC4 encryption with 40-bit keys. Use the pull-down menu to enable or disable this ciphersuite. This field is *Enabled* by default.

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. For more information on SSL and its functions, see the ***DGS-3324TGR Command Line Reference Manual***, located on the documentation CD of this product.

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.

SSL V3 Configuration



SSL V3 Configuration

Configure the SSL version 3 on the switch

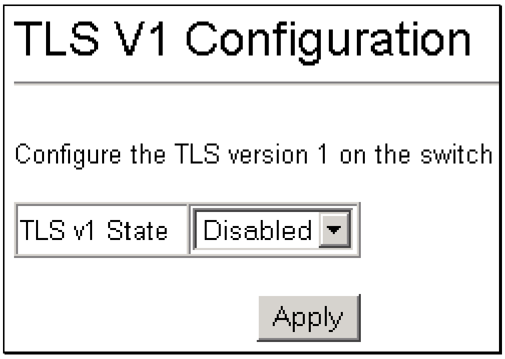
SSL v3 State: Disabled

Figure 6- 131. SSL V3 Configuration window

To set up SSL version 3 on the Switch, toggle to *Enabled* and click **Apply**.

Parameter	Description
SSL v3 State	Use the pull-down menu to enable or disable the SSL version 3 state on the switch. The default is *Disabled*.

TLS V1 Configuration



TLS V1 Configuration

Configure the TLS version 1 on the switch

TLS v1 State: Disabled

Figure 6- 132. TLS V1 Configuration window

To set up TLS version 1 on the Switch, toggle to *Enabled* and click **Apply**.

Parameter	Description
TLS v1 State	Use the pull-down menu to enable or disable the TLS version 1 state on the switch. The default is *Disabled*.

7

Single IP Management

SIM Settings

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:

1. SIM can simplify management of small workgroups or wiring closets while scaling the network to handle increased bandwidth demand.
2. SIM can reduce the number of IP address needed in your network.
3. 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 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).

All Switches in a particular SIM group must be in the same IP subnet (broadcast domain). Members of a SIM group cannot cross a router.

A SIM group accepts up to 32 Switches (numbered 0-31), including the Commander Switch (numbered 0).

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 DGS-3224TGRmay take on three different roles:

1. **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.

2. **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.

3. **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 through an automatic function of the DGS-3224TGR, or 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:

Each device begins in a Commander state.

CS's 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.

The user can manually configure a CS to become a CaS.

A MS can become a CaS by:

Being configured as a CaS through the CS.

If report packets from the CS to the MS time out.

The user can manually configure a CaS to become a CS

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

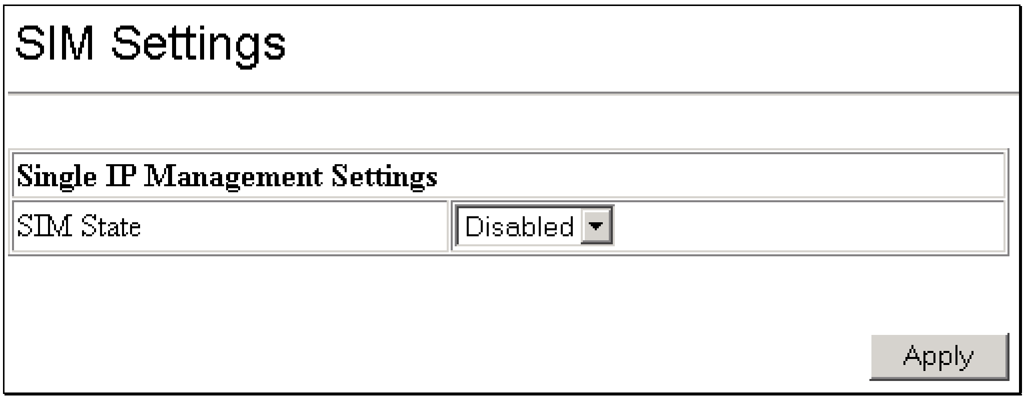
After configuring one Switch to operate as the CS of a SIM group, additional DGS-3224TGRSwitches may join the group either by an automatic method or by manually configuring the Switch to be a MS. The CS will then serve as the in band entry point for access to the MS. The CS's IP address will become the 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, 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 (include 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.

SIM Using the Web Interface

All DGS-3224TGR Switches are set as Candidate (CaS) Switches as their factory default configuration and Single IP Management will be disabled. To enable SIM for the Switch using the Web interface, go to the **Single IP Management** folder and click the **SIM Settings** link, revealing the following window.

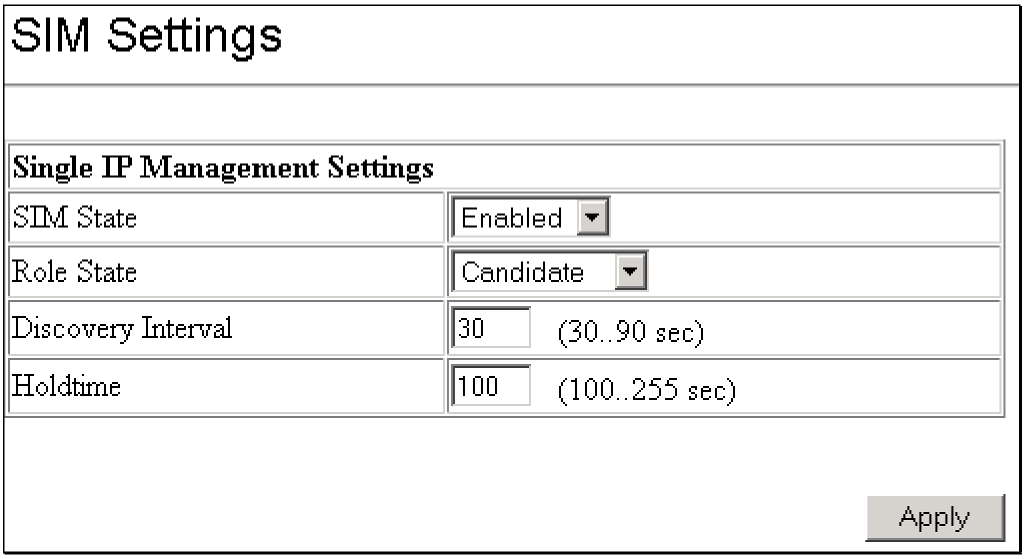


SIM Settings

Single IP Management Settings	
SIM State	Disabled

Figure 7- 1. SIM Settings window (disabled)

Change the **SIM State** to *Enabled* using the pull-down menu and click **Apply**. The window will then refresh and the **SIM Settings** window will look like this:



SIM Settings

Single IP Management Settings	
SIM State	Enabled
Role State	Candidate
Discovery Interval	30 (30..90 sec)
Holdtime	100 (100..255 sec)

Figure 7- 2. SIM Settings window (enabled)

The following parameters can be set:

Parameters	Description
SIM State	Use the pull-down menu to either enable or disable the SIM state on the Switch. *Disabled* will render all SIM functions on the Switch inoperable.
Role State	Use the pull-down menu to change the SIM role of the Switch. The two choices are: *Candidate* - 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 DGS-3224TGR. *Commander* - 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.
Discovery Interval	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.

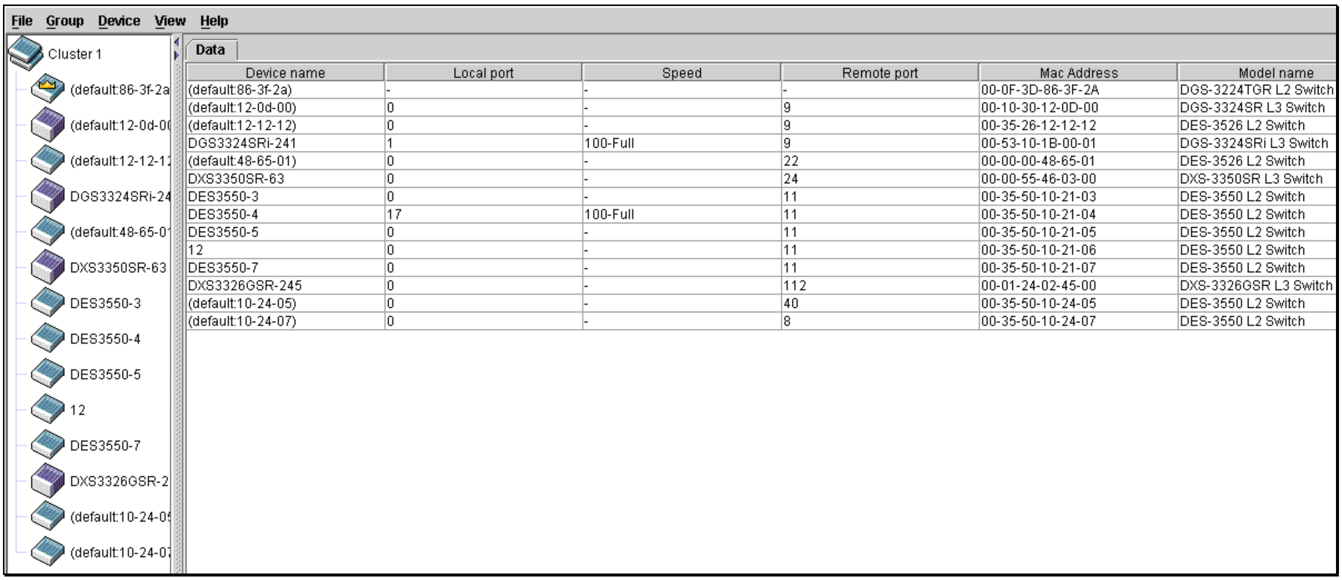
Holdtime	This parameter may be set for the time, in seconds, the Switch will hold information sent to it from other Switches, utilizing the Discovery Interval. The user may set the hold time from *100* to *255* seconds.

