D-Link ™ DGS-3224TGR

Managed 24-Port Gigabit Ethernet Switch

User's Guide

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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。

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警告使用者

這是甲類的資訊產品,在居住的環境中使用時,可能會造成射頻干擾,在這種情況下使用者會被要求採取某些適當的對策

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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.

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.

Appendix C, "Understanding and Troubleshooting the Spanning Tree Protocol"

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.

- 802.1Q Tagged VLAN support, including GVRP (GARP VLAN Registration Protocol).
- Support for up to 255 VLANs.
- IGMP snooping support per switch.
- Link aggregation support for up to 32 trunk groups and 8 trunk members per group.
- 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.

- SYSLOG support.
- Destination Lookup Fail control.

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.

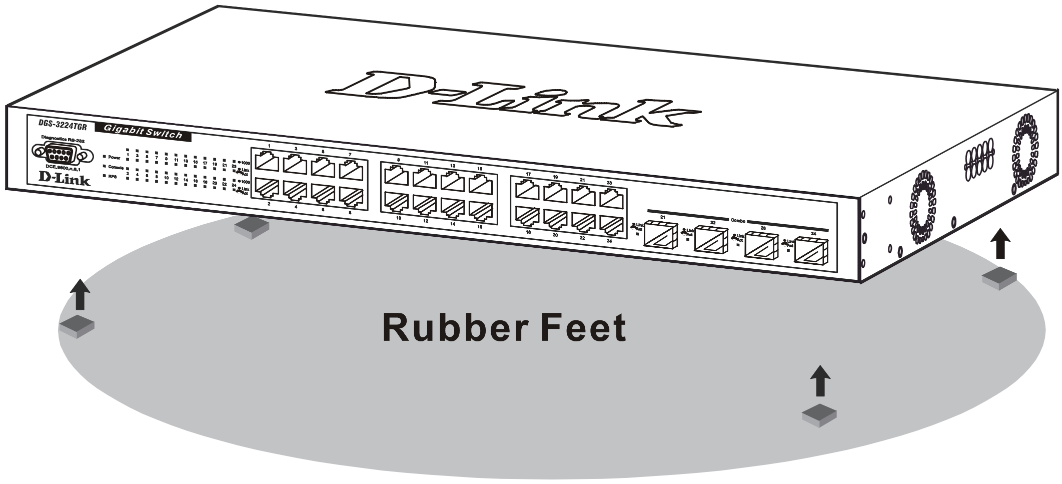


Figure 2-1. Installing rubber feet for desktop installation

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.

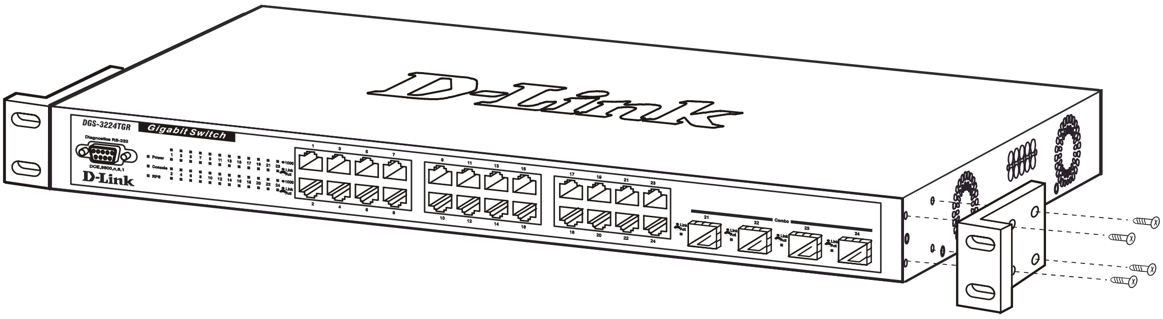


Figure 2- 2A. Attaching the mounting brackets

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

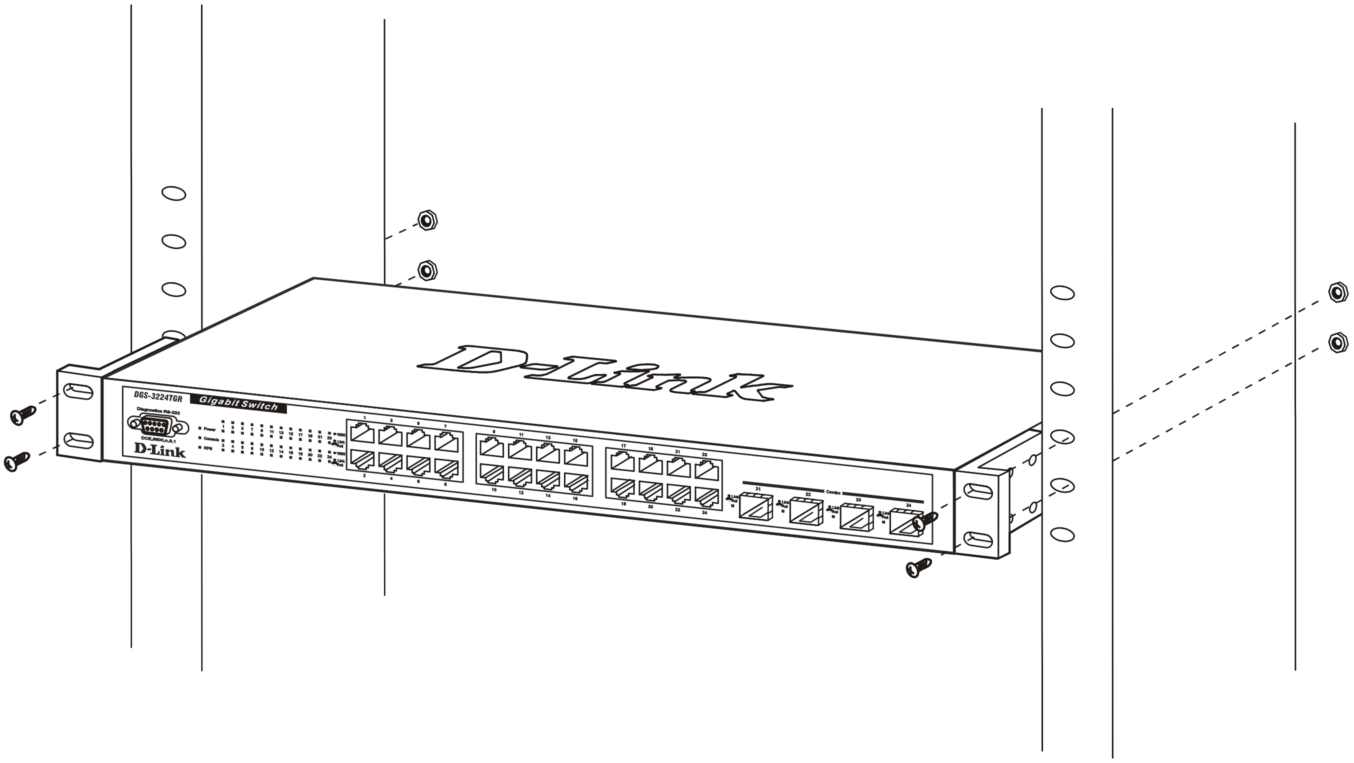


Figure 2- 2B.   Installing in an equipment rack

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.

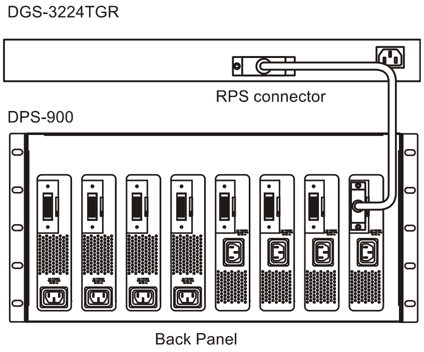


Figure 2-3. DPS-300 in DPS-900 with DGS-3224TGR

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.

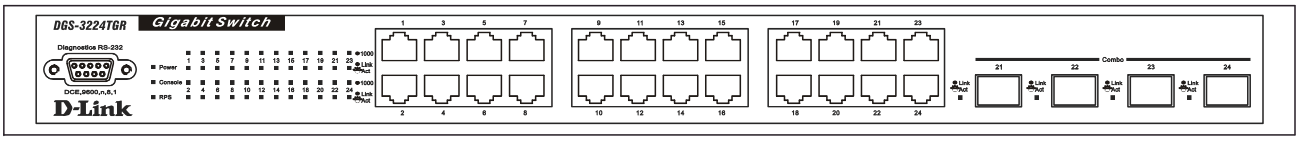


Figure 3-1. Front panel view

- 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.

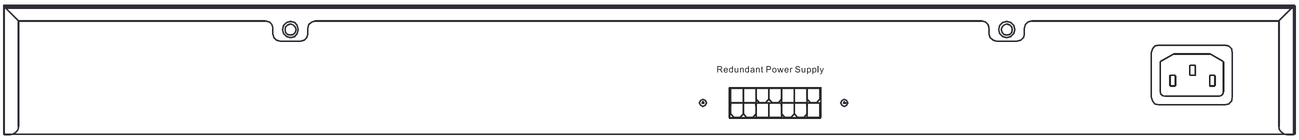


Figure 3-2. Rear panel view

- 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.

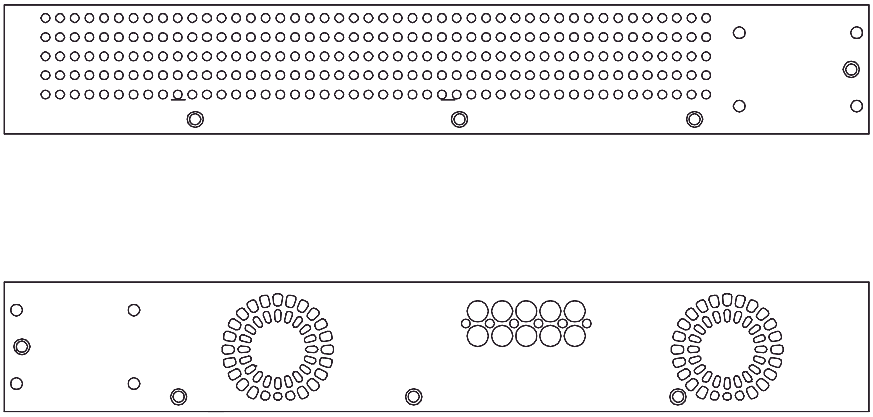


Figure 3-3. Side panel views of the Switch

- 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.

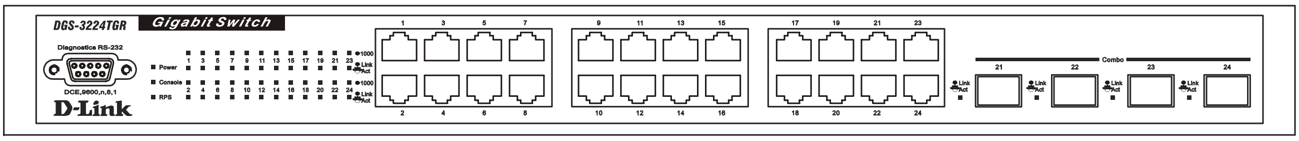


Figure 3-4. LED indicators

- **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.

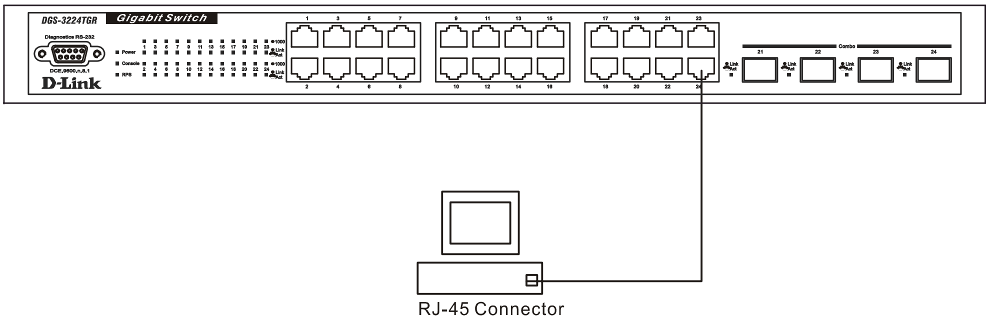


Figure 4-1. Switch connected to an End Node

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.

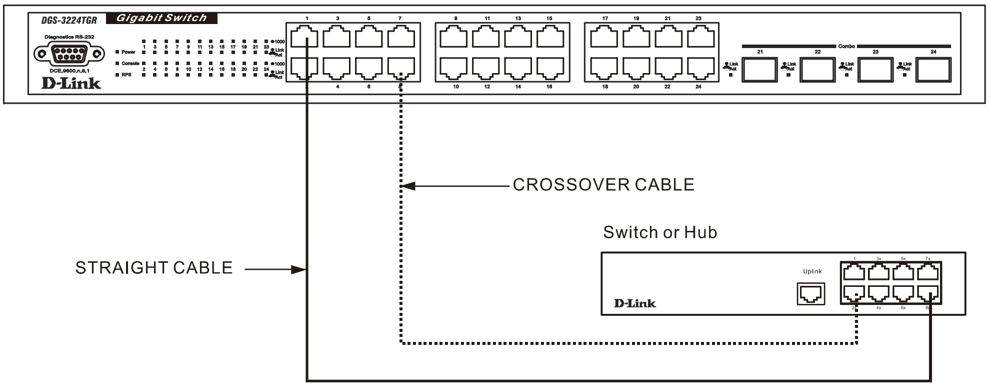


Figure 4-2. Switch connected to a normal (non-Uplink) port on a hub or switch using a straight or crossover cable

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.

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 Protocol

The IEEE 802.1D Spanning Tree Protocol allows for the blocking of links between switches that form loops within the network. When multiple links between switches are detected, a primary link is established. Duplicated links are blocked from use and become standby links. The protocol allows for the duplicate links to be used in the event of a failure of the primary link. Once the Spanning Tree Protocol is configured and enabled, primary links are established and duplicated links are blocked automatically. The reactivation of the blocked links (at the time of a primary link failure) is also accomplished automatically – without operator intervention.

This automatic network reconfiguration provides maximum uptime to network users. However, the concepts of the Spanning Tree Algorithm and protocol are a complicated and complex subject and must be fully researched and understood. It is possible to cause serious degradation of the performance of the network if the Spanning Tree is incorrectly configured. Please read the following before making any changes from the default values.

The switch STP performs the following functions:

- Creates a single spanning tree from any combination of switching or bridging elements.

- Automatically reconfigures the spanning tree to compensate for the failure, addition, or removal of any element in the tree.

- Reconfigures the spanning tree without operator intervention.

STP Operation Levels

STP calculates the Bridge Identifier for each switch and then sets the Root Bridge and the Designated Bridges.

The following are the user-configurable STP parameters for the switch level:

Parameter	Description	Default Value
Bridge Identifier (Not user-configurable except by setting priority below)	A combination of the User-set priority and the switch's MAC address. The Bridge Identifier consists of two parts: a 16-bit priority and a 48-bit Ethernet MAC address	32768 + MAC
Priority	A relative priority for each switch – lower numbers give a higher priority and a greater chance of a given switch being elected as the root bridge	32768
Hello Time	The length of time between broadcasts of the hello message by the switch	2 seconds
Maximum Age Timer	Measures the age of a received BPDU for a port and ensures that the BPDU is discarded when its age exceeds the value of the maximum age timer.	20 seconds
Forward Delay Timer	The amount time spent by a port in the learning and listening states waiting for a BPDU that may return the port to the blocking state.	15 seconds

Table 5-1. STP Parameters – Switch Level

The following are the user-configurable STP parameters for the port or port group level:

Variable	Description	Default Value
Port Priority	A relative priority for each port – lower numbers give a higher priority and a greater chance of a given port being elected as the root port	32768
Port Cost	A value used by STP to evaluate paths.	19

Table 5-2. STP Parameters – Port Group Level

Bridge Protocol Data Units

For STP to arrive at a stable network topology, the following information is used:

- The unique switch identifier
- The path cost to the root associated with each switch port
- The port identifier

STP communicates between switches on the network using Bridge Protocol Data Units (BPDUs). Each BPDU contains the following information:

- The unique identifier of the switch that the transmitting switch currently believes is the root switch
- The path cost to the root from the transmitting port
- The port identifier of the transmitting port

The switch sends BPDUs to communicate and construct the spanning-tree topology. All switches connected to the LAN on which the packet is transmitted will receive the BPDU. BPDUs are not directly forwarded by the switch, but the receiving switch uses the information in the frame to calculate a BPDU, and, if the topology changes, initiates a BPDU transmission.

The communication between switches via BPDUs results in the following:

- One switch is elected as the root switch
- The shortest distance to the root switch is calculated for each switch
- A designated switch is selected. This is the switch closest to the root switch through which packets will be forwarded to the root.
- A port for each switch is selected. This is the port providing the best path from the switch to the root switch.
- Ports included in the STP are selected.

Creating a Stable STP Topology

If all switches have STP enabled with default settings, the switch with the lowest MAC address in the network will become the root switch. By increasing the priority (lowering the priority number) of the best switch, STP can be forced to select the best switch as the root switch.

When STP is enabled using the default parameters, the path between source and destination stations in a switched network might not be ideal. For instance, connecting higher-speed links to a port that has a higher number than the current root port can cause a root-port change. The goal is to make the fastest link the root port.

STP Port States

The BPDUs take some time to pass through a network. This propagation delay can result in topology changes where a port that transitioned directly from a Blocking state to a Forwarding state could create temporary data loops. Ports must wait for new network topology information to propagate throughout the network before starting to forward packets. They must also wait for the packet lifetime to expire for BPDU packets that were forwarded based on the old topology. The forward delay timer is used to allow the network topology to stabilize after a topology change. In addition, STP specifies a series of states a port must transition through to further ensure that a stable network topology is created after a topology change.

Each port on a switch using STP exists is in one of the following five states:

- Blocking – the port is blocked from forwarding or receiving packets
- Listening – the port is waiting to receive BPDU packets that may tell the port to go back to the blocking state
- Learning – the port is adding addresses to its forwarding database, but not yet forwarding packets
- Forwarding – the port is forwarding packets
- Disabled – the port only responds to network management messages and must return to the blocking state first

A port transitions from one state to another as follows:

- From initialization (switch boot) to blocking
- From blocking to listening or to disabled
- From listening to learning or to blocking or to disabled
- From learning to forwarding or to blocking or to disabled
- From forwarding to blocking or to disabled
- From disabled to blocking

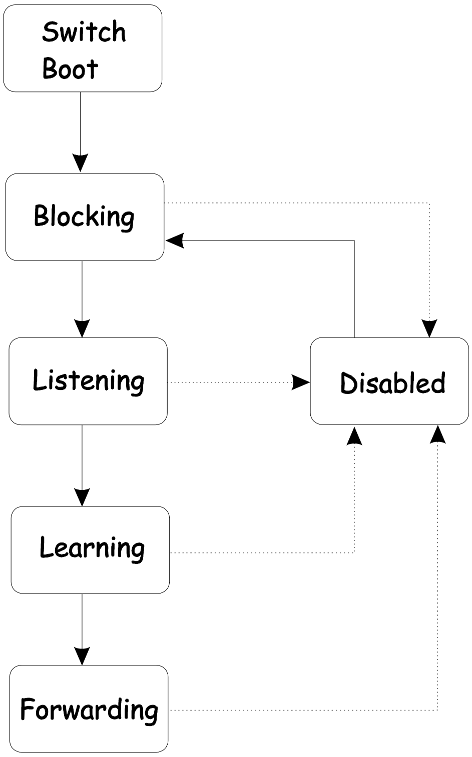


Figure 5-3. STP Port State Transitions

When you enable STP, every port on every switch in the network goes through the blocking state and then transitions through the states of listening and learning at power up. If properly configured, each port stabilizes to the forwarding or blocking state.

No packets (except BPDUs) are forwarded from, or received by, STP enabled ports until the forwarding state is enabled for that port.

Default Spanning-Tree Configuration

Feature	**Default Value**
Enable state	STP enabled for all ports
Port priority	128
Port cost	Link in 100M, cost=19
	Link in 1000M, cost=4
Bridge Priority	32,768

Table 5-3. Default STP Parameters

User-Changeable STP Parameters

The factory default setting should cover the majority of installations. However, it is advisable to keep the default settings as set at the factory, unless it is absolutely necessary. The user changeable parameters in the Switch are as follows:

- **Priority** – A Priority for the switch can be set from 0 to 65535. 0 is equal to the highest Priority.
- **Hello Time** – 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.