Click **Apply** to implement the settings changed.

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

Topology

The **Topology** window will be used to configure and manage the Switch within the SIM group and requires Java Runtime Environment 1.4.2 to function properly on your computer.



Device name	Local port	Speed	Remote port	Mac Address	Model name
(default:86-3f-2a)	-	-	-	00-0F-3D-86-3F-2A	DGS-3224TGR L2 Switch
(default:12-0d-00)	0	-	9	00-10-30-12-0D-00	DGS-3324SR L3 Switch
(default:12-12-12)	0	-	9	00-35-26-12-12-12	DES-3526 L2 Switch
DGS3324SRi-241	1	100-Full	9	00-53-10-1B-00-01	DGS-3324SRi L3 Switch
(default:48-65-01)	0	-	22	00-00-00-48-65-01	DES-3526 L2 Switch
DXS3350SR-63	0	-	24	00-00-55-46-03-00	DXS-3350SR L3 Switch
DES3550-3	0	-	11	00-35-50-10-21-03	DES-3550 L2 Switch
DES3550-4	17	100-Full	11	00-35-50-10-21-04	DES-3550 L2 Switch
DES3550-5	0	-	11	00-35-50-10-21-05	DES-3550 L2 Switch
12	0	-	11	00-35-50-10-21-06	DES-3550 L2 Switch
DES3550-7	0	-	11	00-35-50-10-21-07	DES-3550 L2 Switch
DXS3326GSR-245	0	-	112	00-01-24-02-45-00	DXS-3326GSR L3 Switch
(default:10-24-05)	0	-	40	00-35-50-10-24-05	DES-3550 L2 Switch
(default:10-24-07)	0	-	8	00-35-50-10-24-07	DES-3550 L2 Switch

Figure 7- 3. Single IP Management window-Tree View

The Tree View window holds the following information under 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 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.
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 that the CS is connected to. 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 Map**, click the View menu in the toolbar and then Topology, which will produce the following window. The **Topology View** will refresh itself periodically (20 seconds by default).

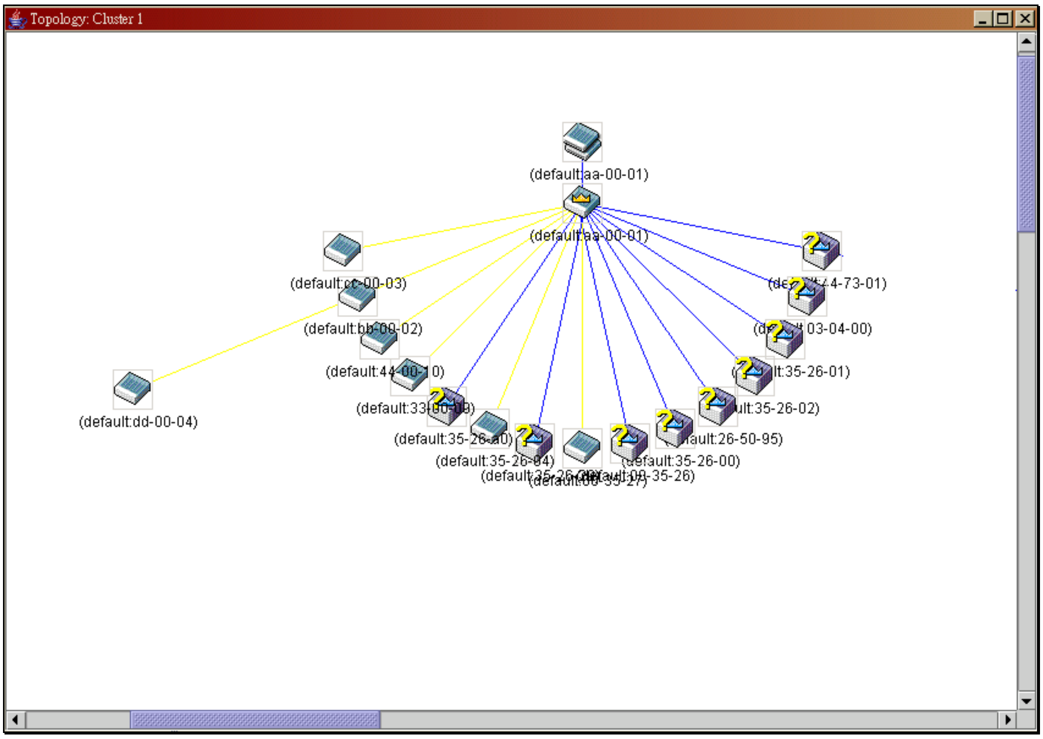


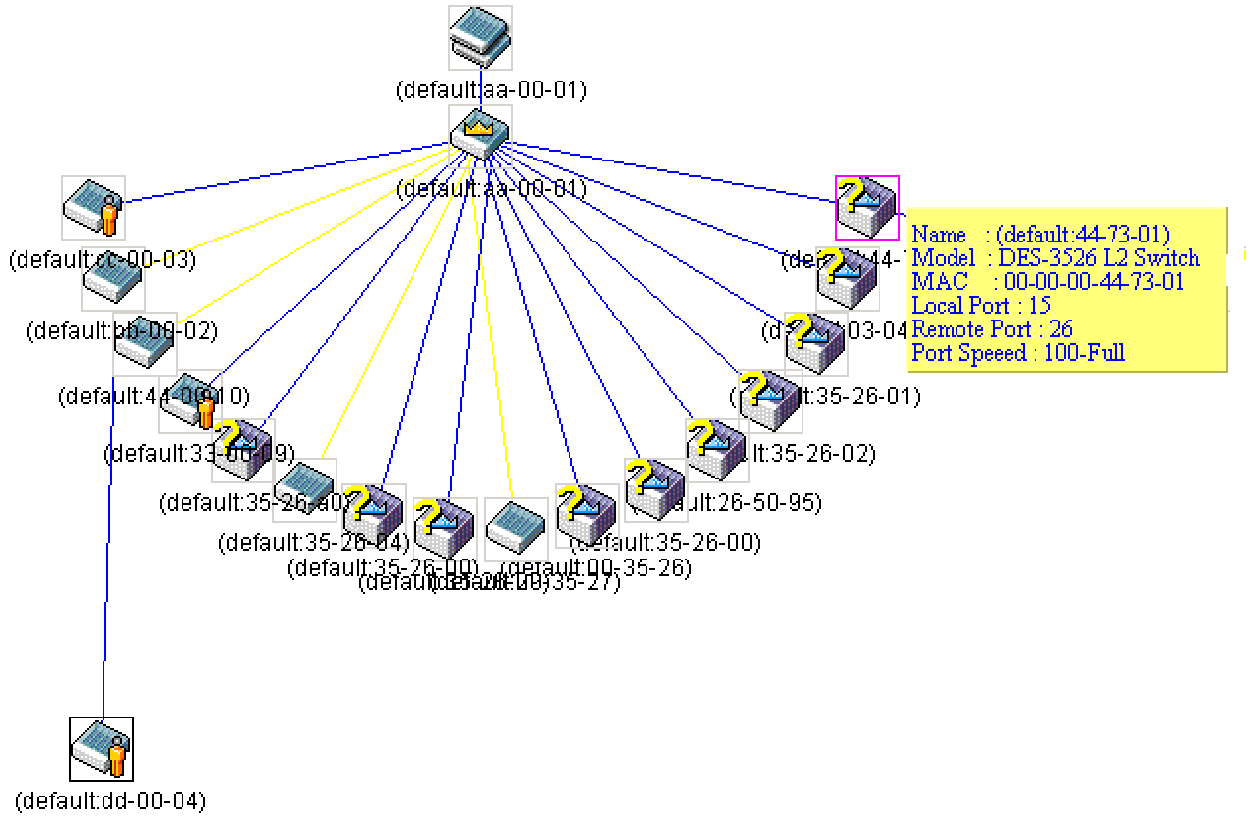
Figure 7- 4. Topology view

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

Icon	Description
	Group
	Layer 2 commander Switch
	Layer 3 commander Switch
	Commander Switch of other group
	Layer 2 member Switch.
	Layer 3 member Switch
	Member Switch of other group
	Layer 2 candidate Switch
	Layer 3 candidate Switch
	Unknown device
	Non-SIM devices

Tool Tips

In the Topology view window, the mouse plays an important role in configuration and in viewing device information. Setting the mouse cursor over a specific device in the topology window (tool tip) will display the same information about a specific device as the Tree view does. See the window below for an example.



Name : (default:44-73-01)
Model : DES-3526 L2 Switch
MAC : 00-00-00-44-73-01
Local Port : 15
Remote Port : 26
Port Speeed : 100-Full

Figure 7- 5. Device Information Utilizing the Tool Tip

Setting the mouse cursor over a line between two devices will display the connection speed between the two devices, as shown below.

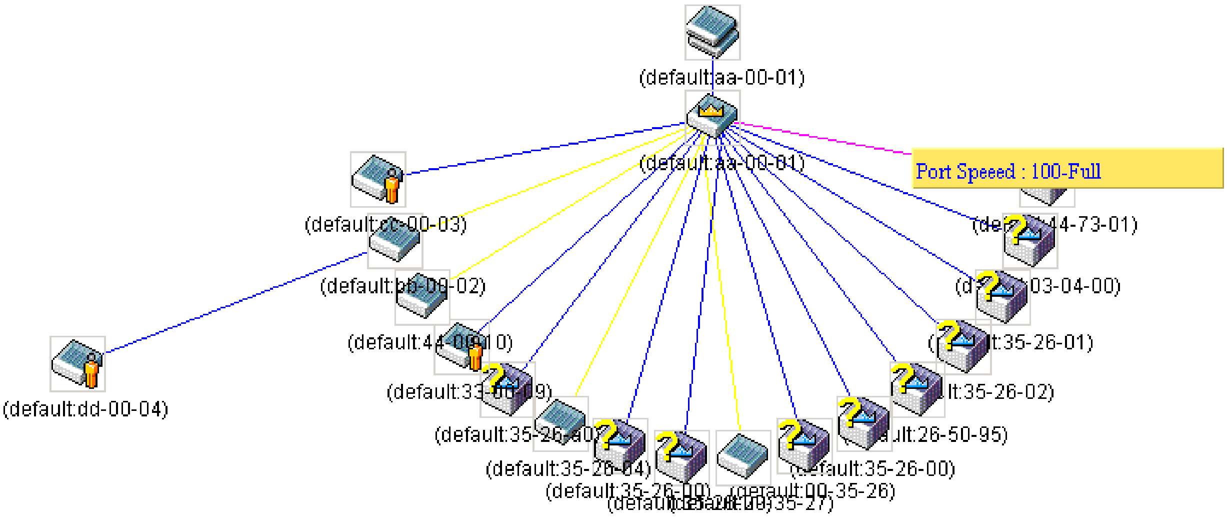


Figure 7- 6. Port Speed Utilizing the Tool Tip

Right-Click

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

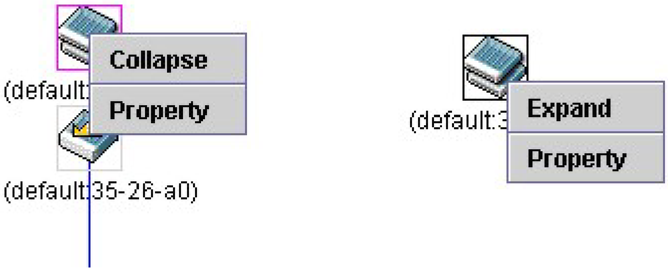


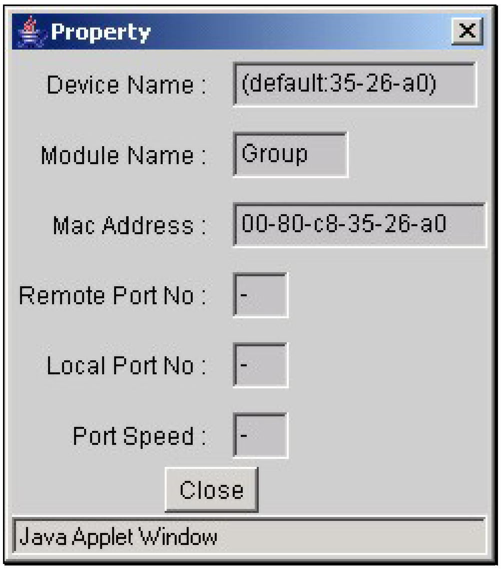
Figure 7- 7. Right-Clicking a Group Icon

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.

Property - to pop up a window to display the group information.



Property

Device Name : (default:35-26-a0)

Module Name : Group

Mac Address : 00-80-c8-35-26-a0

Remote Port No : -

Local Port No : -

Port Speed : -

Figure 7- 8. Property window

Commander Switch Icon

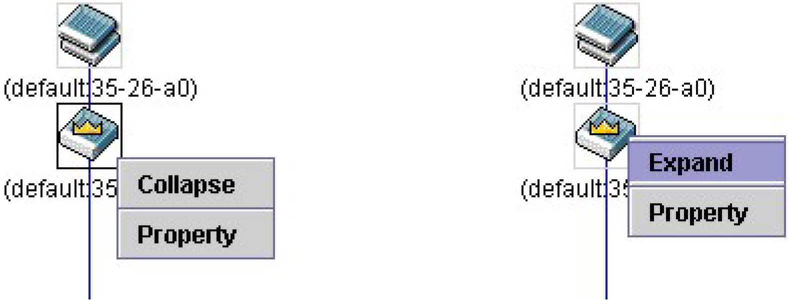


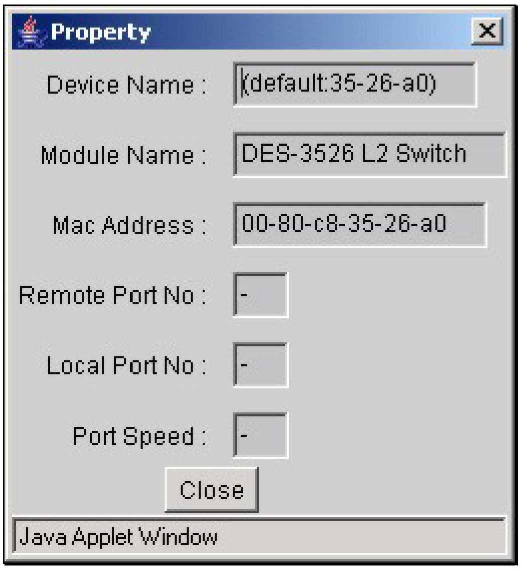
Figure 7- 9. Right-Clicking a Commander Icon

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.

Property - to pop up a window to display the group information.



Property

Device Name : (default:35-26-a0)

Module Name : DES-3526 L2 Switch

Mac Address : 00-80-c8-35-26-a0

Remote Port No : -

Local Port No : -

Port Speed : -

Figure 7- 10. Property window

Member Switch Icon

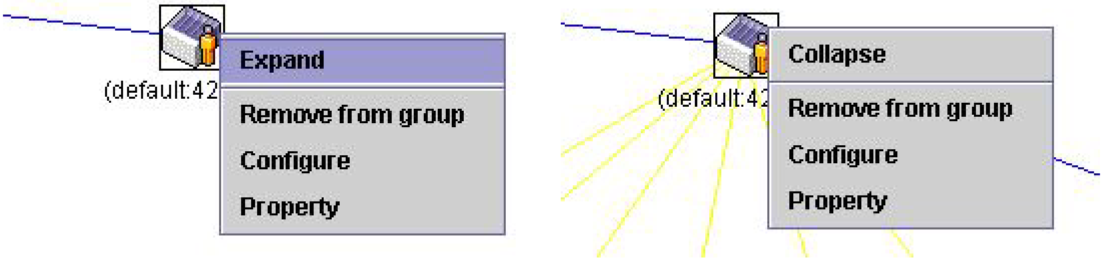


Figure 7- 11. Right-Clicking a Member icon

The following options may appear for the user to configure:

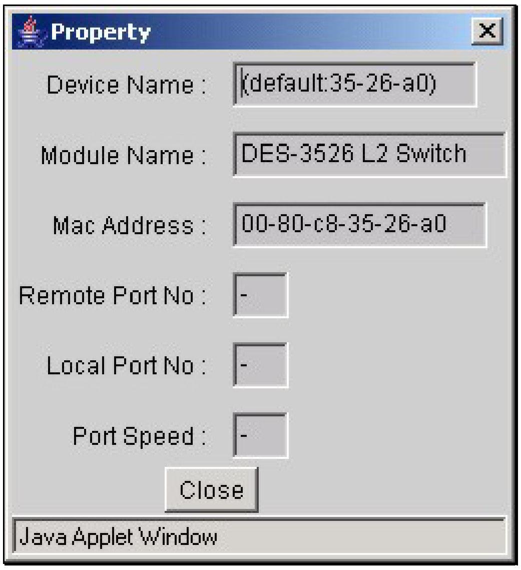
Collapse - to collapse the group that will be represented by a single icon.