  Note: *The Hello Time cannot be longer than the Max. Age. Otherwise, a configuration error will occur.*

- **Max. Age** – The Max. Age can be from 6 to 40 seconds. At the end of the Max. 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.
- **Forward Delay Timer** – 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.

NOTE: Observe the following formulas when setting the above parameters:

Max. Age ≤ 2 x (Forward Delay - 1 second)
Max. Age ≥ 2 x (Hello Time + 1 second)

- **Port Priority** – A Port Priority can be from 0 to 255. The lower the number, the greater the probability the port will be chosen as the Root Port.

- **Port Cost** – A Port Cost can be set from 1 to 65,535. The lower the number, the greater the probability the port will be chosen to forward packets.

Illustration of STP

A simple illustration of three Bridges (or three switches) connected in a loop is depicted in Figure 5-3. In this example, you can anticipate some major network problems if the STP assistance is not applied. If Bridge A broadcasts a packet to Bridge B, Bridge B will broadcast it to Bridge C, and Bridge C will broadcast it to back to Bridge A, and so on. The broadcast packet will be passed indefinitely in a loop, potentially causing a network failure.

STP can be applied as shown in Figure 5-4. In this example, STP breaks the loop by blocking the connection between Bridge B and C. The decision to block a particular connection is based on the STP calculation of the most current Bridge and Port settings. Now, if Bridge A broadcasts a packet to Bridge C, then Bridge C will drop the packet at port 2 and the broadcast will end there.

Setting-up STP using values other than the defaults can be complex. Therefore, you are advised to keep the default factory settings and STP will automatically assign root bridges/ports and block loop connections. Influencing STP to choose a particular switch as the root bridge using the **Priority** setting, or influencing STP to choose a particular port to block using the **Port Priority** and **Port Cost** settings is, however, relatively straight forward.

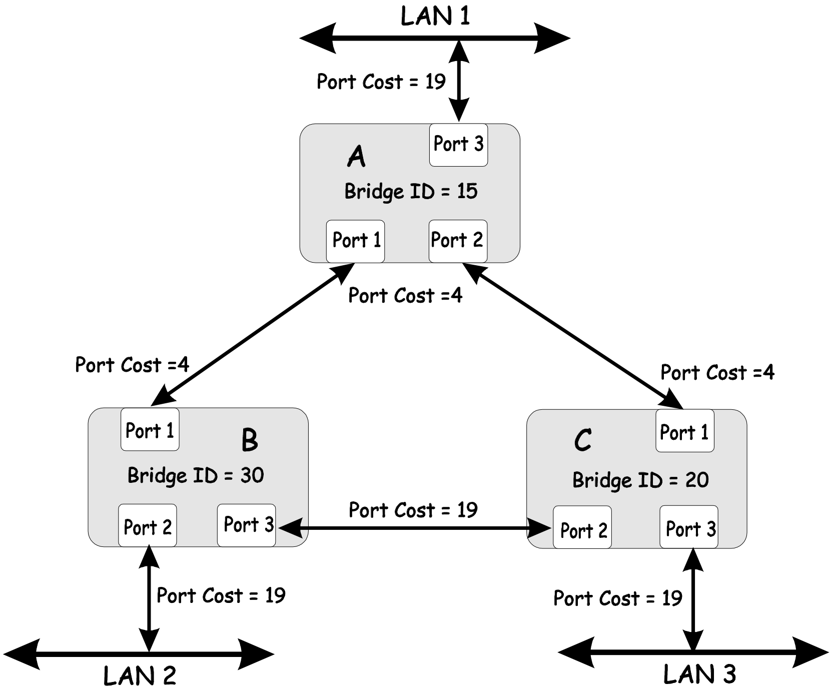


Figure 5-4. Before Applying the STA Rules

In this example, only the default STP values are used.

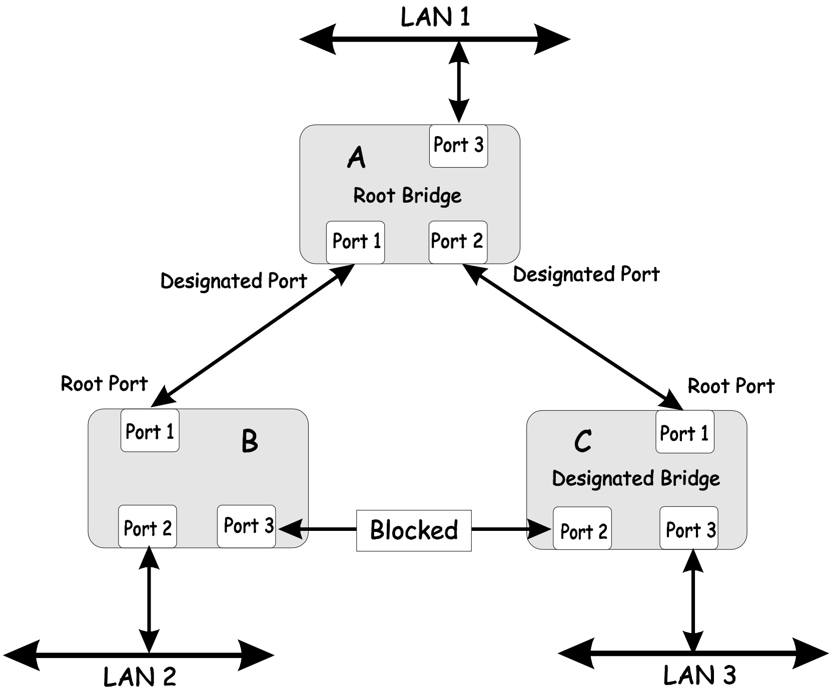


Figure 5-5. After Applying the STA Rules

The switch with the lowest Bridge ID (switch A) was elected the root bridge, and the ports were selected to give a high port cost between switches B and C.

Note also that the example network topology is intended to provide redundancy to protect the network against a link or port failure – not a switch failure or removal. For example, a failure of switch A would isolate LAN 1 from connecting to LAN 2 or LAN 3.

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.

Notes About VLANs on the DGS-3224TGR

1. 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.

2. 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.

3. The switch's default is to assign all ports to a single 802.1Q VLAN named "default."

4. 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.

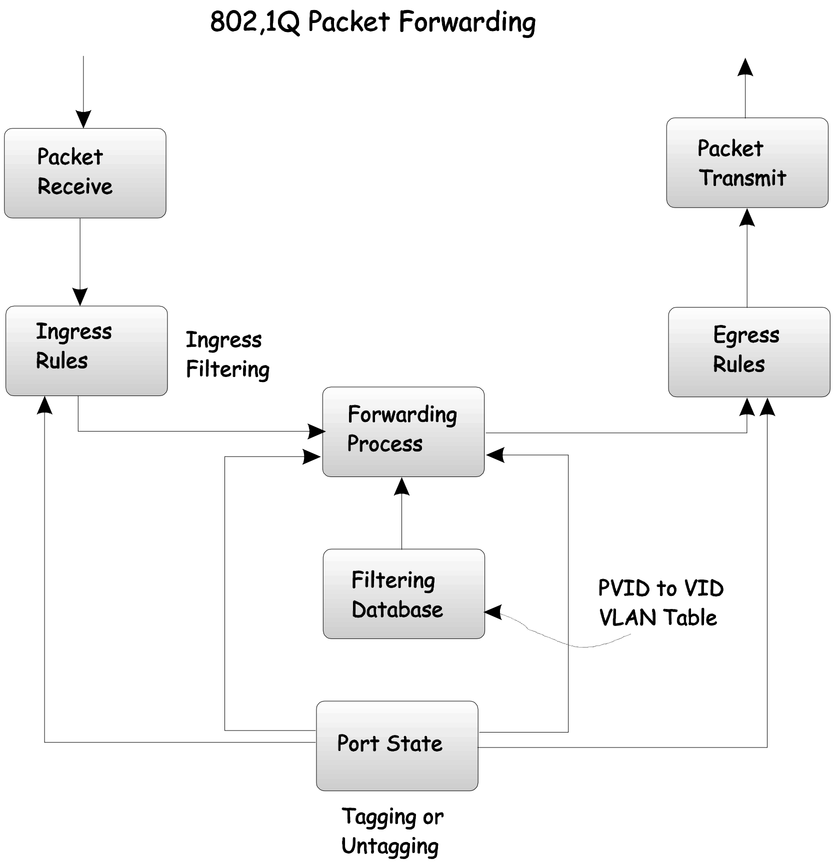


Figure 5-6. IEEE 802.1Q Packet Forwarding

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 or 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.

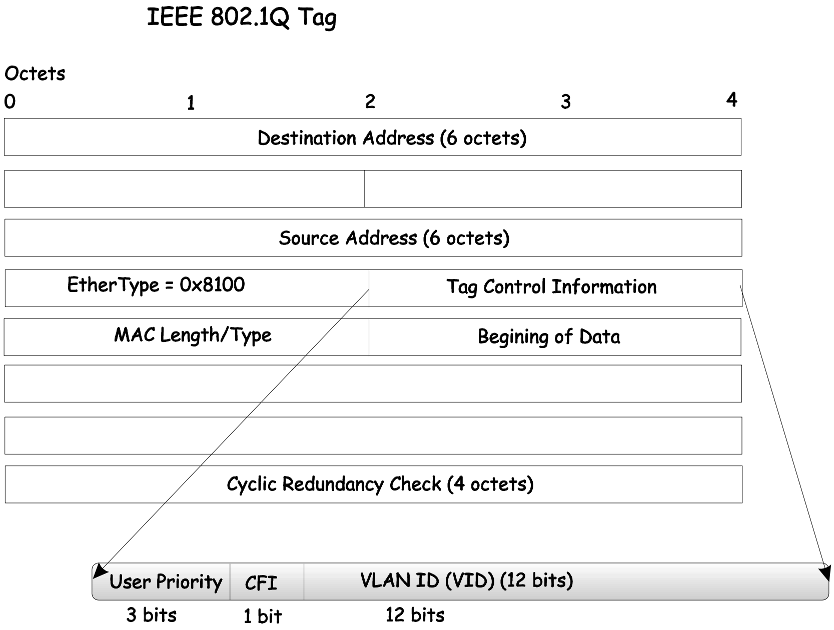


Figure 5-7. IEEE 802.1Q Tag

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.

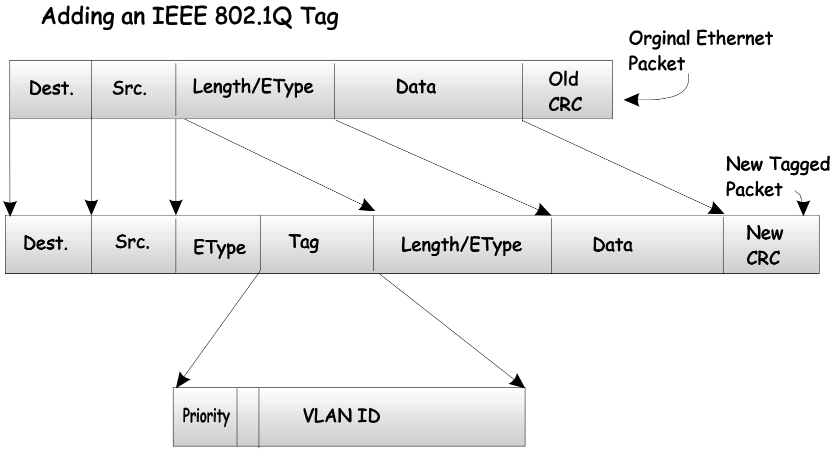


Figure 5-8. Adding an IEEE 802.1Q Tag

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.

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).

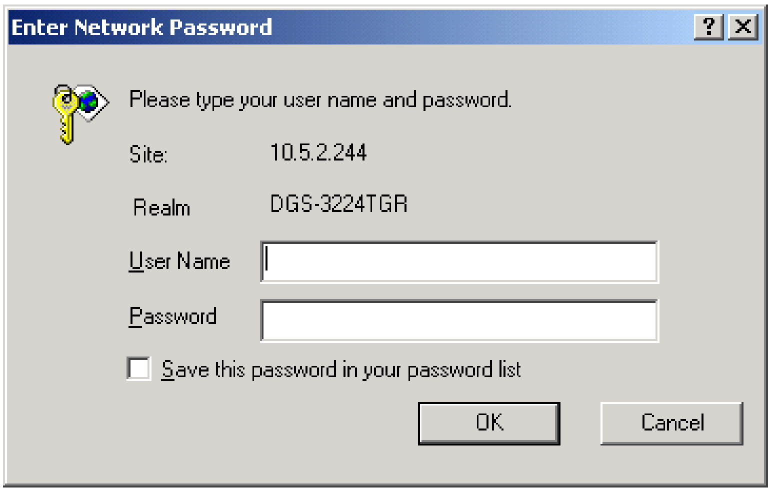
Getting Started

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: 10.5.2.244

Realm DGS-3224TGR

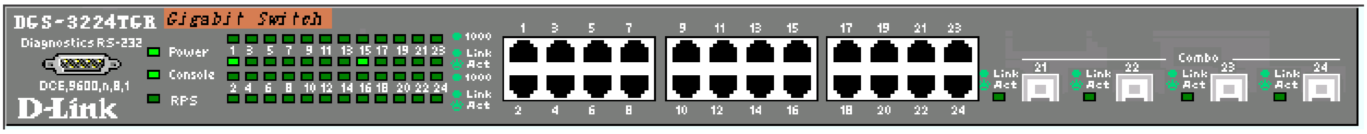
User Name

Password

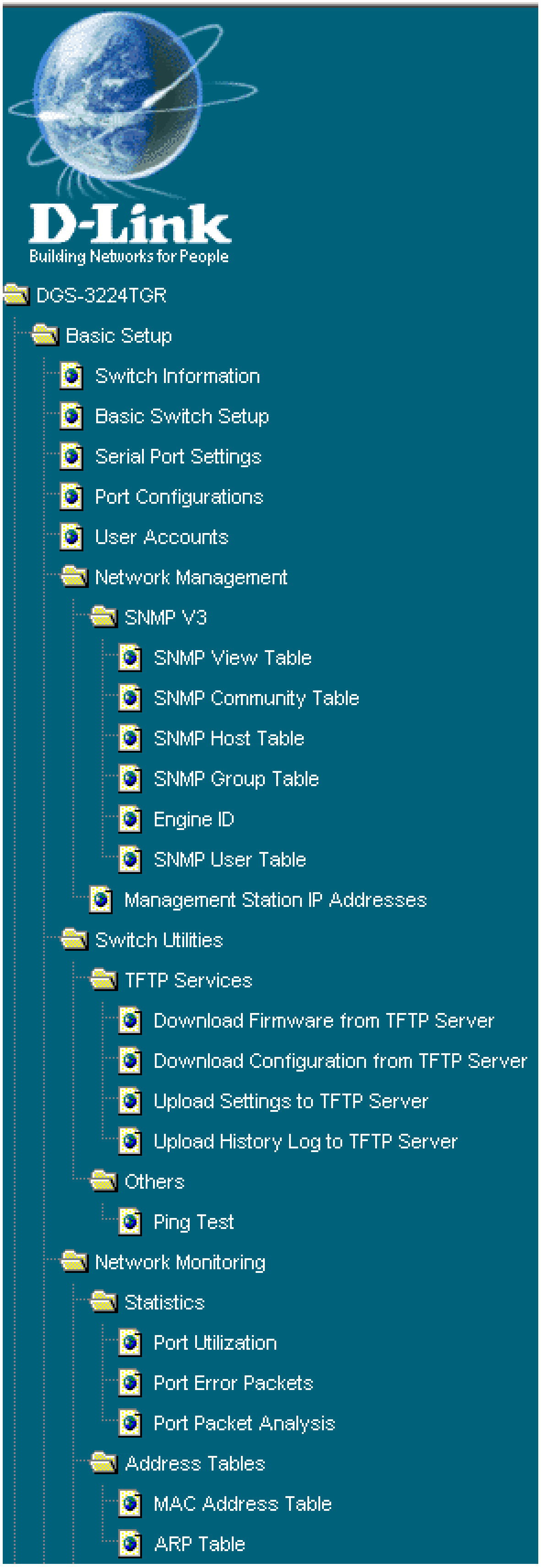
□ Save this password in your password list

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

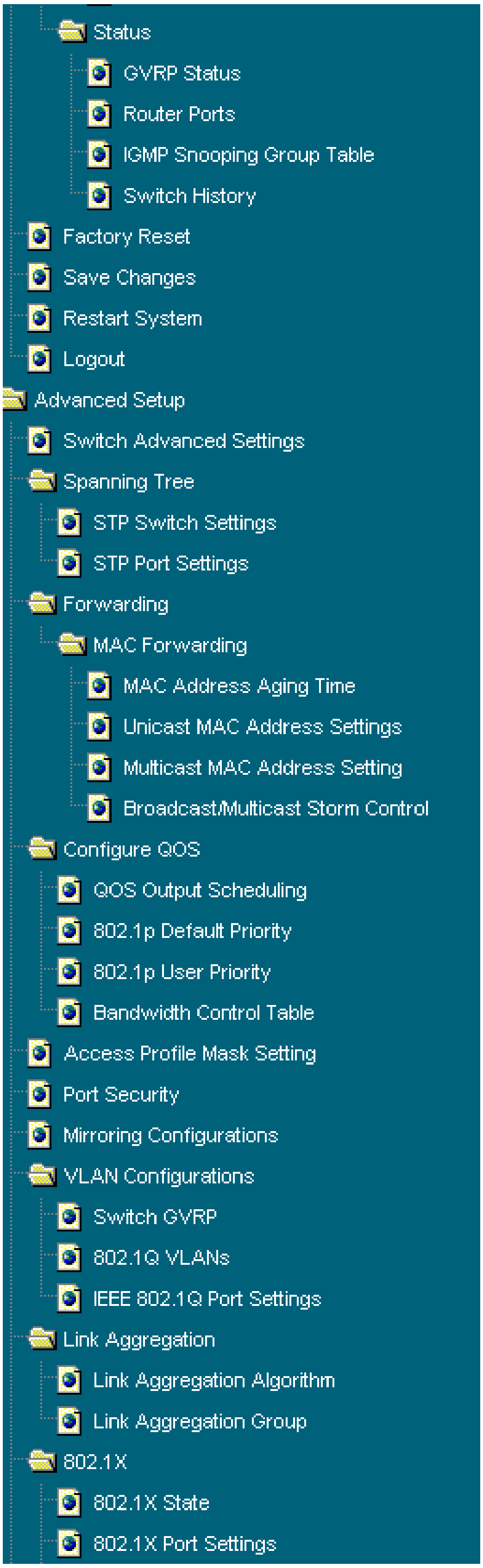
The top panel shows a real-time front panel display of the DGS-3224TGR. Clicking on an individual port on this display will connect you to the **Port Configurations** window (see **Basic Setup** → **Port Configurations** for a detailed description).