Expand - to expand the SIM group, in detail.

Remove from group - remove a member from a group.

Configure - launch the web management to configure the Switch.

Property - to pop up a window to display the device information.



Property

Device Name : (default:35-26-a0)

Module Name : DES-3526 L2 Switch

Mac Address : 00-80-c8-35-26-a0

Remote Port No : -

Local Port No : -

Port Speed : -

Figure 7- 12. Property window

Candidate Switch Icon

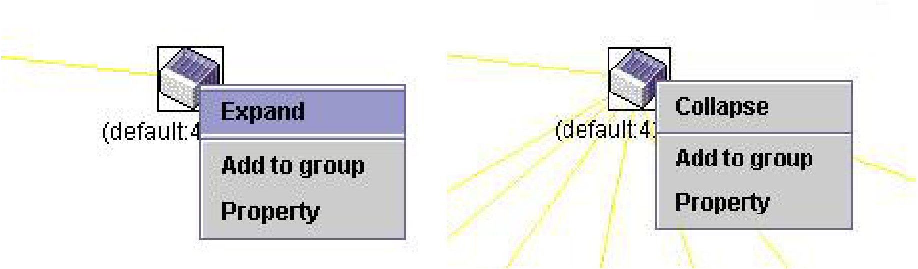


Figure 7- 13. Right-Clicking a Candidate icon

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.

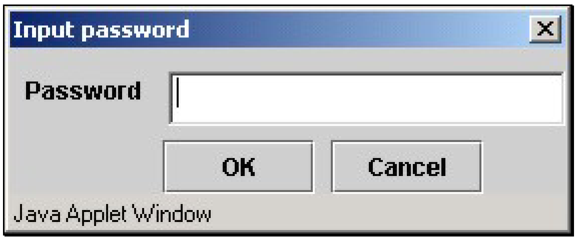
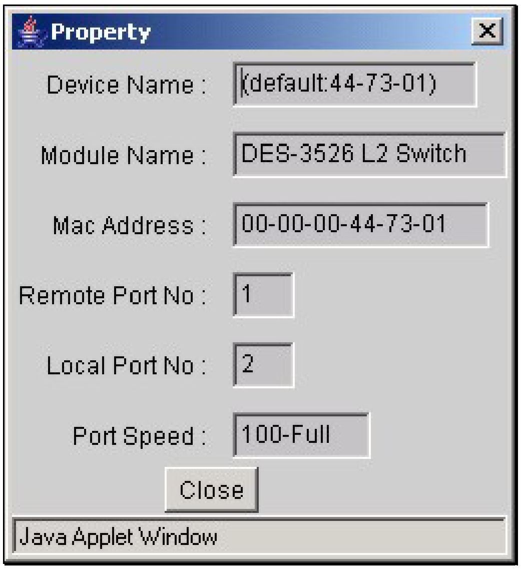


Figure 7- 14. Input password dialog box

Property - to pop up a window to display the device information, as shown below.



Property

Device Name : (default:44-73-01)

Module Name : DES-3526 L2 Switch

Mac Address : 00-00-00-44-73-01

Remote Port No : 1

Local Port No : 2

Port Speed : 100-Full

Figure 7- 15. Property window

This window holds the following information:

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 **Close** to close the **Property** window.

Menu Bar

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

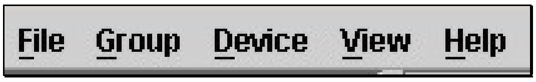


Figure 7- 16. Menu Bar of the Topology View

The five menus on the menu bar are as follows.

File

Print Setup - will view the image to be printed.

Print Topology - will print the topology map.

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 screen 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 window.

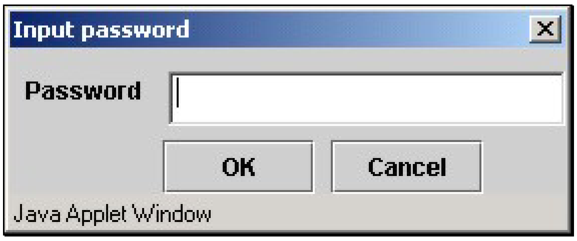


Figure 7- 17. Input password window

Remove from Group - remove an MS from the group.

Device

Configure - will open the web manager for the specific device.

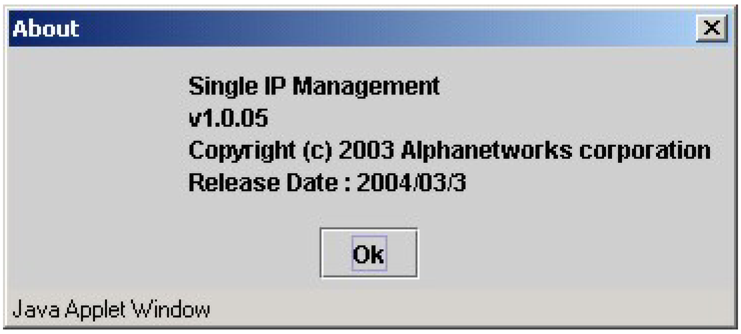
View

Refresh - update the views with the latest status.

Topology - display the Topology view.

Help

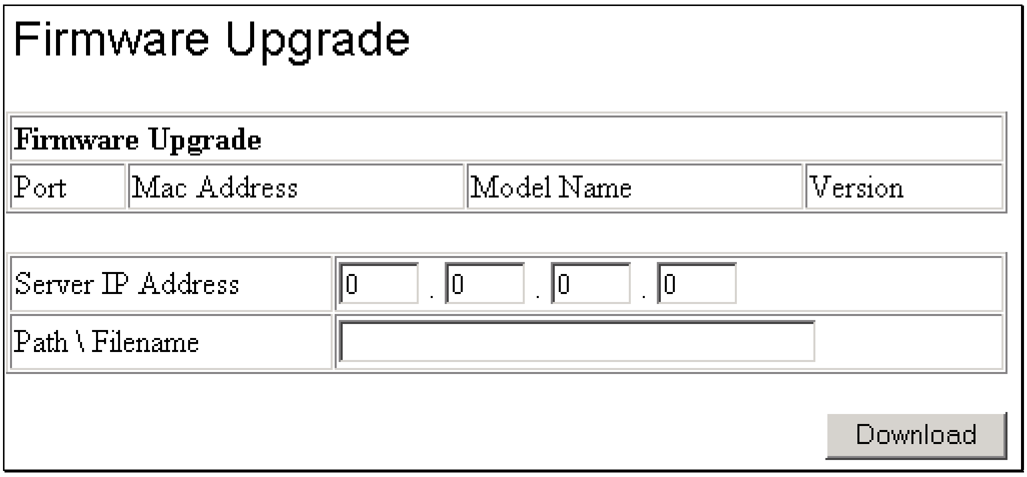
About - Will display the SIM information, including the current SIM version.



Single IP Management
v1.0.05
Copyright (c) 2003 Alphanetworks corporation
Release Date : 2004/03/3

NOTE: Upon this firmware release, some functions of the SIM can only be configured through the Command Line Interface. See the ***DGS-3224TGR Command Line Interface Reference Manual*** for more information on SIM and its configurations.

Firmware Upgrade



Firmware Upgrade

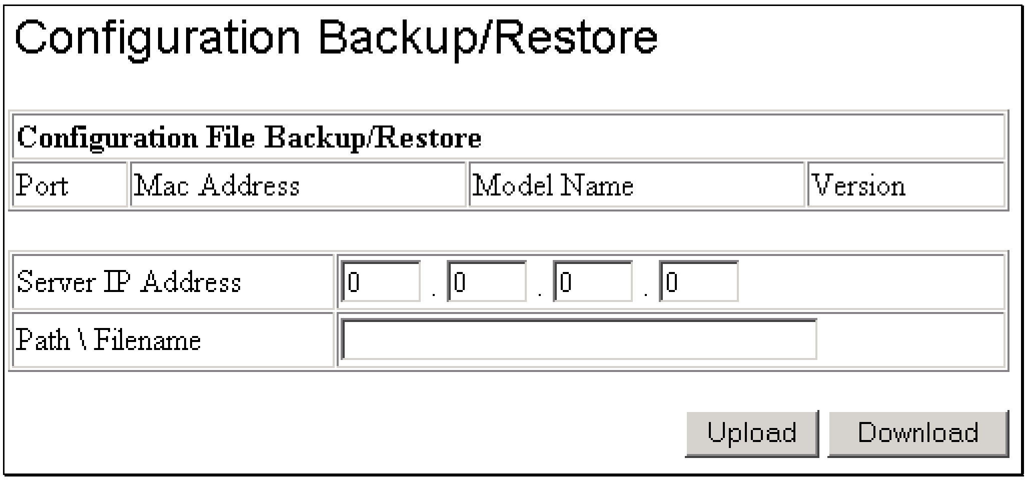
Firmware Upgrade			
Port	Mac Address	Model Name	Version

Server IP Address	0 . 0 . 0 . 0
Path \ Filename	

Figure 7- 18. Firmware Upgrade window

This window is used to upgrade firmware from the Commander Switch to the Member Switch. To access the following window, click **Single IP Management > Firmware Upgrade**. 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

Configuration Backup/Restore



Configuration Backup/Restore

Configuration File Backup/Restore			
Port	Mac Address	Model Name	Version

Server IP Address	0 . 0 . 0 . 0
Path \ Filename	

Figure 7- 19. Configuration Backup/Restore window

This window 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 Port (port on the CS where the MS resides), MAC Address, Model Name and Version. To specify a certain Switch for upgrading configuration files, click its corresponding radio button under the Port heading. To update the configuration file, enter the Server IP Address where the file resides and enter the Path/Filename of the configuration file. Click **Download** to initiate the file transfer from a TFTP server to the Switch. Click **Upload** to backup the configuration file to a TFTP server.

A

Technical Specifications

Performance	
Transmission Method	Store-and-forward
RAM Buffer	2 MB per device
Packet Filtering/ Forwarding Rate	Full-wire speed for all connections. 1,488,095 pps per port (for 1000Mbps)
MAC Address Learning	Automatic update. Supports 16K MAC address.
Priority Queues	8 Priority Queues per port.
Forwarding Table Age Time	Max age: 10–1000000 seconds. Default = 300.

Physical and Environmental	
AC inputs	100 – 240 VAC, 50/60 Hz (internal universal power supply)
Power Consumption	60 watts maximum
DC fans	4 built-in 40 x 40 x 10 mm fans 1 built-in 60 x 60 x 18 mm 5400 RPM fan blower
Operating Temperature	0 to 40 degrees Celsius
Storage Temperature	-25 to 55 degrees Celsius
Humidity	Storage: 5% to 95% non-condensing
Dimensions	441mm (W) x 309mm (D) x 44mm (H), 19-inch rack-mount width 1U height
Weight	4 kg
EMI	FCC, CE Mark, C-Tick
Safety	CSA International

General	
Standards	IEEE 802.3 10BASE-T Ethernet IEEE 802.3u 100BASE-TX Fast Ethernet IEEE 802.3z Gigabit Ethernet IEEE 802.1Q Tagged VLAN IEEE 802.1P Tagged Packets IEEE 802.3ab 1000BASE-T IEEE 802.3x Full-duplex Flow Control ANSI/IEEE 802.3 NWay auto-negotiation
Protocols	CSMA/CD
Data Transfer Rates	
Ethernet:	Half duplex Full duplex
Fast Ethernet:	
Gigabit Ethernet:	10 Mbps 20 Mbps
	100 Mbps 200 Mbps 2000 Mbps (Full duplex only)
Topology	Star
Network Cables	
10BASE-T:	UTP Category 3, 4, 5 (100 meters max.) EIA/TIA- 568 150-ohm STP (100 meters max.)
100BASE-TX:	UTP Cat. 5 (100 meters max.) EIA/TIA-568 150-ohm STP (100 meters max.)
1000BASE-T:	UTP Cat. 5e (100 meters max.) UTP Cat. 5 (100 meters max.) EIA/TIA-568B 150-ohm STP (100 meters max.)
1000BASE-LX:	Single-mode fiber module (10km)
1000BASE-SX:	Multi-mode fiber module (550m)
1000BASE-LHX:	Single-mode fiber module (40km)
1000BASE-ZX:	Single-mode fiber module (80km)
Mini-GBIC:	SFP Transceiver for 1000BASE-LX Single-mode fiber module (10km) SFP Transceiver for 1000BASE-SX Multi-mode fiber module (550m) SFP Transceiver for 1000BASE-LHX Single-mode fiber module (40km) SFP Transceiver for 1000BASE-ZX Single-mode fiber module (80km)
Number of Ports:	24 x 10/100/1000 Mbps ports 4 x GBIC combo ports

B

Cable Lengths

Use the following table to as a guide for the maximum cable lengths:

Standard	Media Type	Maximum Distance
Mini GBIC	DEM-310GT: SFP Transceiver for 1000BASE-LX, Single-mode fiber module	10km
	DEM-311GT: SFP Transceiver for 1000BASE-SX, Multi-mode fiber module	550m
	DEM-314GT: SFP Transceiver for 1000BASE-LHX, Single-mode fiber module	40km
	DEM-315GT: SFP Transceiver for 1000BASE-ZX, Single-mode fiber module	80km
1000BASE-T	Category 5e UTP Cable Category 5 UTP Cable (1000 Mbps)	100m
100BASE-TX	Category 5 UTP Cable (100 Mbps)	100m
10BASE-T	Category 3 UTP Cable (10 Mbps)	100m

Glossary

1000BASE-T – A specification for Gigabit Ethernet over copper wire (IEEE Std. 802.3ab). The standard defines 1 Gb/s data transfer over distances of up to 100 meters using four pairs of CAT-5 balanced copper cabling and a 5-level coding scheme. Its benefits include compatibility with existing network protocols (i.e. IP, IPX, AppleTalk), existing applications, Network Operating Systems, network management platforms and applications.

100BASE-TX – 100Mbps Ethernet implementation over Category 5 and Type 1 twisted pair cabling.

10BASE-T – The IEEE 802.3 specification for Ethernet over Unshielded Twisted Pair (UTP) cabling.

aging – The automatic removal of dynamic entries from the Switch Database which have timed-out and are no longer valid.

ATM – Asynchronous Transfer Mode. A connection oriented transmission protocol based on fixed length cells (packets). ATM is designed to carry a complete range of user traffic, including voice, data and video signals.

auto-negotiation – A feature on a port which allows it to advertise its capabilities for speed, duplex and flow control. When connected to an end station that also supports auto-negotiation, the link can self-detect its optimum operating setup.

backbone – The part of a network used as the primary path for transporting traffic

backbone port – A port which does not learn device addresses, and which receives all frames with an unknown address. Backbone ports are normally used to connect the switch to the backbone of your network. Note that backbone ports were formerly known as designated downlink ports.

bandwidth – Information capacity, measured in bits per second, that a channel can transmit. The bandwidth of Ethernet is 10Mbps and the bandwidth of Fast Ethernet is 100Mbps.

baud rate – The switching speed of a line. Also known as *line speed* between network segments.

BOOTP – The BOOTP protocol allows you to automatically map an IP address to a given MAC address each time a device is started. In addition, the protocol can assign the subnet mask and default gateway to a device.

bridge – A device that interconnects local or remote networks no matter what higher level protocols are involved. Bridges form a single logical network, centralizing network administration.

broadcast – A message sent to all destination devices on the network.

broadcast storm – Multiple simultaneous broadcasts that typically absorb available network bandwidth and can cause network failure.

console port – The port on the switch accepting a terminal. It changes the parallel arrangement of data within computers to the serial form used on data transmission links. This port is most often used for dedicated local management.

CSMA/CD – Channel access method used by Ethernet and IEEE 802.3 standards in which devices transmit only after finding the data channel clear for some period of time. When two devices transmit simultaneously, a collision occurs and the colliding devices delay their retransmissions for a random amount of time.

data center switching – The point of aggregation within a corporate network where a switch provides high-performance access to server farms, a high-speed backbone connection and a control point for network management and security.

Ethernet – A LAN specification developed jointly by Xerox, Intel and Digital Equipment Corporation. Ethernet networks operate at 10Mbps using CSMA/CD to run over cabling.

Fast Ethernet – 100Mbps technology based on the Ethernet/CD network access method.

Flow Control – (IEEE 802.3z) A means of holding packets back at the transmit port of the connected end station. Prevents packet loss at a congested switch port.

forwarding The process of sending a packet toward its destination by an internetworking device.

full duplex – A system that allows packets to be transmitted and received at the same time and, in effect, doubles the potential throughput of a link.

GBIC – Gigabit interface converter, a transceiver that converts serial electric signals to serial optical signals and vice versa. In networking, a GBIC is used to interface a fiber optic system with an Ethernet system, such as Fibre Channel and Gigabit Ethernet.

A GBIC allows designers to design one type of device that can be adapted for either optical or copper applications. GBICs also are hot-swappable, which adds to the ease of upgrading electro-optical communication networks.

half duplex – A system that allows packets to be transmitted and received, but not at the same time. Contrasts with full duplex.