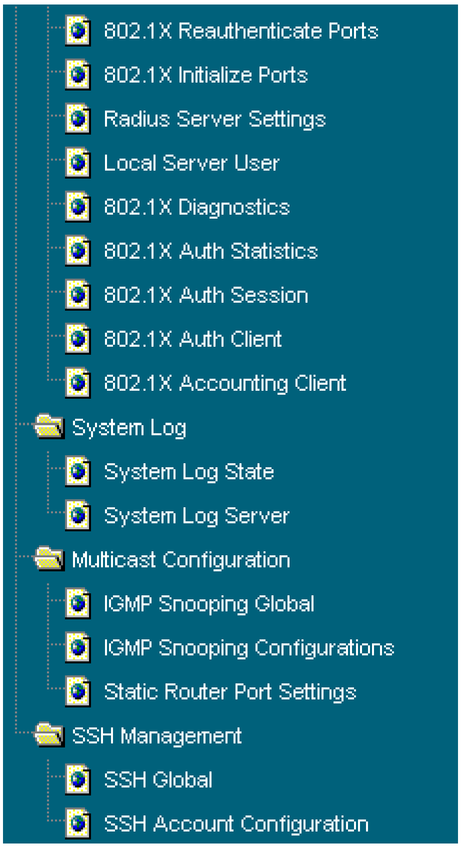


The panel on the left-hand side contains the main menu. The featured items include: **Basic Setup** and **Advanced Setup**. The whole menu looks like this:



D-Link
Building Networks for People
DGS-3224TGR
Basic Setup
Switch Information
Basic Switch Setup
Serial Port Settings
Port Configurations
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
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
Multicast MAC Address Setting
Broadcast/Multicast Storm Control
Configure QOS
QOS Output Scheduling
802.1p Default Priority
802.1p User Priority
Bandwidth Control Table
Access Profile Mask Setting
Port Security
Mirroring Configurations
VLAN Configurations
Switch GVRP
802.1Q VLANs
IEEE 802.1Q Port Settings
Link Aggregation
Link Aggregation Algorithm
Link Aggregation Group
802.1X
802.1X State
802.1X Port Settings



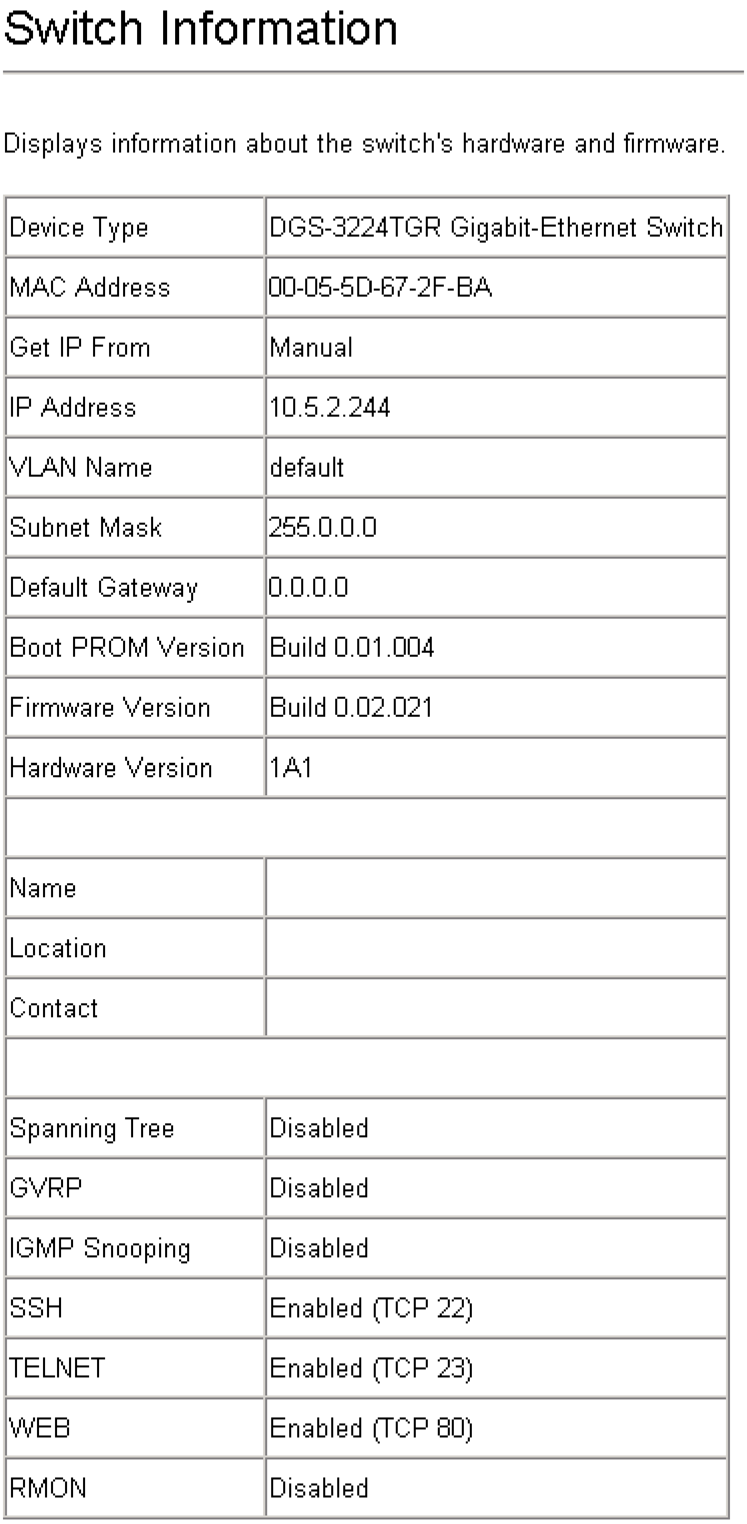
These are the major categories for switch management. If the sub-menus for each main category do not appear, click on the small square hyperlink to the left of the folder icon.

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**, **User Accounts**, **Network Management**, **Switch Utilities**, **Network Monitoring, Factory Reset**, **Save Changes**, **Restart System**, and **Logout**, as well as secondary screens.

Switch Information



Switch Information

Displays information about the switch's hardware and firmware.

Device Type	DGS-3224TGR Gigabit-Ethernet Switch
MAC Address	00-05-5D-67-2F-BA
Get IP From	Manual
IP Address	10.5.2.244
VLAN Name	default
Subnet Mask	255.0.0.0
Default Gateway	0.0.0.0
Boot PROM Version	Build 0.01.004
Firmware Version	Build 0.02.021
Hardware Version	1A1
Name	
Location	
Contact	
Spanning Tree	Disabled
GVRP	Disabled
IGMP Snooping	Disabled
SSH	Enabled (TCP 22)
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.

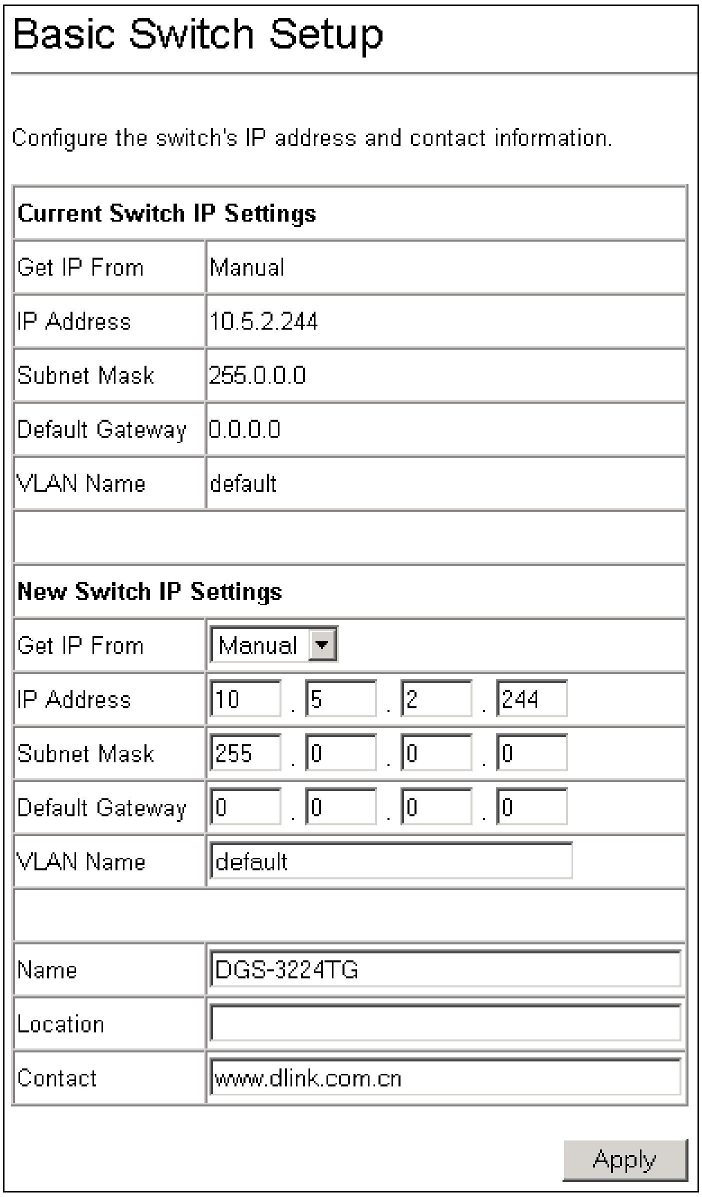
Contact Name of the person to contact should there be any problems or questions with the system. You may also want to include a phone number or extension.

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	10.5.2.244
Subnet Mask	255.0.0.0
Default Gateway	0.0.0.0
VLAN Name	default

New Switch IP Settings	
Get IP From	Manual
IP Address	10 . 5 . 2 . 244
Subnet Mask	255 . 0 . 0 . 0
Default Gateway	0 . 0 . 0 . 0
VLAN Name	default
Name	DGS-3224TG
Location	
Contact	www.dlink.com.cn

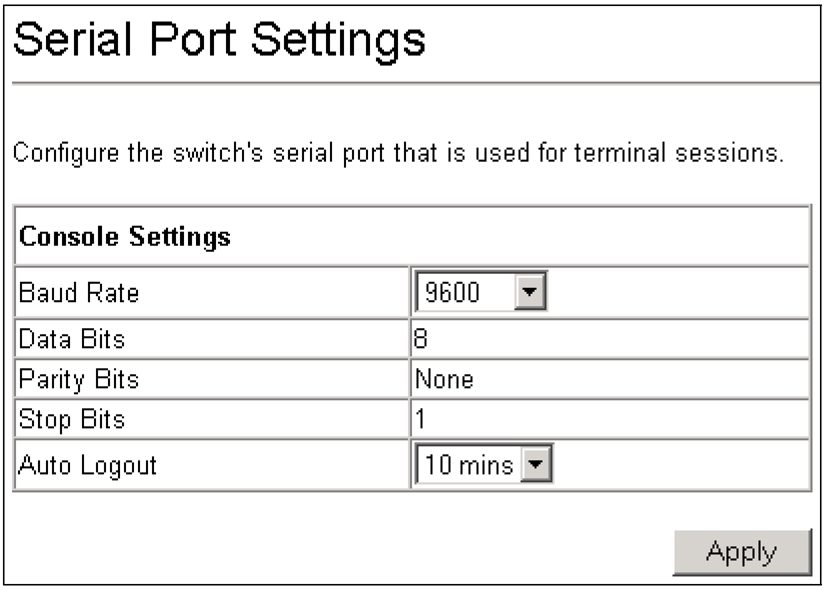
Figure 6- 2. Basic Switch Setup window

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.

Serial Port Settings



Serial Port Settings

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

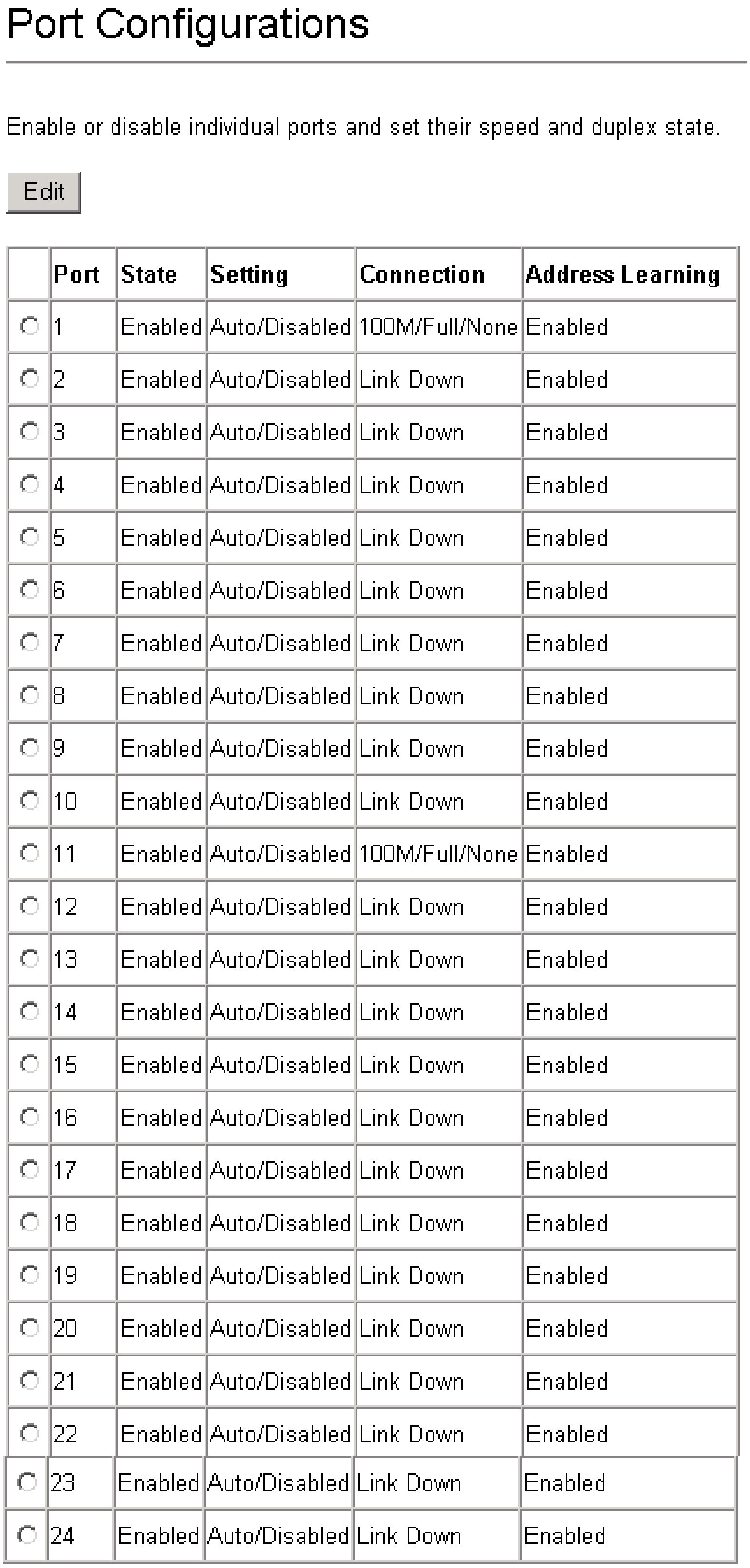
Console Settings	
Baud Rate	9600 ▾
Data Bits	8
Parity Bits	None
Stop Bits	1
Auto Logout	10 mins ▾

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



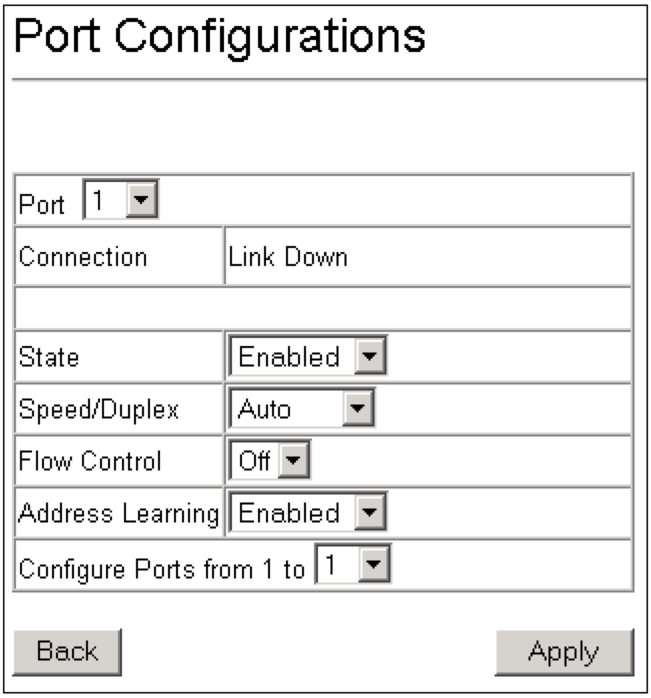
Port Configurations

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. The four mini-GBIC ports are *1000M/Full* only.

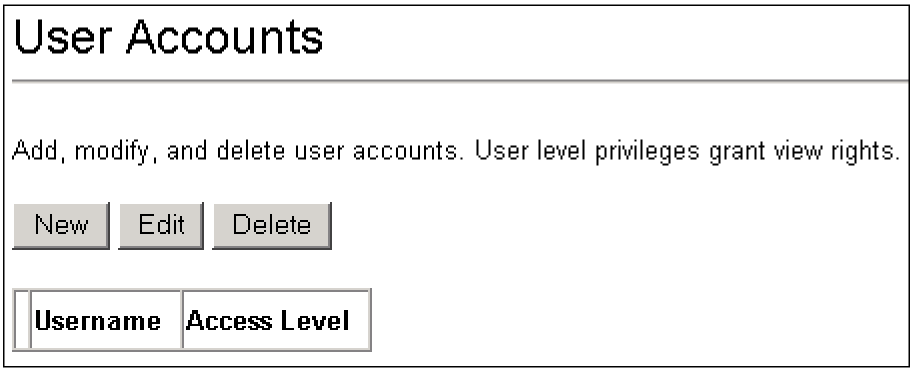
3. Configure the Flow Control setting for the port. Selecting *Enabled* in full-duplex mode will implement IEEE 802.3x flow control. Select *Disabled* for no flow control. Also, if the port is set for *Auto* (NWay) in the speed/duplex field above and flow control is enabled, flow control (whether full- 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.

User Accounts

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



User Accounts

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

	Username	Access Level

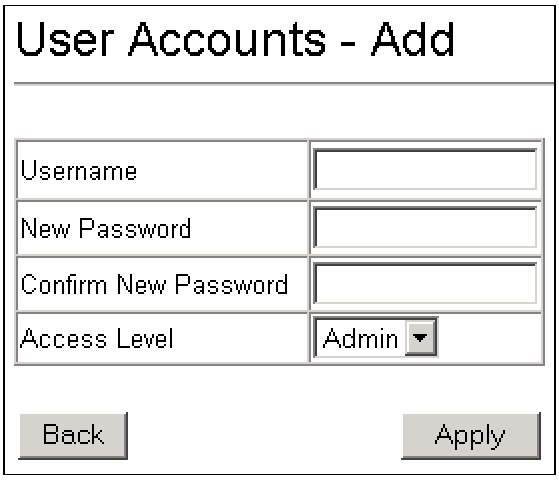
Figure 6- 6. User Accounts window

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*. An *Admin* user 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

Username	
New Password	
Confirm New Password	
Access Level	Admin

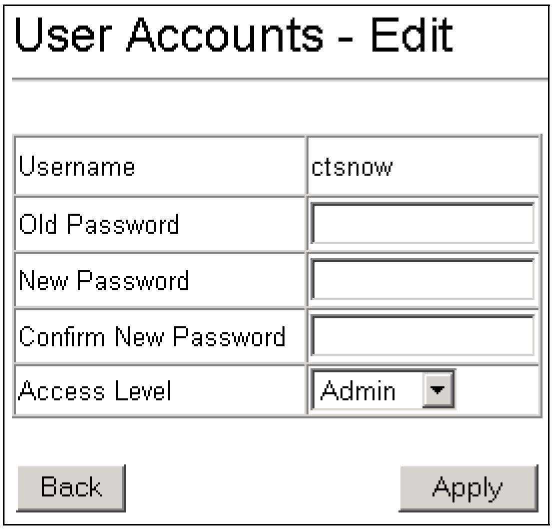
Figure 6- 7. User Accounts – Add window

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*, *Normal* or *Medium,* in the Access Level drop-down menu and click **Apply**.

The information on the window is described as follows:

Parameter	Description
Username	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 three access levels: *Admin*, *Normal*, and *Medium*. An *Admin* user has full read/write access, while a *Normal* user has read-only access. A *Medium* user has the same privileges as a *Normal* user, but with the added ability to restart the Switch.

User Accounts – Edit



User Accounts - Edit

Username	ctsnow
Old Password	
New Password	
Confirm New Password	
Access Level	Admin

Figure 6- 8. 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. Then select the desired access, *Admin*, *User,* in the Access Level drop-down menu and click **Apply**.

The information on the window is described as follows:

Parameter	Description
Username	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.
Access Level	Displays the current access level assigned to each corresponding user. There are three access levels: *Admin*, *Normal*, and *Medium.* An *Admin* user has full read/write access, while a *Normal* user has read-only access. A *Medium* user has the same privileges as a *Normal* user, but with the added ability to restart the switch.

Network Management

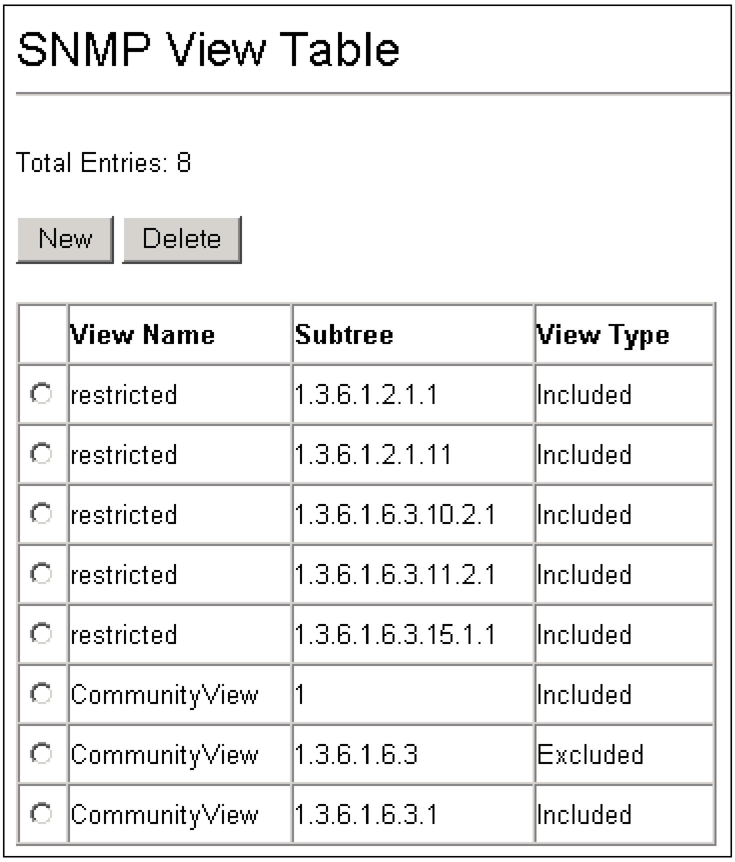
SNMP V3

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 Address** 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.



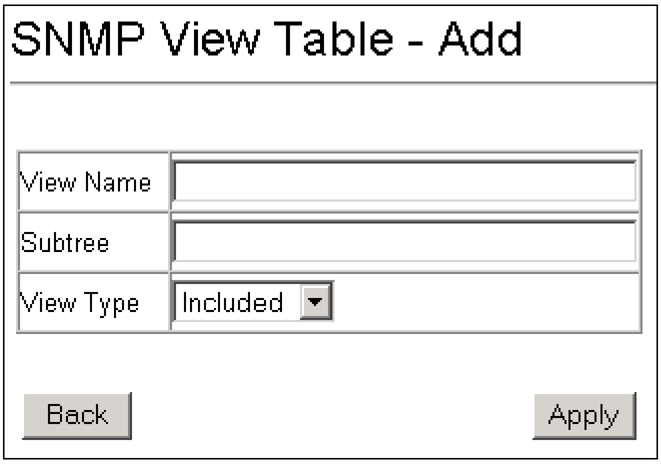
SNMP View Table

Total Entries: 8

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

Figure 6- 9. SNMP View Table window

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



SNMP View Table - Add

View Name	
Subtree	
View Type	Included

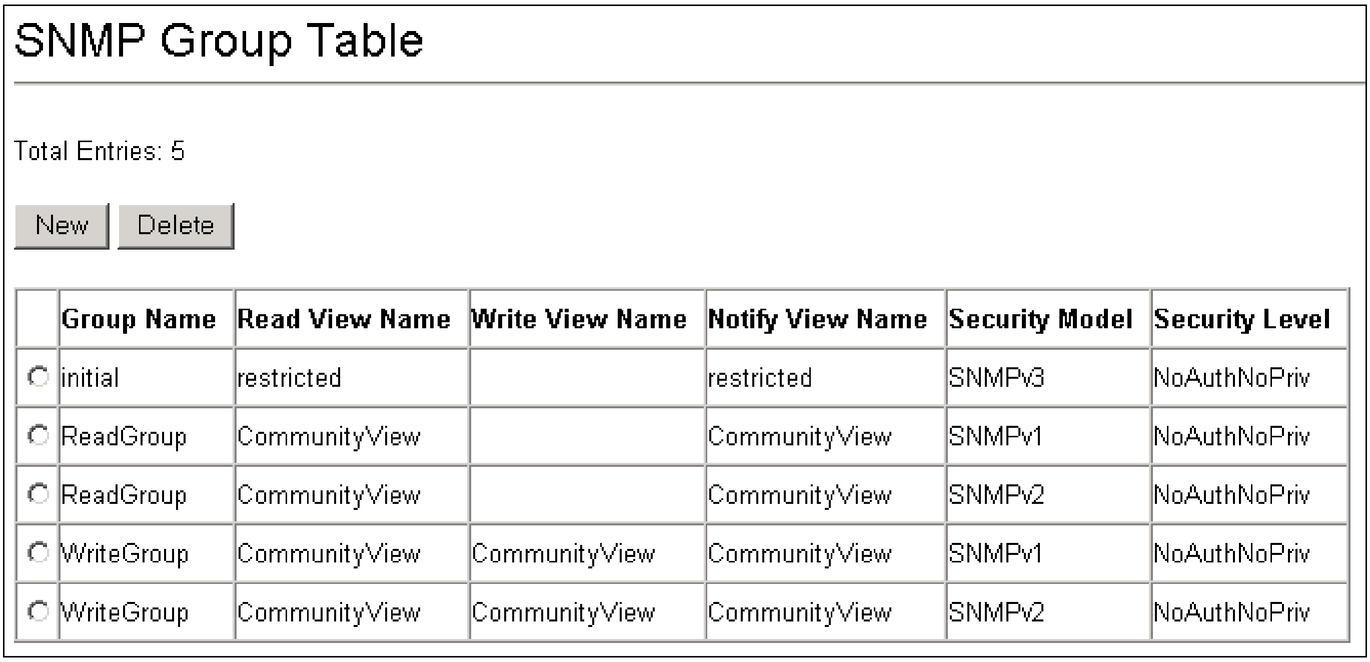
Figure 6- 10. SNMP View Table – Add window

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 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.



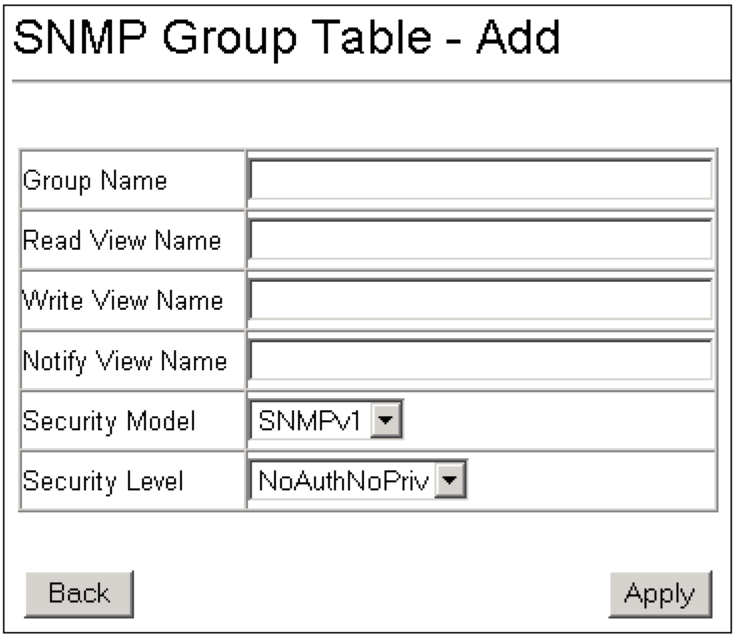
SNMP Group Table

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- 11. 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- 12. SNMP Group Table – Add window

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

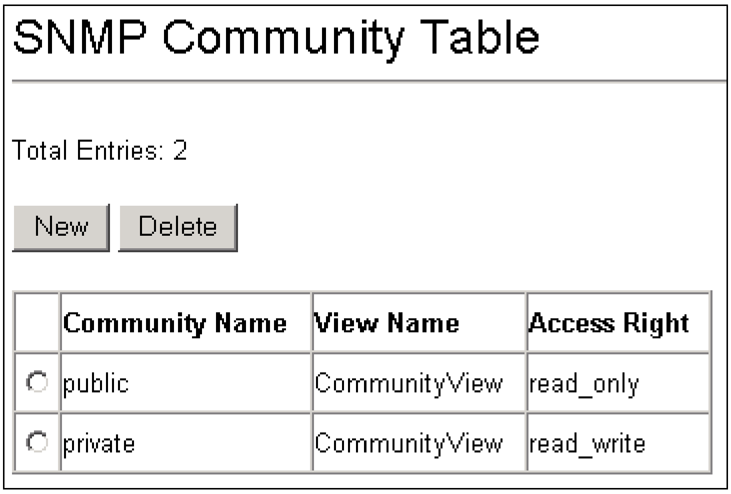
Parameter	Description
Group Name	Type an alphanumeric string of up to 32 characters. This is used to identify the new SNMP group of SNMP users.

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. *USM* – 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.

SNMP Community Table

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

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



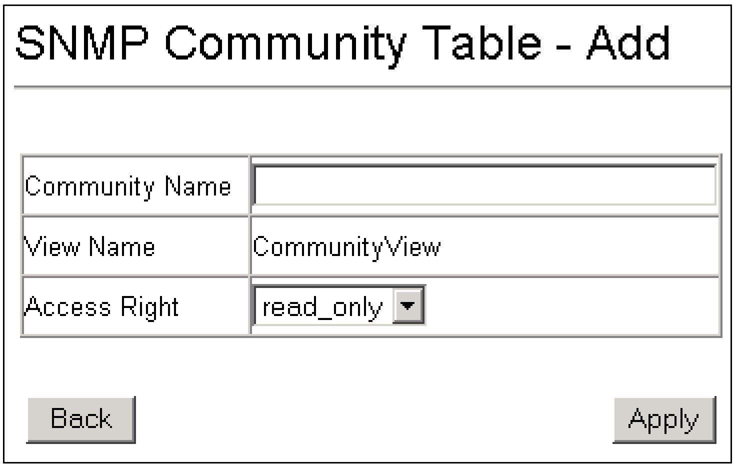
SNMP Community Table

Total Entries: 2

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

Figure 6- 13. SNMP Community 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. To create a new entry, click the **New** button, a separate window will appear. This will add the new string to the SNMP Community Table.



SNMP Community Table - Add

Community Name	
View Name	CommunityView
Access Right	read_only

Figure 6- 14. SNMP Community Table – Add window

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

Parameter	Description

Community Name

Type an alphanumeric string of up to 32 characters that is used to identify members of an SNMP community. This string is used like a password to give remote SNMP managers access to MIB objects in the switch's SNMP agent.

View Name

Type an alphanumeric string of up to 32 characters that is used to identify the group of MIB objects that a remote SNMP manager is allowed to access on the switch. The view name must exist in the SNMP View Table.

Access Right

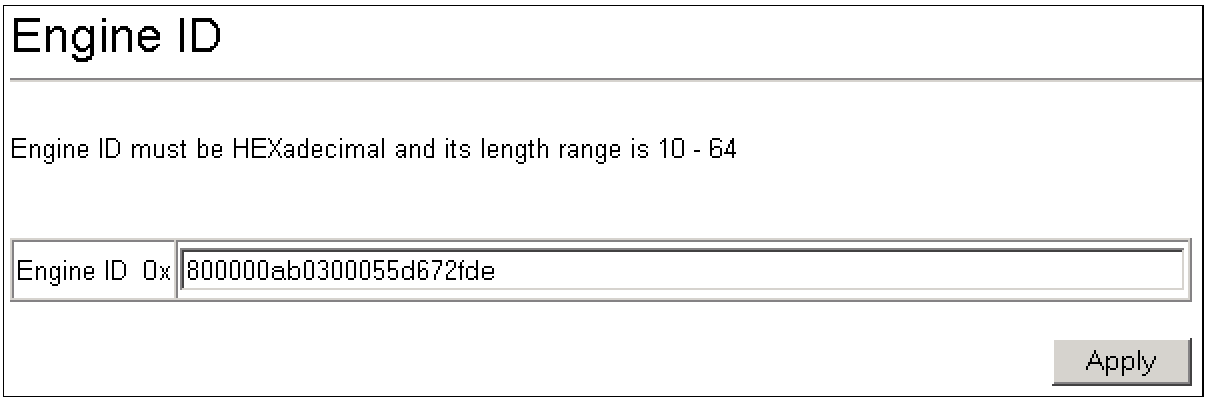
Use the pull-down menu to select the access right:

Read_Only – Specifies that SNMP community members using the community string created with this command can only read the contents of the MIBs on the switch.

Read_Write – Specifies that SNMP community members using the community string created with this command can read from and write to the contents of the MIBs on the switch.

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

Engine ID must be HEXadecimal and its length range is 10 - 64

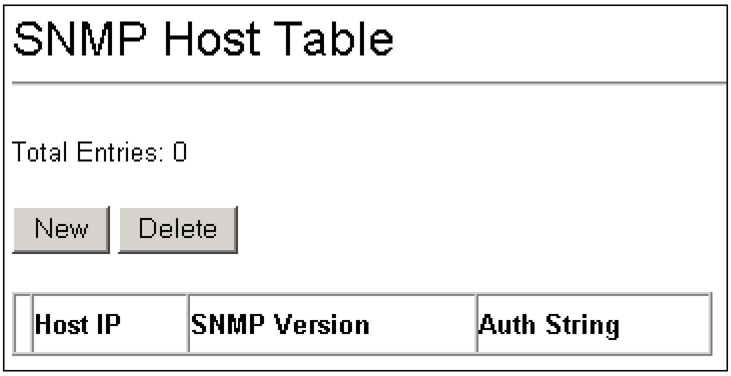
Engine ID 0x: 800000ab0300055d672fde

Figure 6- 15. Engine ID window

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

SNMP Host Table

Use the SNMP Host Table to set up trap recipients.



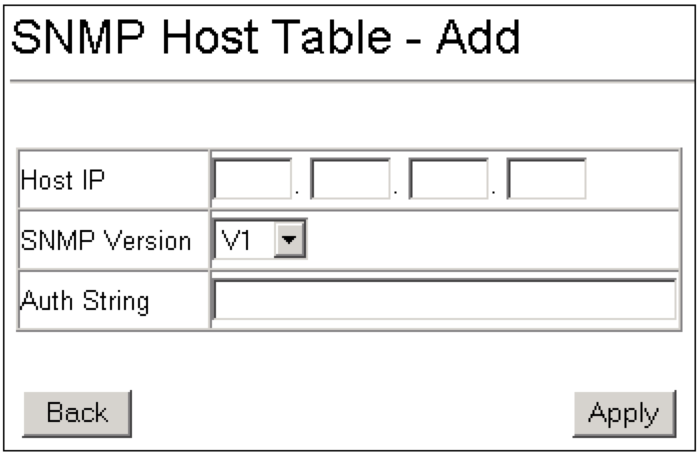
SNMP Host Table

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. To create a new entry, click the **New** button, a separate window will appear.



SNMP Host Table - Add

Host IP	. . .
SNMP Version	V1
Auth String	

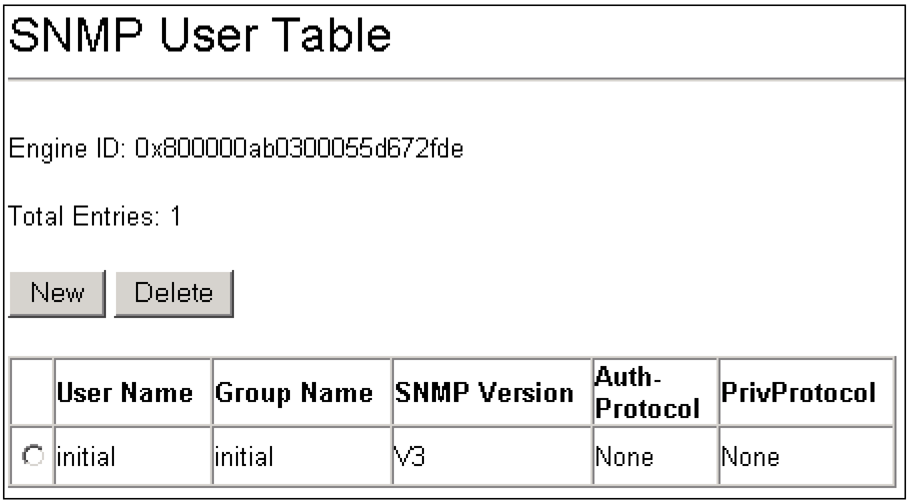
Figure 6- 17. SNMP Host Table – Add window

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* – To specify that the SNMP version 3 will be used.
Auth. String	Type in the community string or SNMP V3 user name as appropriate.

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

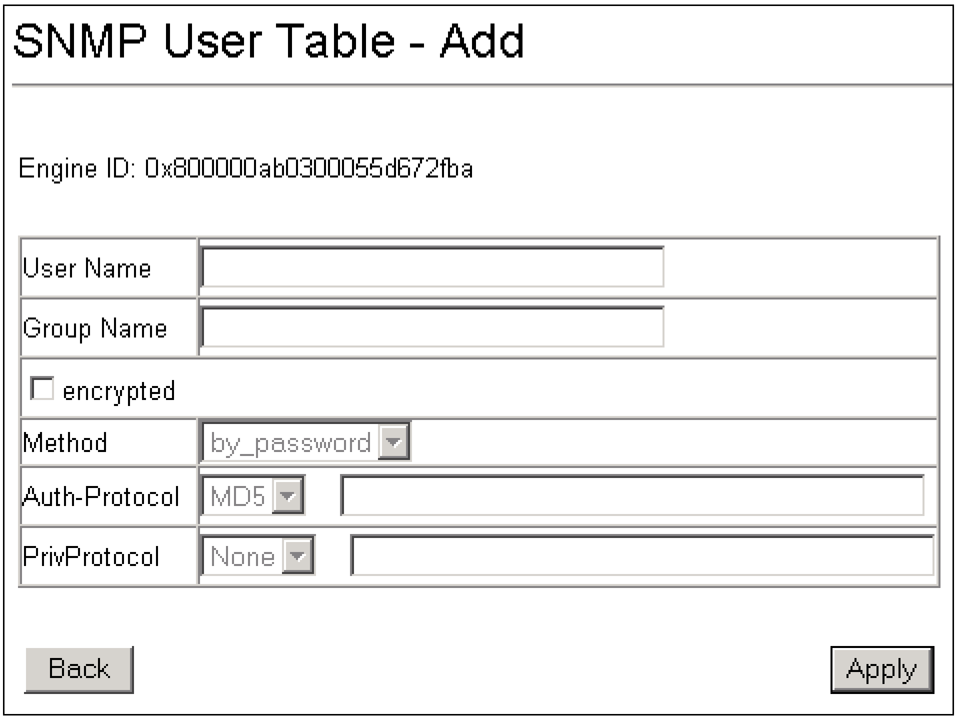
Engine ID: 0x800000ab0300055d672fde

Total Entries: 1

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

Figure 6- 18. 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. 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- 19. SNMP User Table – Add window

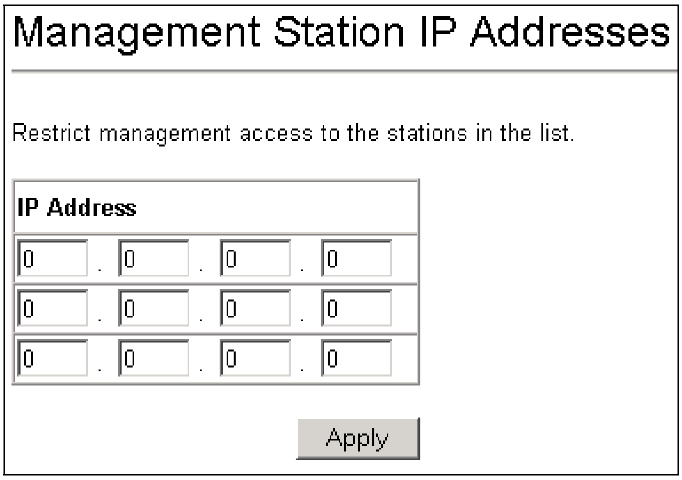
The following parameters are used in the SNMP User Table windows:

Parameter	Description
User Name	Type in the new SNMP V3 user name or community string for V1 or V2

	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. *V2*c– 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- 20. Management Station IP Addresses window

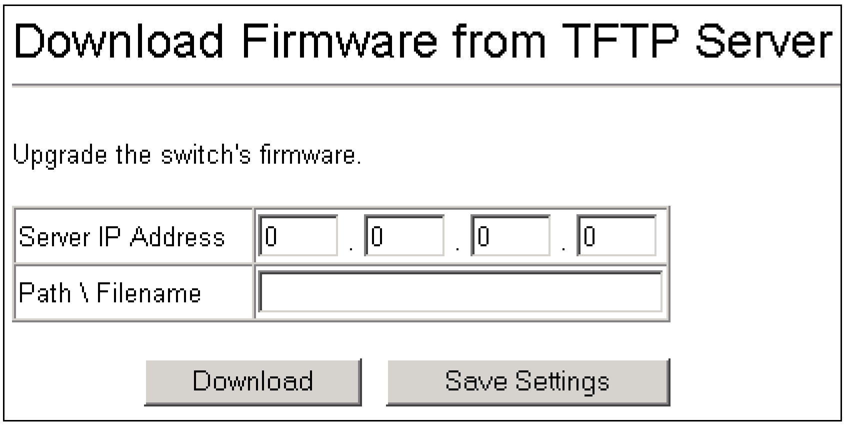
Switch Utilities

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- 21. Download Firmware from TFTP Server window

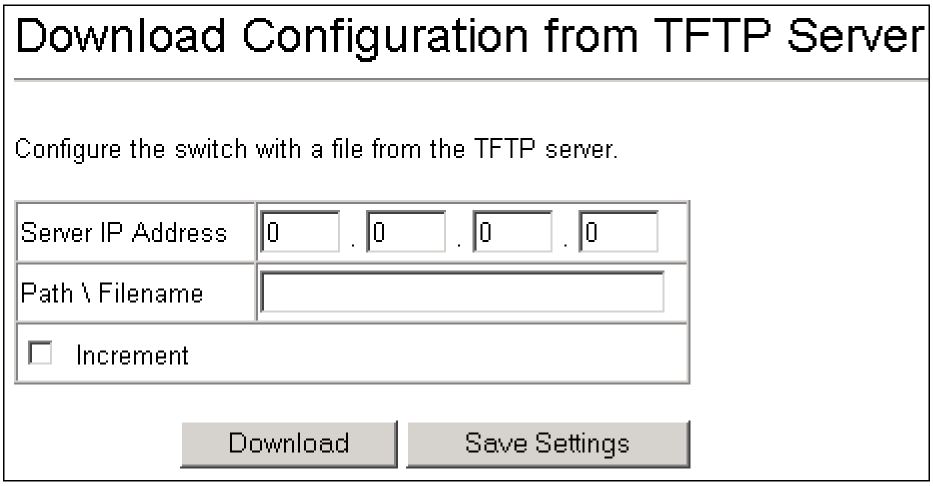
Enter the IP address of the TFTP server in the Server IP Address field and the complete path and file name of the firmware file for the switch in the Path/Filename field. Click **Save Settings** to enter the server's IP address into the switch's RAM (use **Save Changes** to enter the address into the switch's non-volatile RAM). Click **Download** 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.