IP address – Internet Protocol address. A unique identifier for a device attached to a network using TCP/IP. The address is written as four octets separated with full-stops (periods), and is made up of a network section, an optional subnet section and a host section.

IPX – Internetwork Packet Exchange. A protocol allowing communication in a NetWare network.

LAN – Local Area Network. A network of connected computing resources (such as PCs, printers, servers) covering a relatively small geographic area (usually not larger than a floor or building). Characterized by high data rates and low error rates.

latency – The delay between the time a device receives a packet and the time the packet is forwarded out of the destination port.

line speed – See *baud rate*.

main port – The port in a resilient link that carries data traffic in normal operating conditions.

MDI – Medium Dependent Interface. An Ethernet port connection where the transmitter of one device is connected to the receiver of another device.

MDI-X – Medium Dependent Interface Cross-over. An Ethernet port connection where the internal transmit and receive lines are crossed.

MIB – Management Information Base. Stores a device's management characteristics and parameters. MIBs are used by the Simple Network Management Protocol (SNMP) to contain attributes of their managed systems. The Switch contains its own internal MIB.

multicast – Single packets copied to a specific subset of network addresses. These addresses are specified in the destination-address field of the packet.

protocol – A set of rules for communication between devices on a network. The rules dictate format, timing, sequencing and error control.

resilient link – A pair of ports that can be configured so that one will take over data transmission should the other fail. See also *main port* and *standby port*.

RJ-45 – Standard 8-wire connectors for IEEE 802.3 10BASE-T networks.

RMON – Remote Monitoring. Subset of SNMP MIB II which allows monitoring and management capabilities by addressing up to ten different groups of information.

RPS – Redundant Power System. A device that provides a backup source of power when connected to the switch.

server farm – A cluster of servers in a centralized location serving a large user population.

SLIP – Serial Line Internet Protocol. A protocol which allows IP to run over a serial line connection.

SNMP – Simple Network Management Protocol. A protocol originally designed to be used in managing TCP/IP internets. SNMP is presently implemented on a wide range of computers and networking equipment and may be used to manage many aspects of network and end station operation.

Spanning Tree Protocol – (STP) A bridge-based system for providing fault tolerance on networks. STP works by allowing you to implement parallel paths for network traffic, and ensure that redundant paths are disabled when the main paths are operational and enabled if the main paths fail.

stack – A group of network devices that are integrated to form a single logical device.

standby port – The port in a resilient link that will take over data transmission if the main port in the link fails.

switch – A device which filters, forwards and floods packets based on the packet's destination address. The switch learns the addresses associated with each switch port and builds tables based on this information to be used for the switching decision.

TCP/IP – A layered set of communications protocols providing Telnet terminal emulation, FTP file transfer, and other services for communication among a wide range of computer equipment.

Telnet – A TCP/IP application protocol that provides virtual terminal service, letting a user log in to another computer system and access a host as if the user were connected directly to the host.

TFTP – Trivial File Transfer Protocol. Allows you to transfer files (such as software upgrades) from a remote device using your switch's local management capabilities.

UDP – User Datagram Protocol. An Internet standard protocol that allows an application program on one device to send a datagram to an application program on another device.

VLAN – Virtual LAN. A group of location- and topology-independent devices that communicate as if they are on a common physical LAN.

VLT – Virtual LAN Trunk. A Switch-to-Switch link which carries traffic for all the VLANs on each Switch.

VT100 – A type of terminal that uses ASCII characters. VT100 screens have a text-based appearance.

Warranty and Registration Information

(All countries and regions excluding USA)

Wichtige Sicherheitshinweise

1. Bitte lesen Sie sich diese Hinweise sorgfältig durch.
2. Heben Sie diese Anleitung für den spätern Gebrauch auf.
3. Vor jedem Reinigen ist das Gerät vom Stromnetz zu trennen. Vervenden Sie keine Flüssig- oder Aerosolreiniger. Am besten dient ein angefeuchtetes Tuch zur Reinigung.
4. Um eine Beschädigung des Gerätes zu vermeiden sollten Sie nur Zubehörteile verwenden, die vom Hersteller zugelassen sind.
5. Das Gerät is vor Feuchtigkeit zu schützen.
6. Bei der Aufstellung des Gerätes ist auf sichern Stand zu achten. Ein Kippen oder Fallen könnte Verletzungen hervorrufen. Verwenden Sie nur sichere Standorte und beachten Sie die Aufstellhinweise des Herstellers.
7. Die Belüftungsöffnungen dienen zur Luftzirkulation die das Gerät vor Überhitzung schützt. Sorgen Sie dafür, daß diese Öffnungen nicht abgedeckt werden.
8. Beachten Sie beim Anschluß an das Stromnetz die Anschlußwerte.
9. Die Netzanschlußsteckdose muß aus Gründen der elektrischen Sicherheit einen Schutzleiterkontakt haben.
10. Verlegen Sie die Netzanschlußleitung so, daß niemand darüber fallen kann. Es sollete auch nichts auf der Leitung abgestellt werden.
11. Alle Hinweise und Warnungen die sich am Geräten befinden sind zu beachten.
12. Wird das Gerät über einen längeren Zeitraum nicht benutzt, sollten Sie es vom Stromnetz trennen. Somit wird im Falle einer Überspannung eine Beschädigung vermieden.
13. Durch die Lüftungsöffnungen dürfen niemals Gegenstände oder Flüssigkeiten in das Gerät gelangen. Dies könnte einen Brand bzw. Elektrischen Schlag auslösen.
14. Öffnen Sie niemals das Gerät. Das Gerät darf aus Gründen der elektrischen Sicherheit nur von authorisiertem Servicepersonal geöffnet werden.
15. Wenn folgende Situationen auftreten ist das Gerät vom Stromnetz zu trennen und von einer qualifizierten Servicestelle zu überprüfen:
    a. Netzkabel oder Netzstecker sint beschädigt.
    b. Flüssigkeit ist in das Gerät eingedrungen.
    c. Das Gerät war Feuchtigkeit ausgesetzt.
    d. Wenn das Gerät nicht der Bedienungsanleitung ensprechend funktioniert oder Sie mit Hilfe dieser Anleitung keine Verbesserung erzielen.
    e. Das Gerät ist gefallen und/oder das Gehäuse ist beschädigt.
    f. Wenn das Gerät deutliche Anzeichen eines Defektes aufweist.
16. Bei Reparaturen dürfen nur Orginalersatzteile bzw. den Orginalteilen entsprechende Teile verwendet werden. Der Einsatz von ungeeigneten Ersatzteilen kann eine weitere Beschädigung hervorrufen.
17. Wenden Sie sich mit allen Fragen die Service und Repartur betreffen an Ihren Servicepartner. Somit stellen Sie die Betriebssicherheit des Gerätes sicher.
18. Zum Netzanschluß dieses Gerätes ist eine geprüfte Leitung zu verwenden, Für einen Nennstrom bis 6A und einem Gerätegewicht größer 3kg ist eine Leitung nicht leichter als H05VV-F, 3G, 0.75mm2 einzusetzen.

WARRANTIES EXCLUSIVE

IF THE D-LINK PRODUCT DOES NOT OPERATE AS WARRANTED ABOVE, THE CUSTOMER'S SOLE REMEDY SHALL BE, AT D-LINK'S OPTION, REPAIR OR REPLACEMENT. THE FOREGOING WARRANTIES AND REMEDIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. D-LINK NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE, INSTALLATION MAINTENANCE OR USE OF D-LINK'S PRODUCTS.

D-LINK SHALL NOT BE LIABLE UNDER THIS WARRANTY IF ITS TESTING AND EXAMINATION DISCLOSE THAT THE ALLEGED DEFECT IN THE PRODUCT DOES NOT EXIST OR WAS CAUSED BY THE CUSTOMER'S OR ANY THIRD PERSON'S MISUSE, NEGLECT, IMPROPER INSTALLATION OR TESTING, UNAUTHORIZED ATTEMPTS TO REPAIR, OR ANY OTHER CAUSE BEYOND THE RANGE OF THE INTENDED USE, OR BY ACCIDENT, FIRE, LIGHTNING OR OTHER HAZARD.

LIMITATION OF LIABILITY

IN NO EVENT WILL D-LINK BE LIABLE FOR ANY DAMAGES, INCLUDING LOSS OF DATA, LOSS OF PROFITS, COST OF COVER OR OTHER INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES ARISING OUT THE INSTALLATION, MAINTENANCE, USE, PERFORMANCE, FAILURE OR INTERRUPTION OF A D- LINK PRODUCT, HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY. THIS LIMITATION WILL APPLY EVEN IF D-LINK HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

IF YOU PURCHASED A D-LINK PRODUCT IN THE UNITED STATES, SOME STATES DO NOT ALLOW THE LIMITATION OR EXCLUSION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

Limited Warranty

Hardware:

D-Link warrants each of its hardware products to be free from defects in workmanship and materials under normal use and service for a period commencing on the date of purchase from D-Link or its Authorized Reseller and extending for the length of time stipulated by the Authorized Reseller or D-Link Branch Office nearest to the place of purchase.

This Warranty applies on the condition that the product Registration Card is filled out and returned to a D-Link office within ninety (90) days of purchase. A list of D-Link offices is provided at the back of this manual, together with a copy of the Registration Card.

If the product proves defective within the applicable warranty period, D-Link will provide repair or replacement of the product. D-Link shall have the sole discretion whether to repair or replace, and replacement product may be new or reconditioned. Replacement product shall be of equivalent or better specifications, relative to the defective product, but need not be identical. Any product or part repaired by D-Link pursuant to this warranty shall have a warranty period of not less than 90 days, from date of such repair, irrespective of any earlier expiration of original warranty period. When D-Link provides replacement, then the defective product becomes the property of D-Link.

Warranty service may be obtained by contacting a D-Link office within the applicable warranty period, and requesting a Return Material Authorization (RMA) number. If a Registration Card for the product in question has not been returned to D-Link, then a proof of purchase (such as a copy of the dated purchase invoice) must be provided. If Purchaser's circumstances require special handling of warranty correction, then at the time of requesting RMA number, Purchaser may also propose special procedure as may be suitable to the case.

After an RMA number is issued, the defective product must be packaged securely in the original or other suitable shipping package to ensure that it will not be damaged in transit, and the RMA number must be prominently marked on the outside of the package. The package must be mailed or otherwise shipped to D-Link with all costs of mailing/shipping/insurance prepaid. D-Link shall never be responsible for any software, firmware, information, or memory data of Purchaser contained in, stored on, or integrated with any product returned to D-Link pursuant to this warranty.

Any package returned to D-Link without an RMA number will be rejected and shipped back to Purchaser at Purchaser's expense, and D-Link reserves the right in such a case to levy a reasonable handling charge in addition mailing or shipping costs.

Software:

Warranty service for software products may be obtained by contacting a D-Link office within the applicable warranty period. A list of D-Link offices is provided at the back of this manual, together with a copy of the Registration Card. If a Registration Card for the product in question has not been returned to a D-Link office, then a proof of purchase (such as a copy of the dated purchase invoice) must be provided when requesting warranty service. The term "purchase" in this software warranty refers to the purchase transaction and resulting license to use such software.

D-Link warrants that its software products will perform in substantial conformance with the applicable product documentation provided by D-Link with such software product, for a period of ninety (90) days from the date of purchase from D-Link or its Authorized Reseller. D-Link warrants the magnetic media, on which D-Link provides its software product, against failure during the same warranty period. This warranty applies to purchased software, and to replacement software provided by D-Link pursuant to this warranty, but shall not apply to any update or replacement which may be provided for download via the Internet, or to any update which may otherwise be provided free of charge.

D-Link's sole obligation under this software warranty shall be to replace any defective software product with product which substantially conforms to D-Link's applicable product documentation. Purchaser assumes responsibility for the selection of appropriate application and system/platform software and associated reference materials. D-Link makes no warranty that its software products will work in combination with any hardware, or any application or system/platform software product provided by any third party, excepting only such products as are expressly represented, in D-Link's applicable product documentation as being compatible. D-Link's obligation under this warranty shall be a reasonable effort to provide compatibility, but D-Link shall have no obligation to provide compatibility when there is fault in the third-party hardware or software. D-Link makes no warranty that operation of its software products will be uninterrupted or absolutely error-free, and no warranty that all defects in the software product, within or without the scope of D-Link's applicable product documentation, will be corrected.

D-Link®
Building Networks for People

Limited Warranty
(USA Only)

Subject to the terms and conditions set forth herein, D-Link Systems, Inc. (“D-Link”) provides this Limited Warranty:

- Only to the person or entity that originally purchased the product from D-Link or its authorized reseller or distributor, and
- Only for products purchased and delivered within the fifty states of the United States, the District of Columbia, U.S. Possessions or Protectorates, U.S. Military Installations, or addresses with an APO or FPO.

Limited Warranty: D-Link warrants that the hardware portion of the D-Link product described below (“Hardware”) will be free from material defects in workmanship and materials under normal use from the date of original retail purchase of the product, for the period set forth below (“Warranty Period”), except as otherwise stated herein.

Limited Lifetime Warranty for the product is defined as follows:

- Hardware: For as long as the original customer/end user owns the product, or five (5) years after product discontinuance, whichever occurs first (excluding power supplies and fans)
- Power supplies and fans: Three (3) Year
- Spare parts and spare kits: Ninety (90) days

The customer's sole and exclusive remedy and the entire liability of D-Link and its suppliers under this Limited Warranty will be, at D-Link’s option, to repair or replace the defective Hardware during the Warranty Period at no charge to the original owner or to refund the actual purchase price paid. Any repair or replacement will be rendered by D-Link at an Authorized D-Link Service Office. The replacement hardware need not be new or have an identical make, model or part. D-Link may, at its option, replace the defective Hardware or any part thereof with any reconditioned product that D-Link reasonably determines is substantially equivalent (or superior) in all material respects to the defective Hardware. Repaired or replacement hardware will be warranted for the remainder of the original Warranty Period or ninety (90) days, whichever is longer, and is subject to the same limitations and exclusions. If a material defect is incapable of correction, or if D-Link determines that it is not practical to repair or replace the defective Hardware, the actual price paid by the original purchaser for the defective Hardware will be refunded by D-Link upon return to D-Link of the defective Hardware. All Hardware or part thereof that is replaced by D-Link, or for which the purchase price is refunded, shall become the property of D-Link upon replacement or refund.

Limited Software Warranty: D-Link warrants that the software portion of the product (“Software”) will substantially conform to D-Link’s then current functional specifications for the Software, as set forth in the applicable documentation, from the date of original retail purchase of the Software for a period of ninety (90) days (“Software Warranty Period”), provided that the Software is properly installed on approved hardware and operated as contemplated in its documentation. D-Link further warrants that, during the Software Warranty Period, the magnetic media on which D-Link delivers the Software will be free of physical defects. The customer's sole and exclusive remedy and the entire liability of D-Link and its suppliers under this Limited Warranty will be, at D-Link’s option, to replace the non-conforming Software (or defective media) with software that substantially conforms to D-Link’s functional specifications for the Software or to refund the portion of the actual purchase price paid that is attributable to the Software. Except as otherwise agreed by D-Link in writing, the replacement Software is provided only to the original licensee, and is subject to the terms and conditions of the license granted by D-Link for the Software. Replacement Software will be warranted for the remainder of the original Warranty Period and is subject to the same limitations and exclusions. If a material non-conformance is incapable of correction, or if D-Link determines in its sole discretion that it is not practical to replace the non-conforming Software, the price paid by the original licensee for the non-conforming Software will be refunded by D-Link; provided that the non-conforming Software (and all copies thereof) is first returned to D-Link. The license granted respecting any Software for which a refund is given automatically terminates.

Non-Applicability of Warranty: The Limited Warranty provided hereunder for Hardware and Software portions of D-Link's products will not be applied to and does not cover any refurbished product and any product purchased through the inventory clearance or liquidation sale or other sales in which D-Link, the sellers, or the liquidators expressly disclaim their warranty obligation pertaining to the product and in that case, the product is being sold "As-Is" without any warranty whatsoever including, without limitation, the Limited Warranty as described herein, notwithstanding anything stated herein to the contrary.

Submitting A Claim: The customer shall return the product to the original purchase point based on its return policy. In case the return policy period has expired and the product is within warranty, the customer shall submit a claim to D-Link as outlined below:

- The customer must submit with the product as part of the claim a written description of the Hardware defect or Software nonconformance in sufficient detail to allow D-Link to confirm the same, along with proof of purchase of the product (such as a copy of the dated purchase invoice for the product) if the product is not registered.

- The customer must obtain a Case ID Number from D-Link Technical Support at 1-877-453-5465, who will attempt to assist the customer in resolving any suspected defects with the product. If the product is considered defective, the customer must obtain a Return Material Authorization (“RMA”) number by completing the RMA form and entering the assigned Case ID Number at https://rma.dlink.com/.

- After an RMA number is issued, the defective product must be packaged securely in the original or other suitable shipping package to ensure that it will not be damaged in transit, and the RMA number must be prominently marked on the outside of the package. Do not include any manuals or accessories in the shipping package. D-Link will only replace the defective portion of the product and will not ship back any accessories.

- The customer is responsible for all in-bound shipping charges to D-Link. No Cash on Delivery (“COD”) is allowed. Products sent COD will either be rejected by D-Link or become the property of D-Link. Products shall be fully insured by the customer and shipped to **D-Link Systems, Inc., 17595 Mt. Herrmann, Fountain Valley, CA 92708**. D-Link will not be held responsible for any packages that are lost in transit to D-Link. The repaired or replaced packages will be shipped to the customer via UPS Ground or any common carrier selected by D-Link. Return shipping charges shall be prepaid by D-Link if you use an address in the United States, otherwise we will ship the product to you freight collect. Expedited shipping is available upon request and provided shipping charges are prepaid by the customer.