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- 22. 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 **Save Settings** to enter the server's IP address into the switch's RAM (use **Save Changes** to enter the address into the switch's non-volatile RAM). Click **Download** to initiate the file transfer.

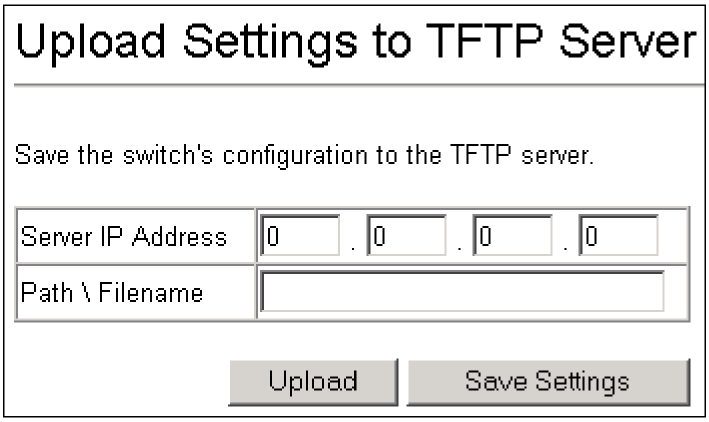
The information is described as follows:

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.
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- 23. 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 **Save Settings** to enter the server's IP address into the switch's RAM (use **Save Changes** to enter the address into the switch's non-volatile RAM). 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.

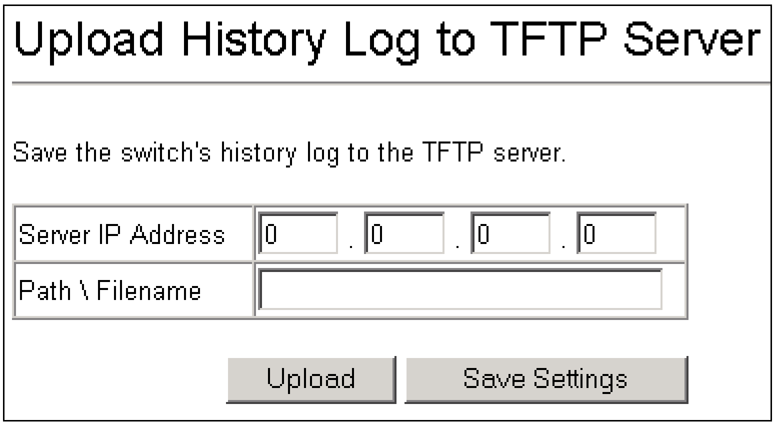
The information is described as follows:

- **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- 24. 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 **Save Settings** to enter the server's IP address into the switch's RAM (use Save Changes to enter the address into the switch's non-volatile RAM). Click **Upload** to initiate the file transfer.

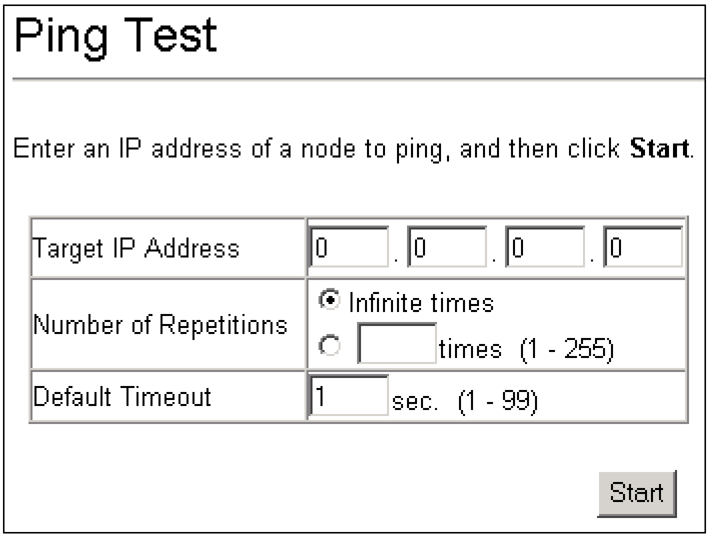
The information is described as follows:

- **Server IP Address –** The IP address of the TFTP server.
- **File Name –** The full file name (including path) of the history log file on the TFTP server.

Others

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- 25. 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.

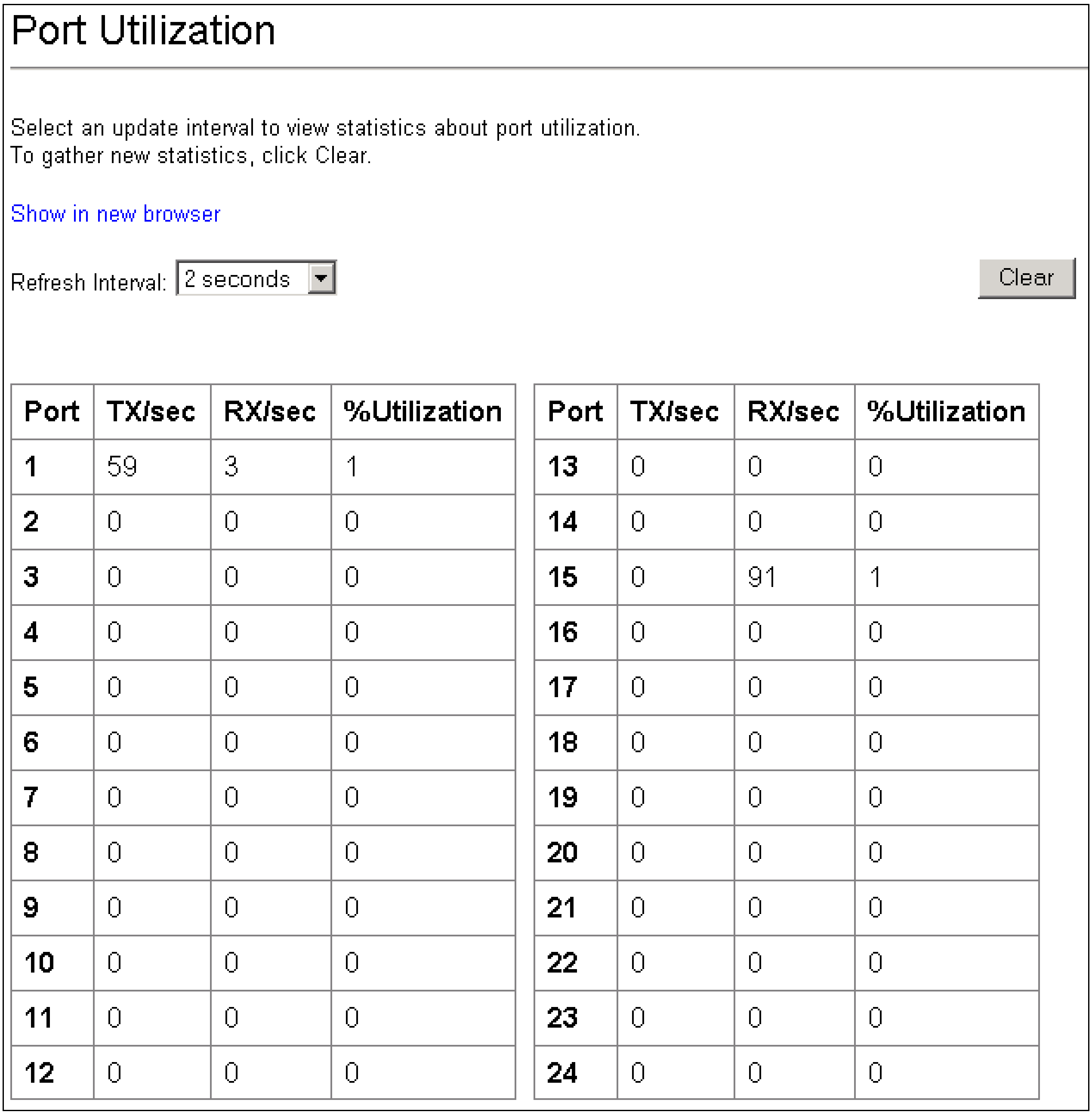
Network Monitoring

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

Statistics

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

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
1	59	3	1
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0

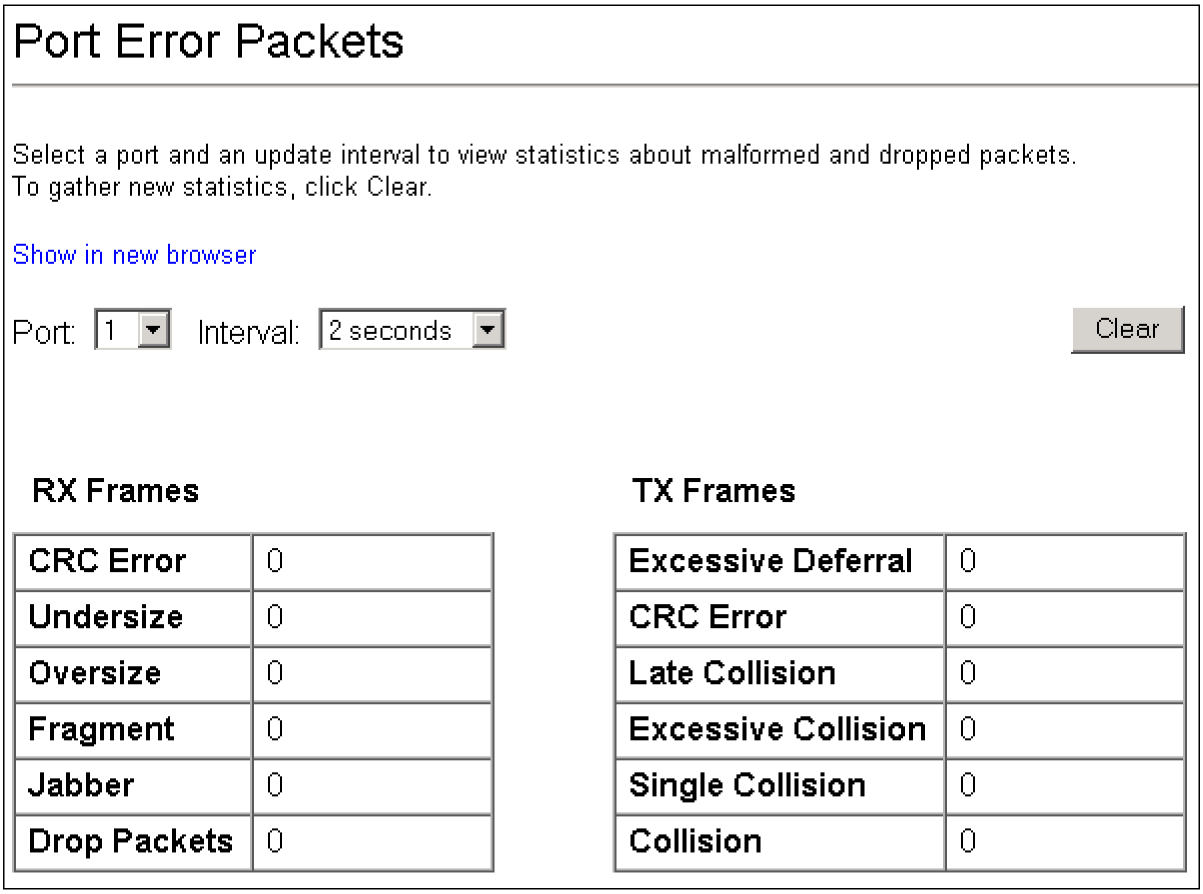
Port	TX/sec	RX/sec	%Utilization
13	0	0	0
14	0	0	0
15	0	91	1
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0

Figure 6- 26. Port Utilization window

The information is described as follows:

- **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

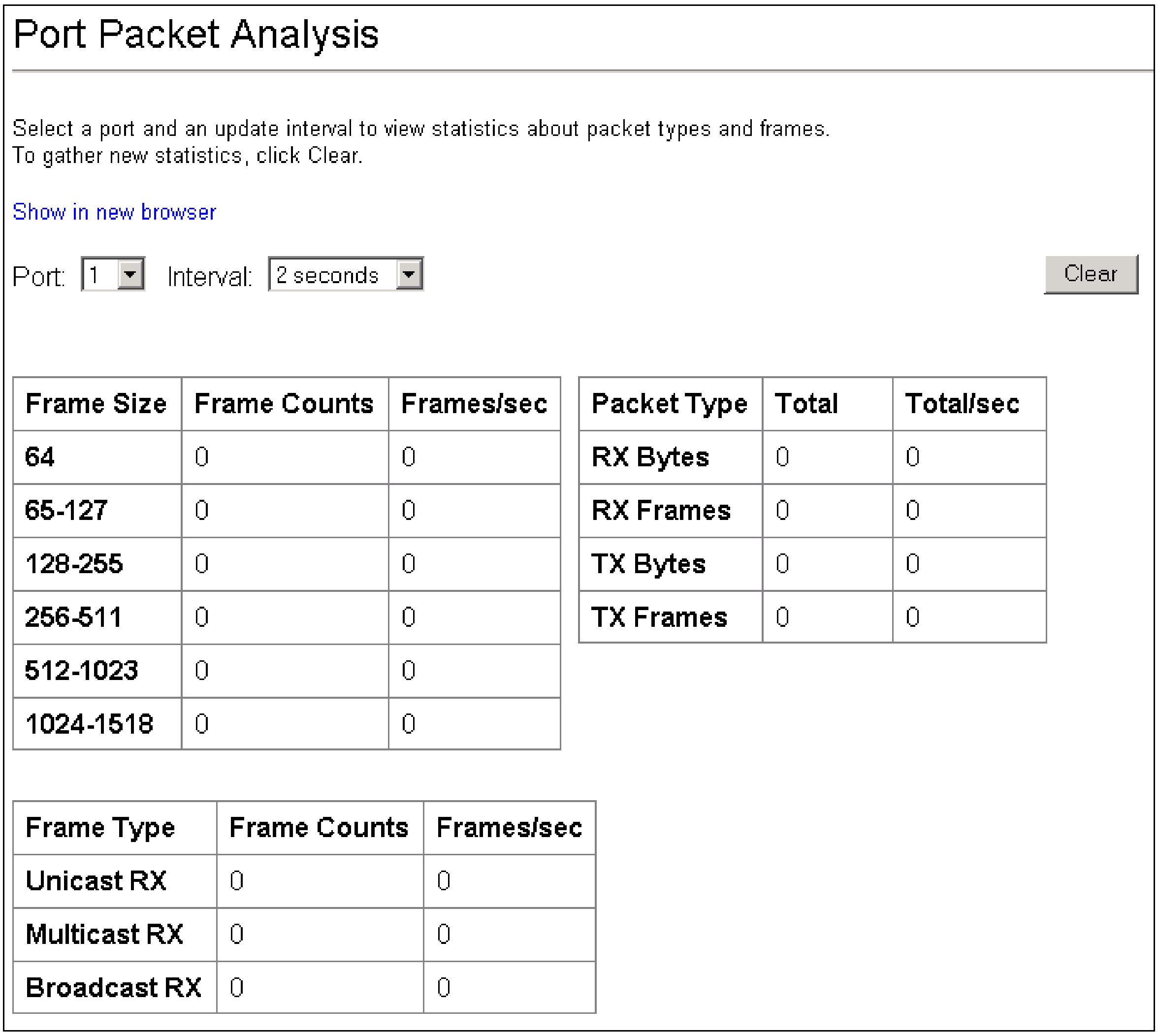
Figure 6- 27. Port Error Packets window

The information is described as follows:

- **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- 28. Port Packet Analysis window

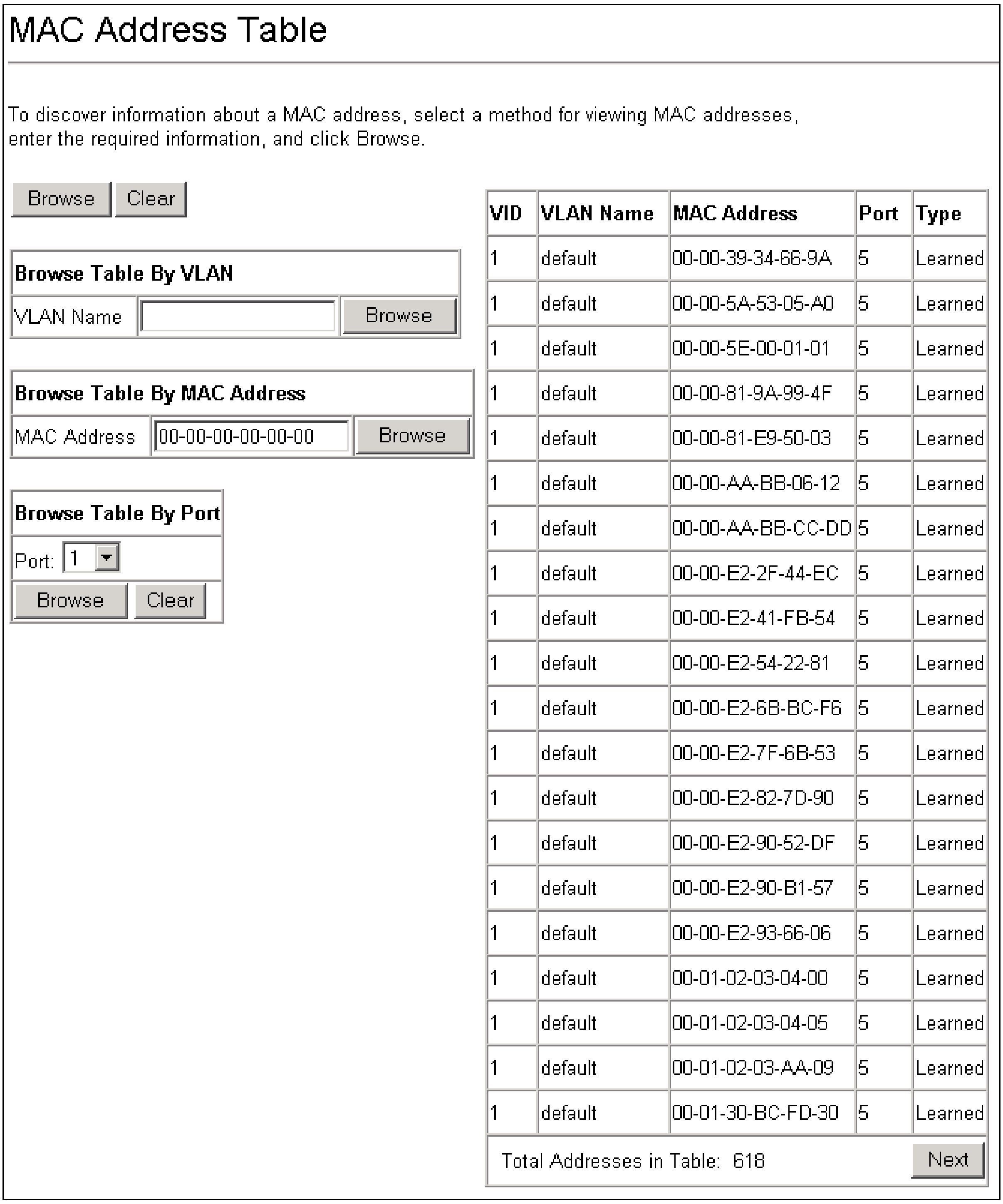
The information is described as follows:

- **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**).
- **TX Frames –** Displays the number of packets (frames) 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



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

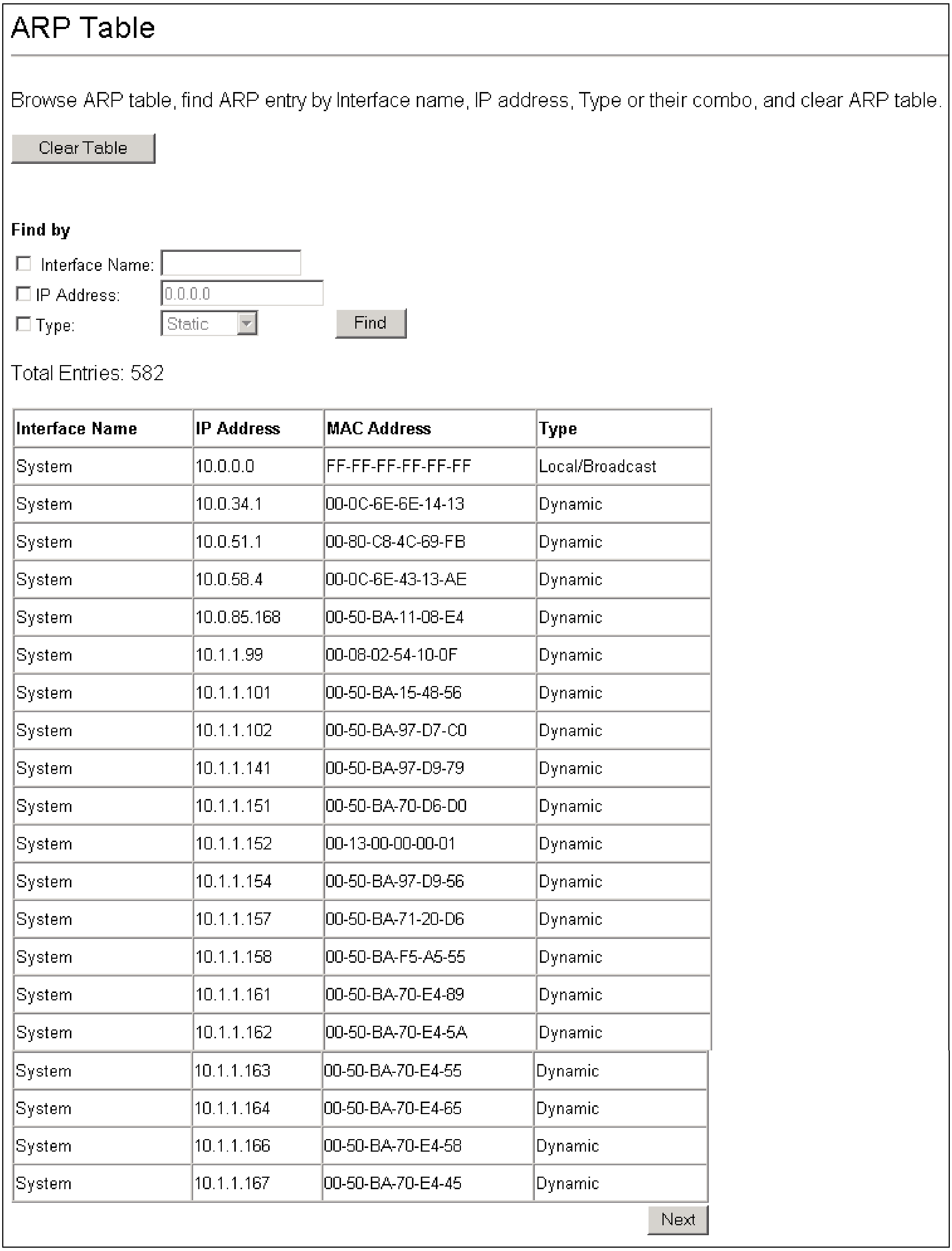
Total Addresses in Table: 618

Figure 6- 29. MAC Address Table window

The information is described as follows:

- **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 ARP table, find ARP entry by Interface name, IP address, Type or their combo, and clear ARP table.

Find by

□ Interface Name:

□ IP Address: 0.0.0.0

□ Type: Static

Total Entries: 582

Interface Name	IP Address	MAC Address	Type
System	10.0.0.0	FF-FF-FF-FF-FF-FF	Local/Broadcast
System	10.0.34.1	00-0C-6E-6E-14-13	Dynamic
System	10.0.51.1	00-80-C8-4C-69-FB	Dynamic
System	10.0.58.4	00-0C-6E-43-13-AE	Dynamic
System	10.0.85.168	00-50-BA-11-08-E4	Dynamic
System	10.1.1.99	00-08-02-54-10-0F	Dynamic
System	10.1.1.101	00-50-BA-15-48-56	Dynamic
System	10.1.1.102	00-50-BA-97-D7-C0	Dynamic
System	10.1.1.141	00-50-BA-97-D9-79	Dynamic
System	10.1.1.151	00-50-BA-70-D6-D0	Dynamic
System	10.1.1.152	00-13-00-00-00-01	Dynamic
System	10.1.1.154	00-50-BA-97-D9-56	Dynamic
System	10.1.1.157	00-50-BA-71-20-D6	Dynamic
System	10.1.1.158	00-50-BA-F5-A5-55	Dynamic
System	10.1.1.161	00-50-BA-70-E4-89	Dynamic
System	10.1.1.162	00-50-BA-70-E4-5A	Dynamic
System	10.1.1.163	00-50-BA-70-E4-55	Dynamic
System	10.1.1.164	00-50-BA-70-E4-65	Dynamic
System	10.1.1.166	00-50-BA-70-E4-58	Dynamic
System	10.1.1.167	00-50-BA-70-E4-45	Dynamic

Figure 6- 30. ARP Table window

The information is described as follows:

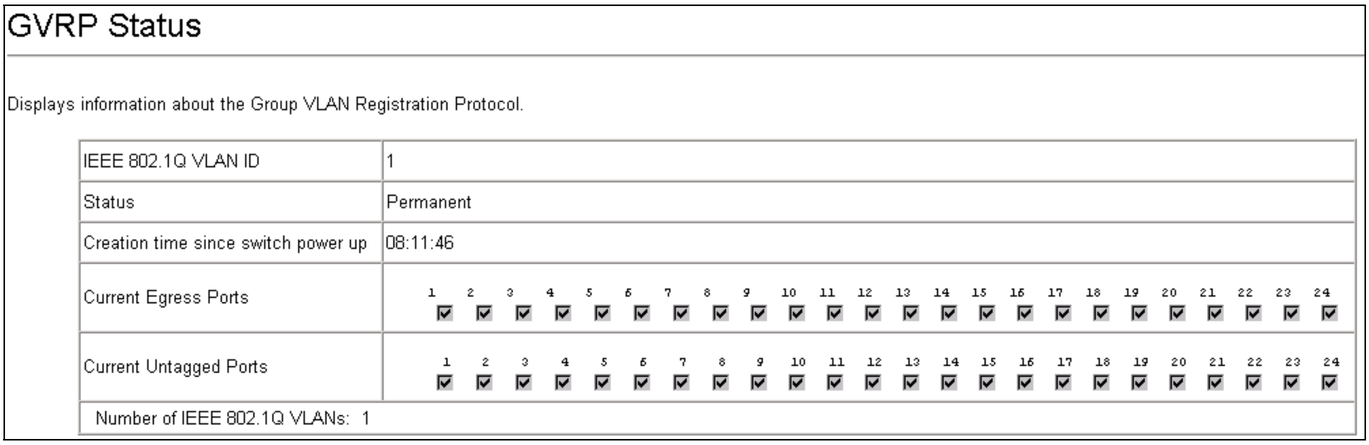
- **Find –** Click this button to initiate the search for the ARP Table.
- **Clear Table –** Clicking this button clears all statistics counters on this window.

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

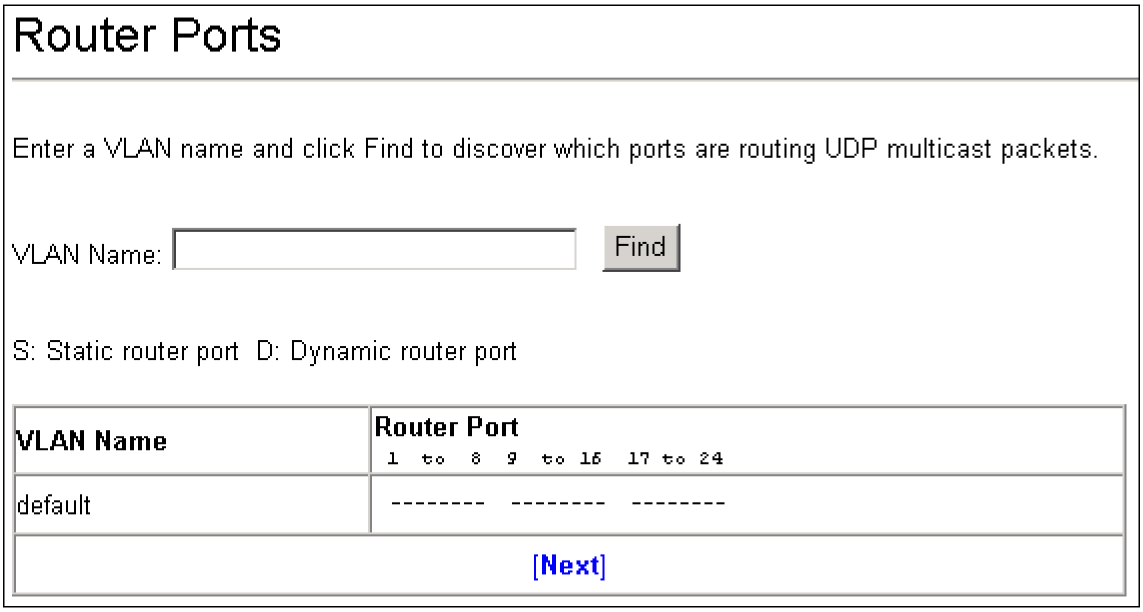
Displays information about the Group VLAN Registration Protocol.

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- 31. 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 Find to discover which ports are routing UDP multicast packets.

VLAN Name:

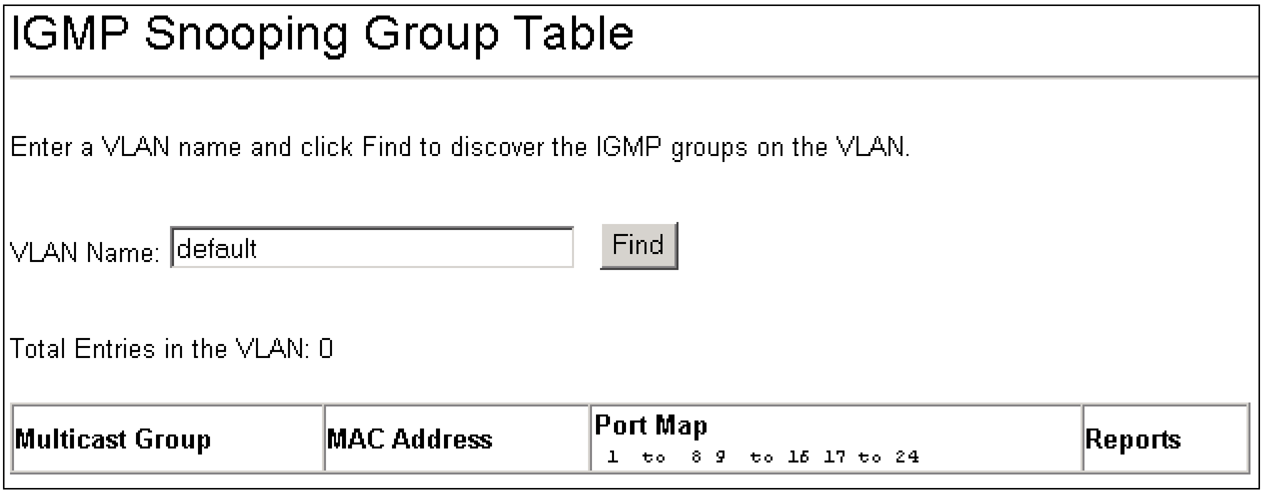
S: Static router port D: Dynamic router port

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

Figure 6- 32. 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

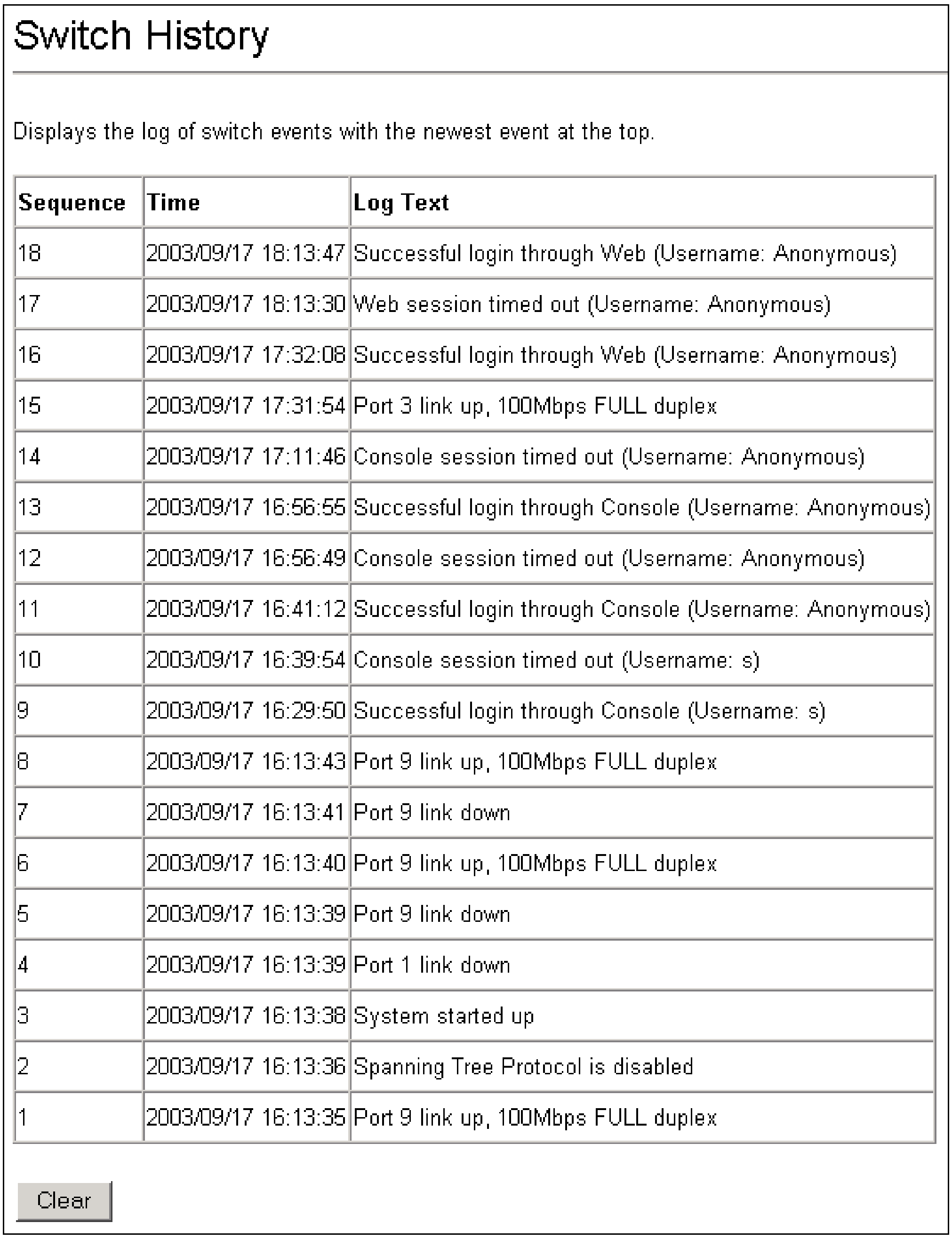
Total Entries in the VLAN: 0

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

Figure 6- 33. 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
18	2003/09/17 18:13:47	Successful login through Web (Username: Anonymous)
17	2003/09/17 18:13:30	Web session timed out (Username: Anonymous)
16	2003/09/17 17:32:08	Successful login through Web (Username: Anonymous)
15	2003/09/17 17:31:54	Port 3 link up, 100Mbps FULL duplex
14	2003/09/17 17:11:46	Console session timed out (Username: Anonymous)
13	2003/09/17 16:56:55	Successful login through Console (Username: Anonymous)
12	2003/09/17 16:56:49	Console session timed out (Username: Anonymous)
11	2003/09/17 16:41:12	Successful login through Console (Username: Anonymous)
10	2003/09/17 16:39:54	Console session timed out (Username: s)
9	2003/09/17 16:29:50	Successful login through Console (Username: s)
8	2003/09/17 16:13:43	Port 9 link up, 100Mbps FULL duplex
7	2003/09/17 16:13:41	Port 9 link down
6	2003/09/17 16:13:40	Port 9 link up, 100Mbps FULL duplex
5	2003/09/17 16:13:39	Port 9 link down
4	2003/09/17 16:13:39	Port 1 link down
3	2003/09/17 16:13:38	System started up
2	2003/09/17 16:13:36	Spanning Tree Protocol is disabled
1	2003/09/17 16:13:35	Port 9 link up, 100Mbps FULL duplex

Figure 6- 34. 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.

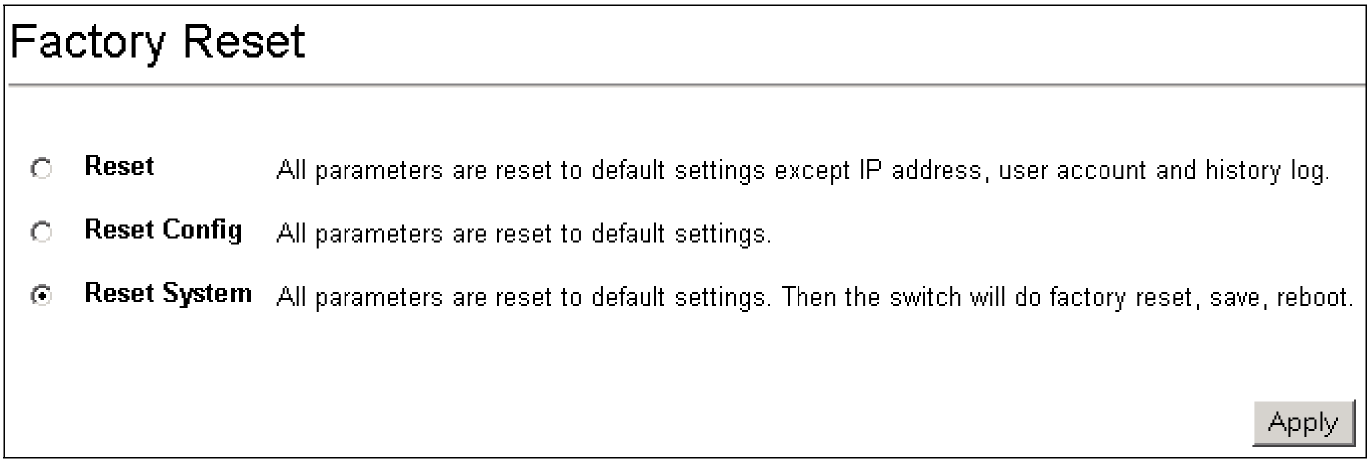
The information is described as follows:

- **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.