D-Link may reject or return any product that is not packaged and shipped in strict compliance with the foregoing requirements, or for which an RMA number is not visible from the outside of the package. The product owner agrees to pay D-Link’s reasonable handling and return shipping charges for any product that is not packaged and shipped in accordance with the foregoing requirements, or that is determined by D-Link not to be defective or non-conforming.

What Is Not Covered: The Limited Warranty provided herein by D-Link does not cover: Products that, in D-Link’s judgment, have been subjected to abuse, accident, alteration, modification, tampering, negligence, misuse, faulty installation, lack of reasonable care, repair or service in any way that is not contemplated in the documentation for the product, or if the model or serial number has been altered, tampered with, defaced or removed; Initial installation, installation and removal of the product for repair, and shipping costs; Operational adjustments covered in the operating manual for the product, and normal maintenance; Damage that occurs in shipment, due to act of God, failures due to power surge, and cosmetic damage; Any hardware, software, firmware or other products or services provided by anyone other than D-Link; and Products that have been purchased from inventory clearance or liquidation sales or other sales in which D-Link, the sellers, or the liquidators expressly disclaim their warranty obligation pertaining to the product. While necessary maintenance or repairs on your Product can be performed by any company, we recommend that you use only an Authorized D-Link Service Office. Improper or incorrectly performed maintenance or repair voids this Limited Warranty.

Disclaimer of Other Warranties: EXCEPT FOR THE LIMITED WARRANTY SPECIFIED HEREIN, THE PRODUCT IS PROVIDED “AS-IS” WITHOUT ANY WARRANTY OF ANY KIND WHATSOEVER INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT. IF ANY IMPLIED WARRANTY CANNOT BE DISCLAIMED IN ANY TERRITORY WHERE A PRODUCT IS SOLD, THE DURATION OF SUCH IMPLIED WARRANTY SHALL BE LIMITED TO NINETY (90) DAYS. EXCEPT AS EXPRESSLY COVERED

UNDER THE LIMITED WARRANTY PROVIDED HEREIN, THE ENTIRE RISK AS TO THE QUALITY, SELECTION AND PERFORMANCE OF THE PRODUCT IS WITH THE PURCHASER OF THE PRODUCT.

Limitation of Liability: TO THE MAXIMUM EXTENT PERMITTED BY LAW, D-LINK IS NOT LIABLE UNDER ANY CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE THEORY FOR ANY LOSS OF USE OF THE PRODUCT, INCONVENIENCE OR DAMAGES OF ANY CHARACTER, WHETHER DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL (INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF GOODWILL, LOSS OF REVENUE OR PROFIT, WORK STOPPAGE, COMPUTER FAILURE OR MALFUNCTION, FAILURE OF OTHER EQUIPMENT OR COMPUTER PROGRAMS TO WHICH D-LINK'S PRODUCT IS CONNECTED WITH, LOSS OF INFORMATION OR DATA CONTAINED IN, STORED ON, OR INTEGRATED WITH ANY PRODUCT RETURNED TO D-LINK FOR WARRANTY SERVICE) RESULTING FROM THE USE OF THE PRODUCT, RELATING TO WARRANTY SERVICE, OR ARISING OUT OF ANY BREACH OF THIS LIMITED WARRANTY, EVEN IF D-LINK HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THE SOLE REMEDY FOR A BREACH OF THE FOREGOING LIMITED WARRANTY IS REPAIR, REPLACEMENT OR REFUND OF THE DEFECTIVE OR NON-CONFORMING PRODUCT. THE MAXIMUM LIABILITY OF D-LINK UNDER THIS WARRANTY IS LIMITED TO THE PURCHASE PRICE OF THE PRODUCT COVERED BY THE WARRANTY. THE FOREGOING EXPRESS WRITTEN WARRANTIES AND REMEDIES RE EXCLUSIVE AND ARE IN LIEU OF ANY OTHER WARRANTIES OR REMEDIES, EXPRESS, IMPLIED OR STATUTORY.

Limitation of Liability: TO THE MAXIMUM EXTENT PERMITTED BY LAW, D-LINK IS NOT LIABLE UNDER ANY CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE THEORY FOR ANY LOSS OF USE OF THE PRODUCT, INCONVENIENCE OR DAMAGES OF ANY CHARACTER, WHETHER DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL (INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF GOODWILL, LOSS OF REVENUE OR PROFIT, WORK STOPPAGE, COMPUTER FAILURE OR MALFUNCTION, FAILURE OF OTHER EQUIPMENT OR COMPUTER PROGRAMS TO WHICH D-LINK'S PRODUCT IS CONNECTED WITH, LOSS OF INFORMATION OR DATA CONTAINED IN, STORED ON, OR INTEGRATED WITH ANY PRODUCT RETURNED TO D-LINK FOR WARRANTY SERVICE) RESULTING FROM THE USE OF THE PRODUCT, RELATING TO WARRANTY SERVICE, OR ARISING OUT OF ANY BREACH OF THIS LIMITED WARRANTY, EVEN IF D-LINK HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THE SOLE REMEDY FOR A BREACH OF THE FOREGOING LIMITED WARRANTY IS REPAIR, REPLACEMENT OR REFUND OF THE DEFECTIVE OR NON-CONFORMING PRODUCT. THE MAXIMUM LIABILITY OF D-LINK UNDER THIS WARRANTY IS LIMITED TO THE PURCHASE PRICE OF THE PRODUCT COVERED BY THE WARRANTY. THE FOREGOING EXPRESS WRITTEN WARRANTIES AND REMEDIES ARE EXCLUSIVE AND ARE IN LIEU OF ANY OTHER WARRANTIES OR REMEDIES, EXPRESS, IMPLIED OR STATUTORY.

Governing Law: This Limited Warranty shall be governed by the laws of the State of California. Some states do not allow exclusion or limitation of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the foregoing limitations and exclusions may not apply. This Limited Warranty provides specific legal rights and you may also have other rights which vary from state to state.

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CE Mark Warning: This is a Class A product. In a residential environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

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

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

For detailed warranty information applicable to products purchased outside the United States, please contact the corresponding local D-Link office.

Product Registration

Register online your D-Link product at http://support.dlink.com/register/
Product registration is entirely voluntary and failure to complete or return this form will not diminish your warranty rights.

Registration Card

(All countries and regions excluding USA)

Print, type or use block letters.

Your name: Mr./Ms ____
Organization: ____ Dept. _________________________
Your title at organization: ____
Telephone: ___________________________________ Fax:____________________________________
Organization's full address: ____
____
Country: ____
Date of purchase (Month/Day/Year): ____

Product Model	Product Serial No.	* Product installed in type of computer (e.g., Compaq 486)	* Product installed in computer serial No.

(* Applies to adapters only)

Product was purchased from:85

Reseller's name: ____
Telephone: ___________________________________ Fax:____________________________________
Reseller's full address: ____
____
____

Answers to the following questions help us to support your product:

1. Where and how will the product primarily be used?
□Home □Office □Travel □Company Business □Home Business □Personal Use

2. How many employees work at installation site?
□1 employee □2-9 □10-49 □50-99 □100-499 □500-999 □1000 or more

3. What network protocol(s) does your organization use ?
□XNS/IPX □TCP/IP □DECnet □Others__________________________

4. What network operating system(s) does your organization use ?
□D-Link LANsmart □Novell NetWare □NetWare Lite □SCO Unix/Xenix □PC NFS □3Com 3+Open
□Banyan Vines □DECnet Pathwork □Windows NT □Windows NTAS □Windows '95
□Others_____________________________________

5. What network management program does your organization use ?
□D-View □HP OpenView/Windows □HP OpenView/Unix □SunNet Manager □Novell NMS
□NetView 6000 □Others____________________________________

6. What network medium/media does your organization use ?
□Fiber-optics □Thick coax Ethernet □Thin coax Ethernet □10BASE-T UTP/STP
□100BASE-TX □100BASE-T4 □100VGAnyLAN □Others_______________

7. What applications are used on your network?
□Desktop publishing □Spreadsheet □Word processing □CAD/CAM
□Database management □Accounting □Others___________________

8. What category best describes your company?
□Aerospace □Engineering □Education □Finance □Hospital □Legal □Insurance/Real Estate □Manufacturing
□Retail/Chainstore/Wholesale □Government □Transportation/Utilities/Communication □VAR
□System house/company □Other_____________________________

9. Would you recommend your D-Link product to a friend?
□Yes □No □Don't know yet

10.Your comments on this product?

PLEASE
PLACE STAMP
HFRF

TO:

D-Link®