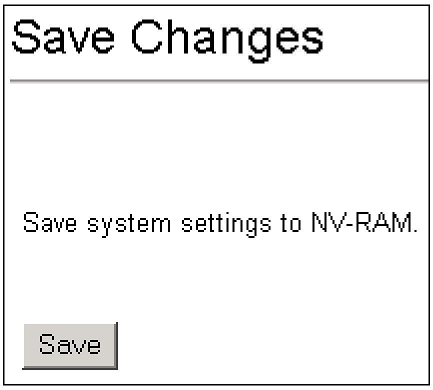
● **Reset System** All parameters are reset to default settings. Then the switch will do factory reset, save, reboot.

Figure 6- 35. 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.



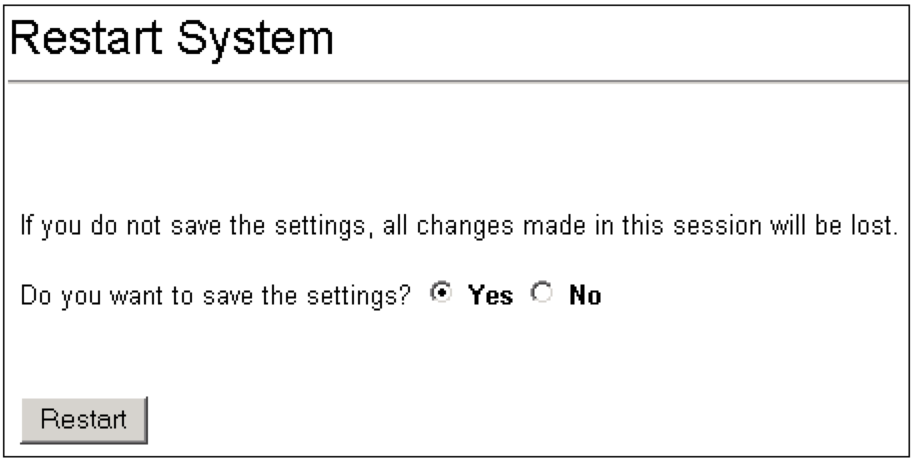
Save Changes

Save system settings to NV-RAM.

Figure 6- 36. 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



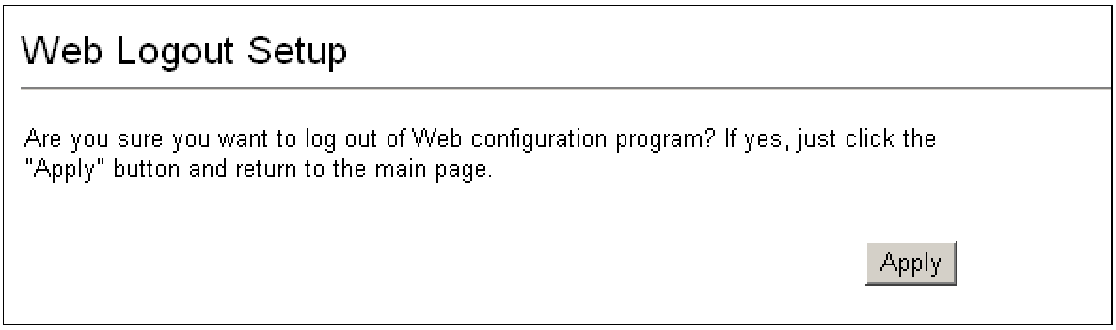
Restart System

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- 37. Restart System window

Logout



Web Logout Setup

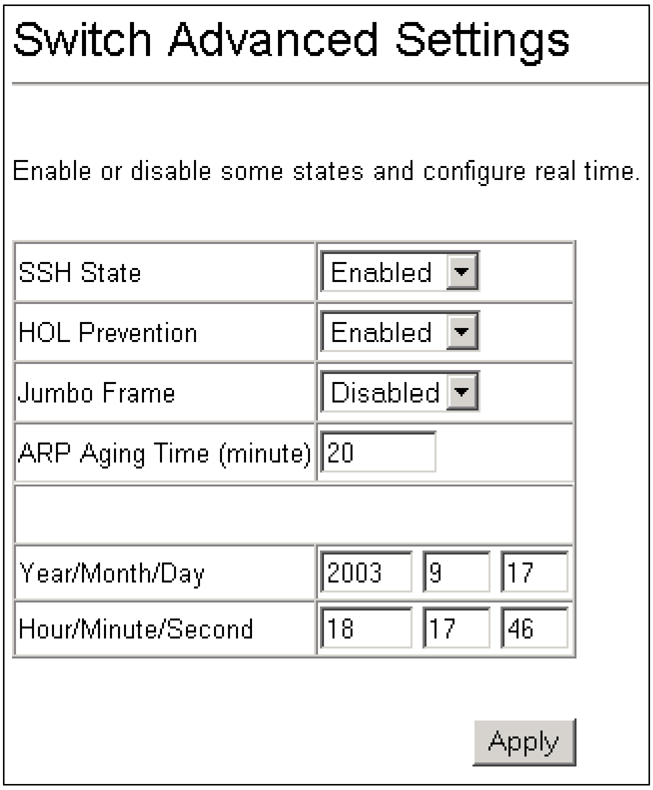
Are you sure you want to log out of Web configuration program? If yes, just click the "Apply" button and return to the main page.

Figure 6- 38. Web Logout Setup window

Advanced Setup

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

Switch Advanced Settings



Switch Advanced Settings

Enable or disable some states and configure real time.

SSH State	Enabled		
HOL Prevention	Enabled		
Jumbo Frame	Disabled		
ARP Aging Time (minute)	20		
Year/Month/Day	2003	9	17
Hour/Minute/Second	18	17	46

Figure 6- 39. Switch Advanced Settings window

The information is described as follows:

- **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.

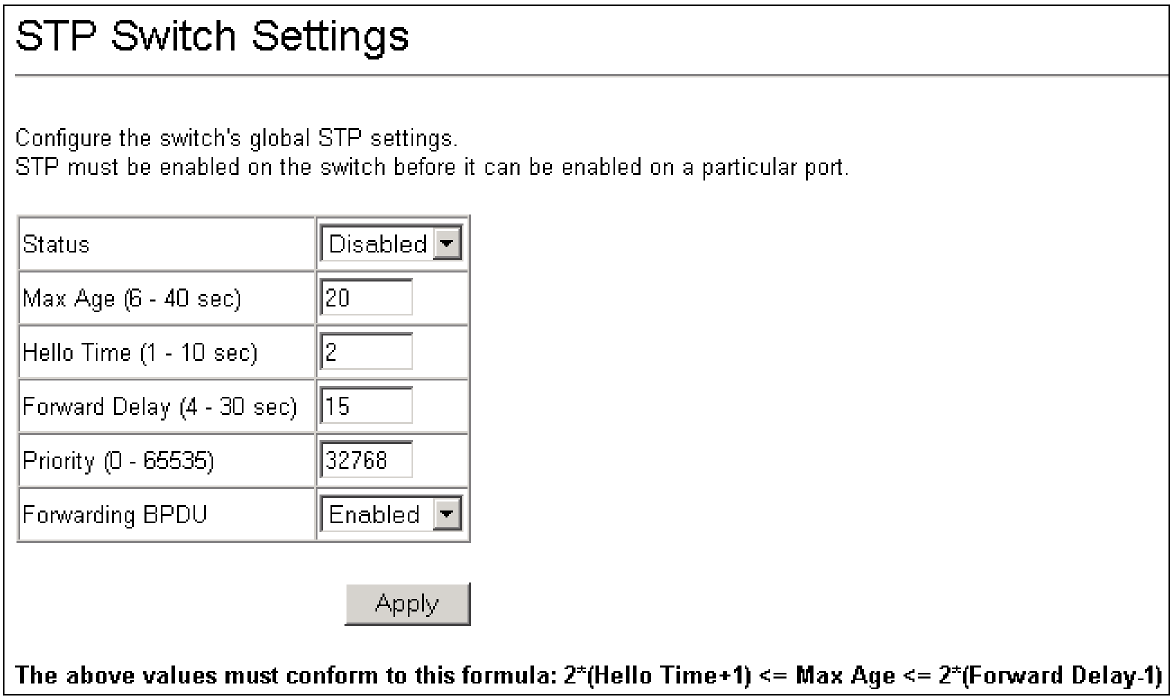
Spanning Tree

The 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.

This section includes two windows, **STP Switch Settings** and **STP Port Settings**.

STP Switch Settings

The switch supports 801.2d 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 - 65535)	32768
Forwarding BPDU	Enabled

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

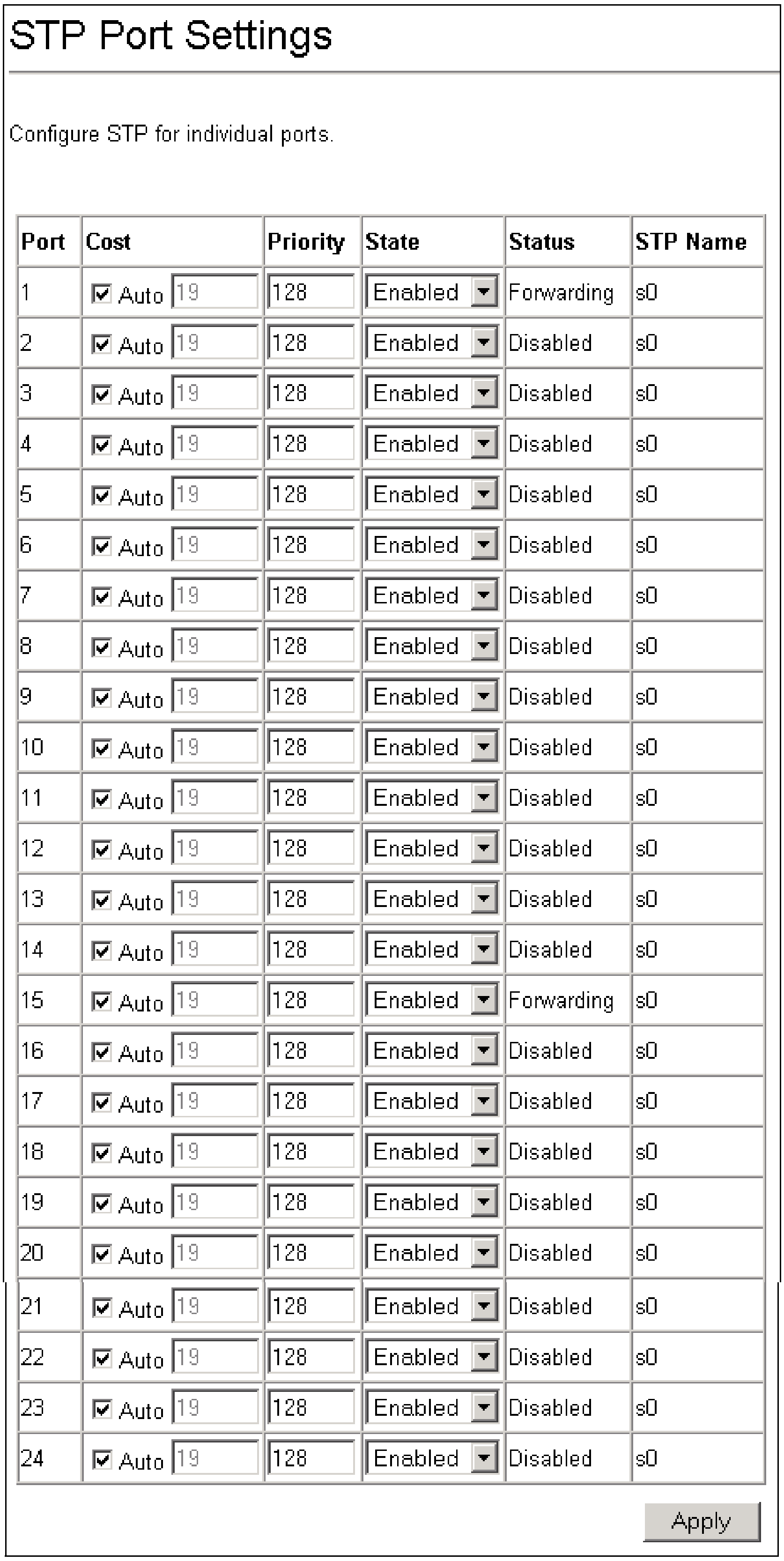
Figure 6- 40. STP Switch Settings window

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

Parameters that you can change are:

- **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 (0-65535)** <*32768*> – A Bridge Priority can be from 0 to 65535. Zero is equal to the highest Bridge Priority.
- **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

Configure STP for individual ports.

Port	Cost	Priority	State	Status	STP Name
1	☑ Auto 19	128	Enabled	Forwarding	s0
2	☑ Auto 19	128	Enabled	Disabled	s0
3	☑ Auto 19	128	Enabled	Disabled	s0
4	☑ Auto 19	128	Enabled	Disabled	s0
5	☑ Auto 19	128	Enabled	Disabled	s0
6	☑ Auto 19	128	Enabled	Disabled	s0
7	☑ Auto 19	128	Enabled	Disabled	s0
8	☑ Auto 19	128	Enabled	Disabled	s0
9	☑ Auto 19	128	Enabled	Disabled	s0
10	☑ Auto 19	128	Enabled	Disabled	s0
11	☑ Auto 19	128	Enabled	Disabled	s0
12	☑ Auto 19	128	Enabled	Disabled	s0
13	☑ Auto 19	128	Enabled	Disabled	s0
14	☑ Auto 19	128	Enabled	Disabled	s0
15	☑ Auto 19	128	Enabled	Forwarding	s0
16	☑ Auto 19	128	Enabled	Disabled	s0
17	☑ Auto 19	128	Enabled	Disabled	s0
18	☑ Auto 19	128	Enabled	Disabled	s0
19	☑ Auto 19	128	Enabled	Disabled	s0
20	☑ Auto 19	128	Enabled	Disabled	s0
21	☑ Auto 19	128	Enabled	Disabled	s0
22	☑ Auto 19	128	Enabled	Disabled	s0
23	☑ Auto 19	128	Enabled	Disabled	s0
24	☑ Auto 19	128	Enabled	Disabled	s0

Figure 6- 41. STP Port Settings window

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

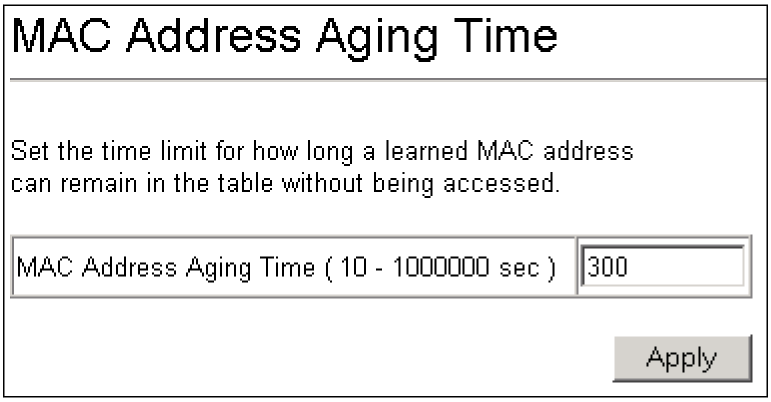
The information on the window is described as follows:

- **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 *65535*. 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 *255*. The lower the number, the greater the probability the port will be chosen as the Root Port.

Forwarding

MAC Forwarding

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

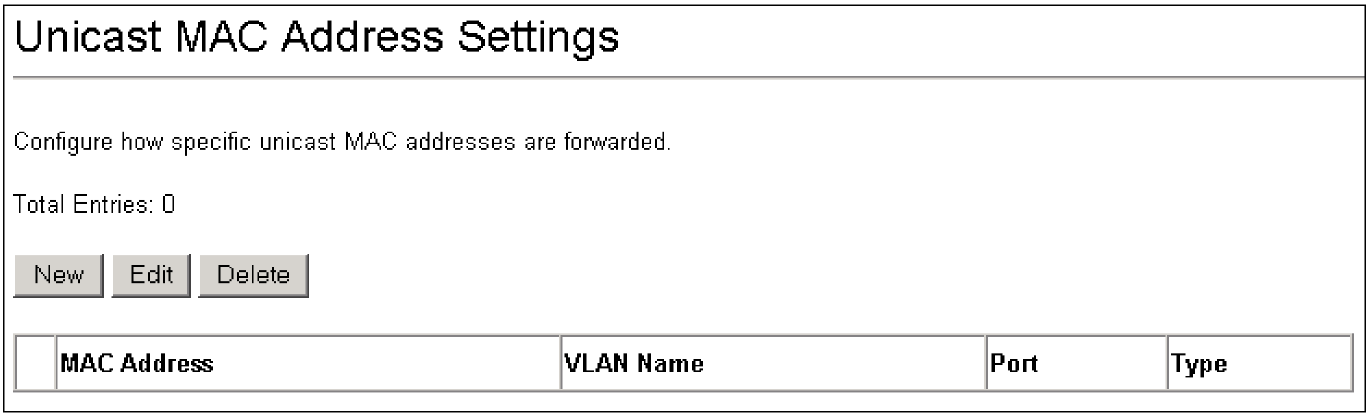
Figure 6- 42. MAC Address Aging Time window

The information on the window is described as follows:

- **MAC Address Aging Time (10 – 1000000 sec)]** <*300* > **–** This field 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

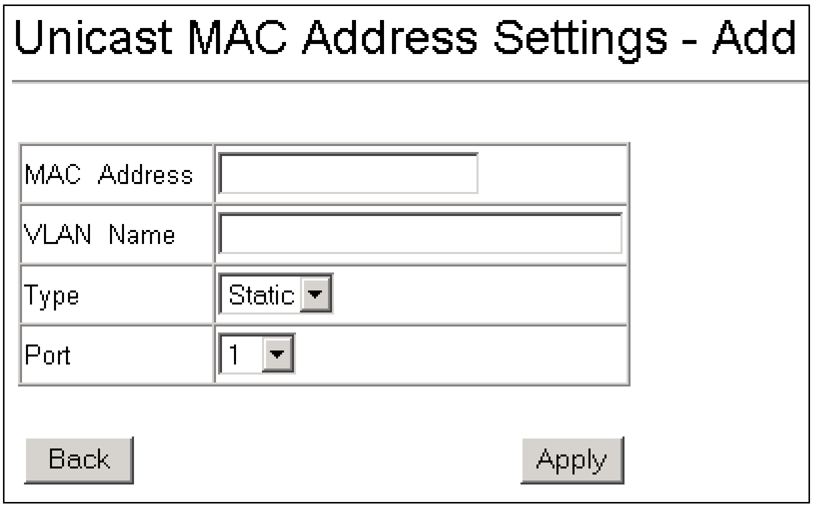
Configure how specific unicast MAC addresses are forwarded.

Total Entries: 0

	MAC Address	VLAN Name	Port	Type

Figure 6- 43. Unicast MAC Address Settings window

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- 44. Unicast MAC Address Settings – Add window

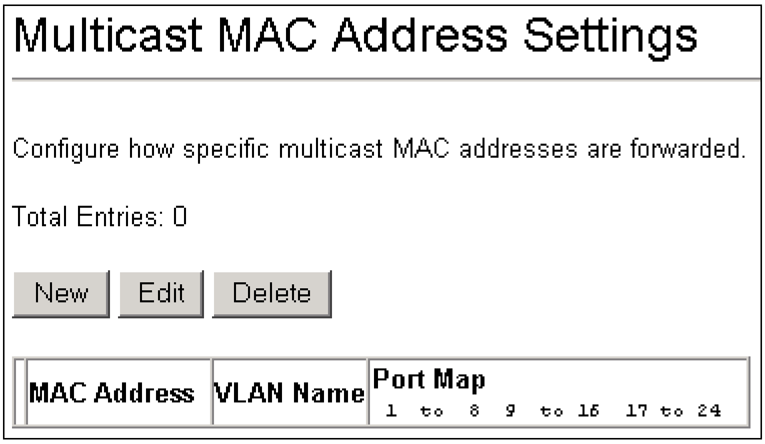
The following fields can be set:

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

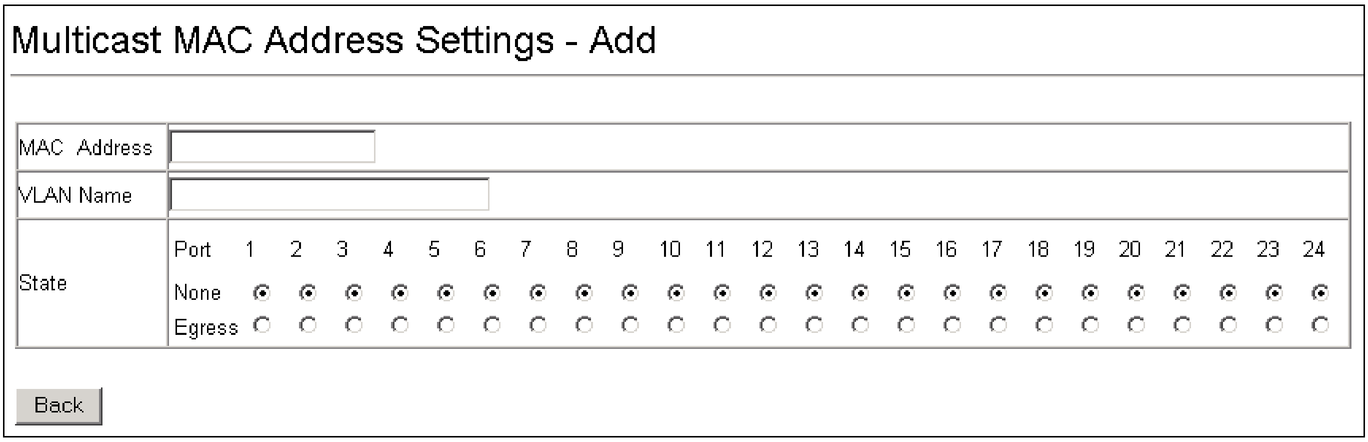
Configure how specific multicast MAC addresses are forwarded.

Total Entries: 0

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

Figure 6- 45. 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- 46. Multicast MAC Address Settings – Add window

The following fields can be set:

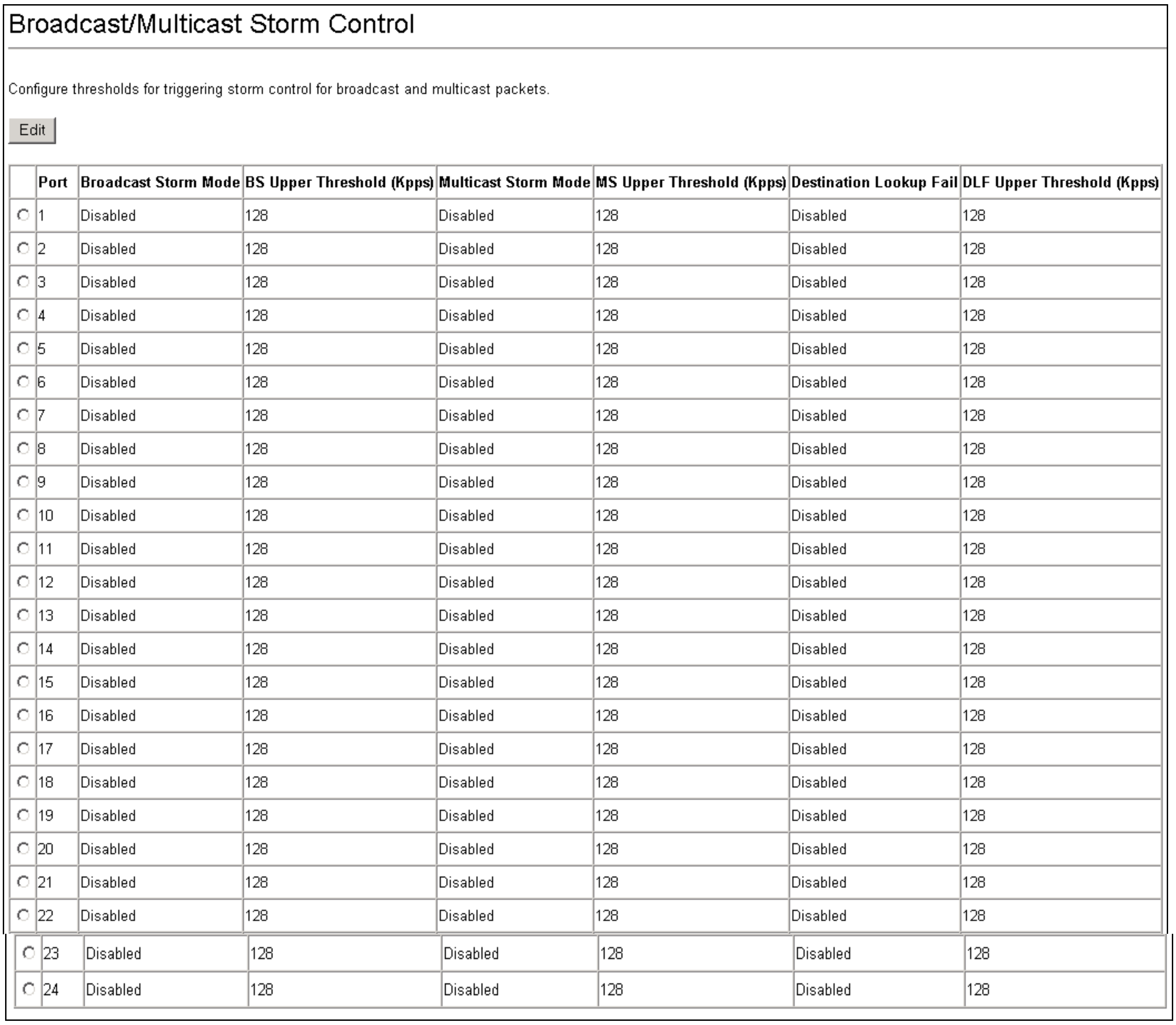
Parameter	Description
MAC Address	Allows the entry of the MAC address of an end station that will be entered

	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.

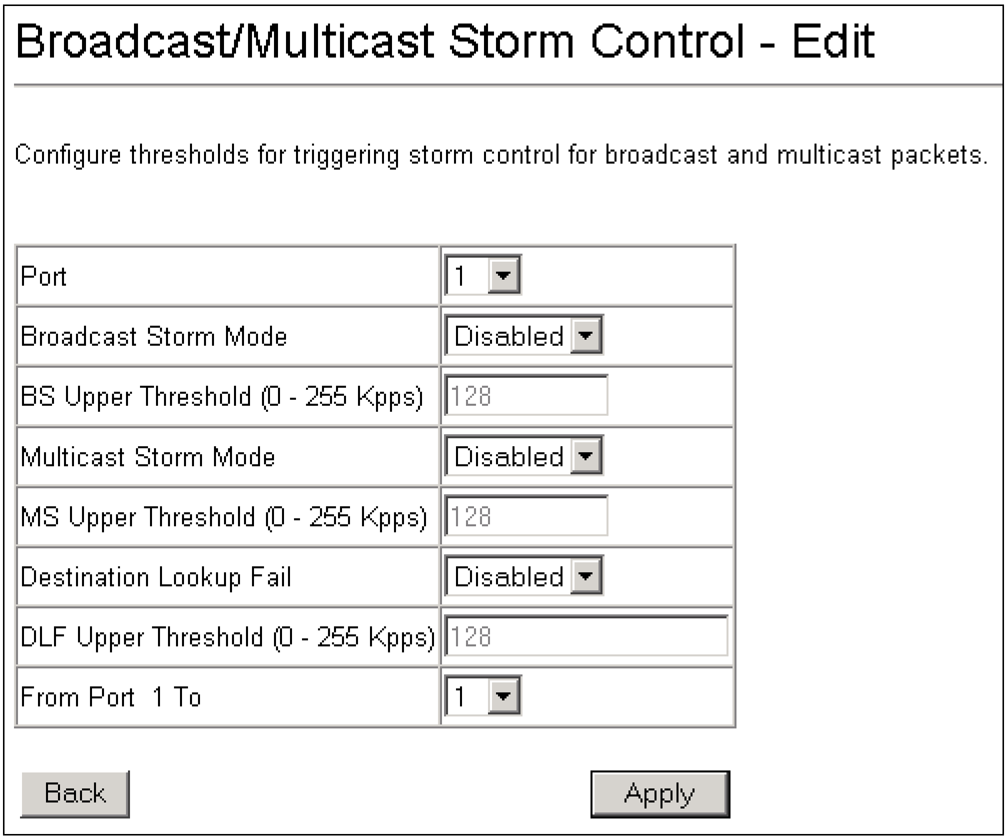


Broadcast/Multicast Storm Control

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- 47. 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- 48. 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.

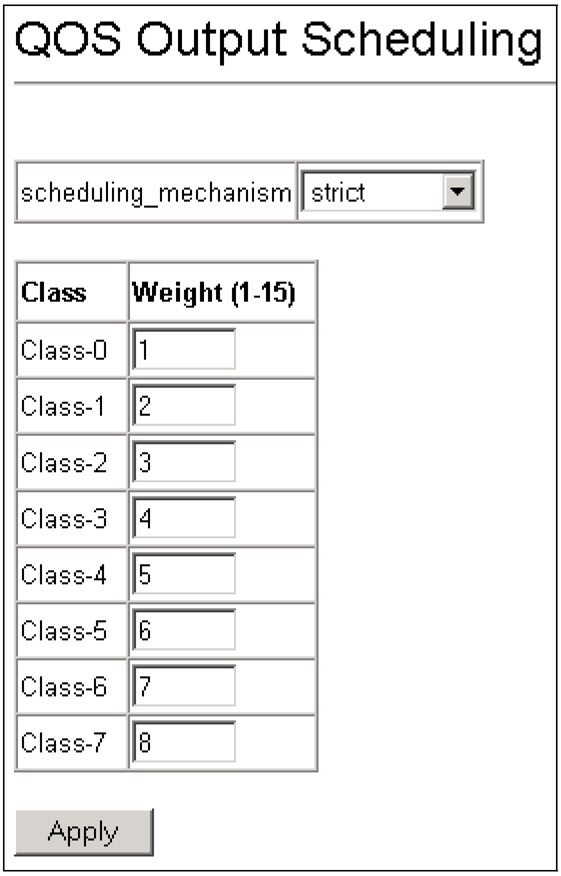
For weighted round-robin queuing, the number of packets sent from each priority queue depends upon the assigned weight. For a configuration of 8 CoS queues, A~H with their respective weight value: 8~1, the packets are sent in the following sequence: A1, B1, C1, D1, E1, F1, G1, H1, A2, B2, C2, D2, E2, 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

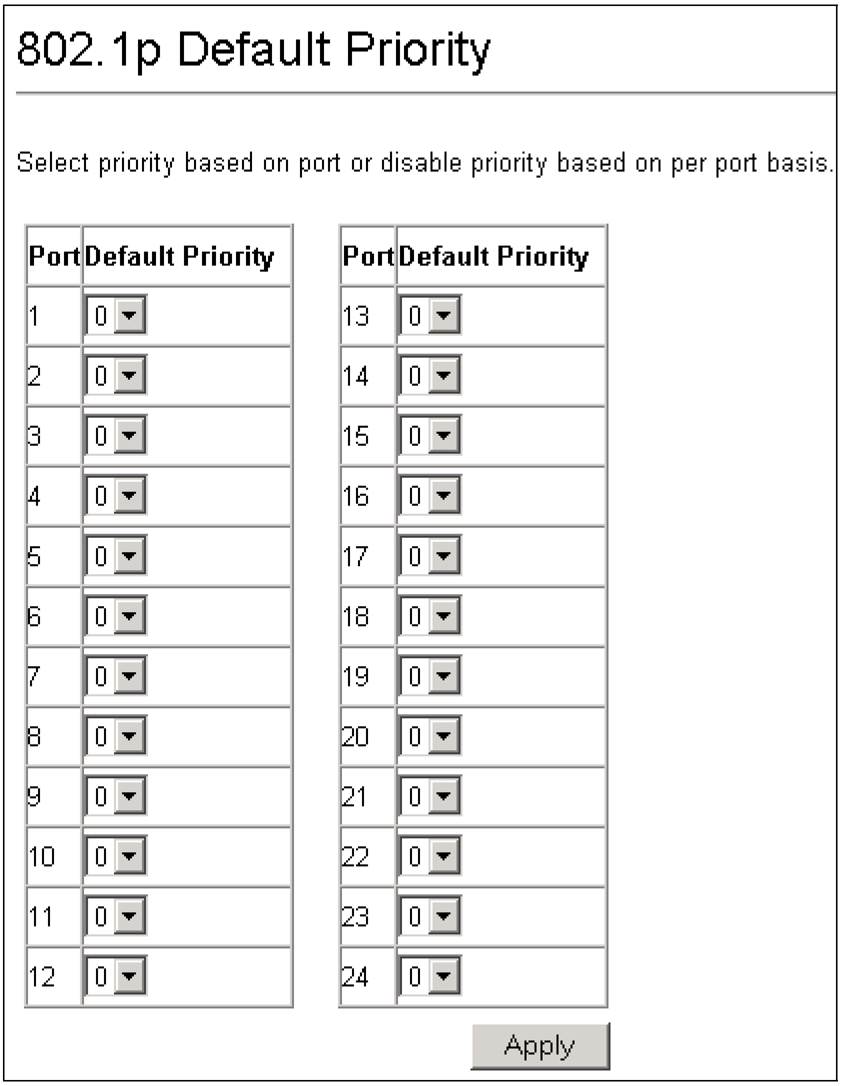
scheduling_mechanism	strict

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- 49. 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

Select priority based on port or disable priority based on per port basis.

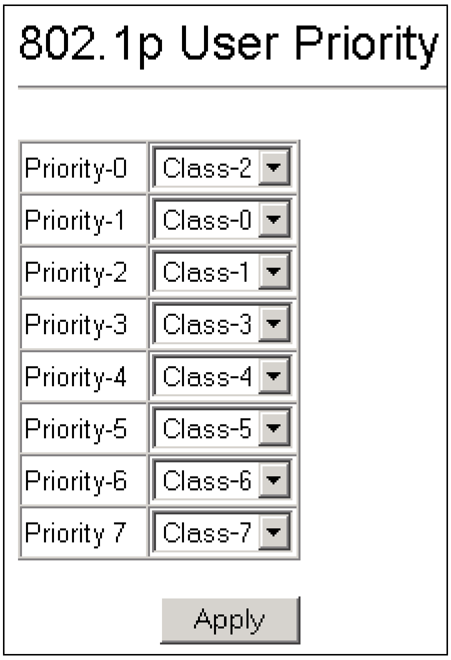
Port	Default Priority	Port	Default Priority
1	0	13	0
2	0	14	0
3	0	15	0
4	0	16	0
5	0	17	0
6	0	18	0
7	0	19	0
8	0	20	0
9	0	21	0
10	0	22	0
11	0	23	0
12	0	24	0

Figure 6- 50. 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.



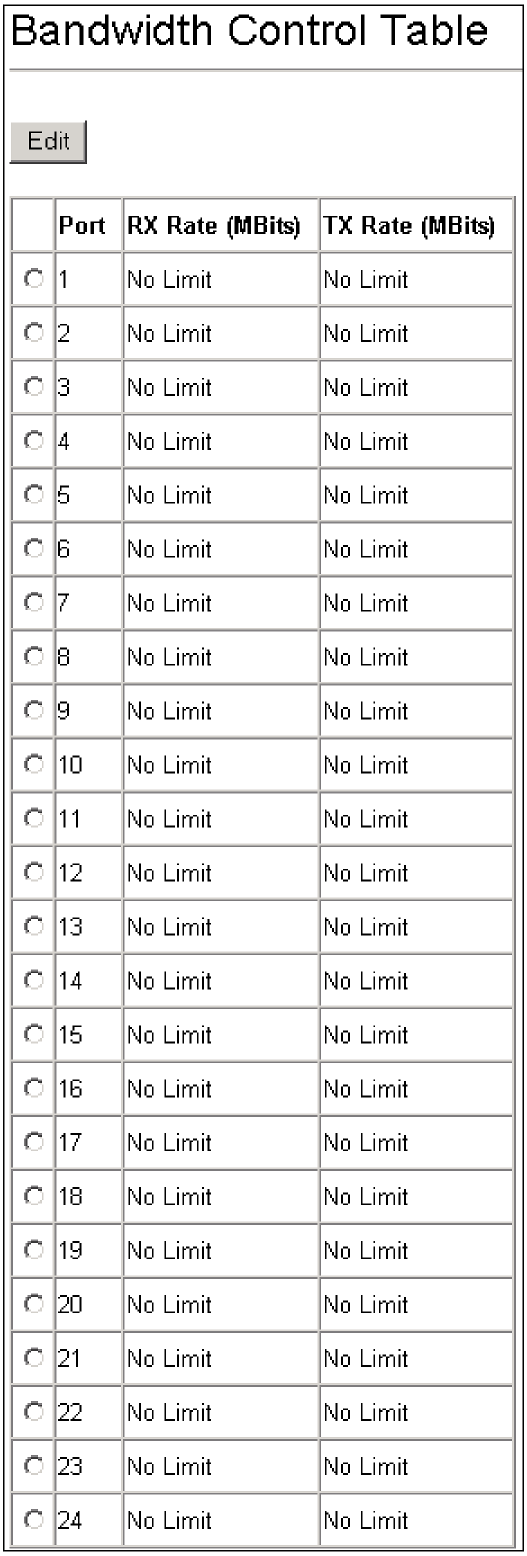
802.1p User Priority

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- 51. 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.

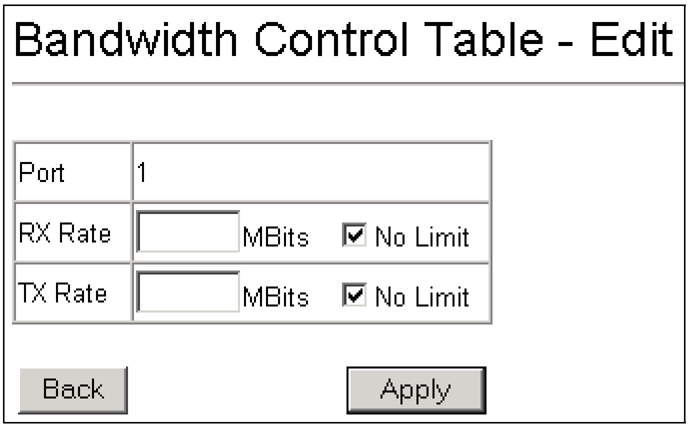


Bandwidth Control Table

	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- 52. 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

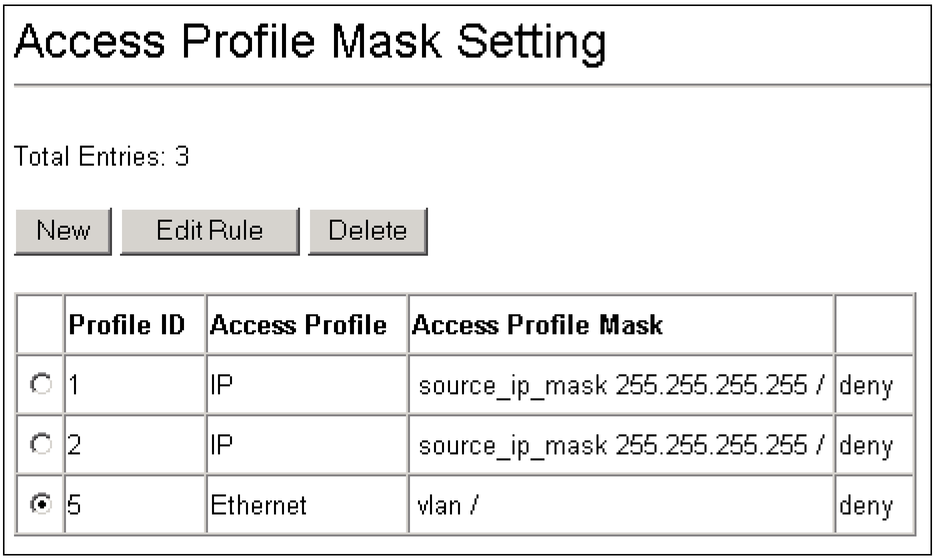
Figure 6- 53. Bandwidth Control Table – Edit window

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

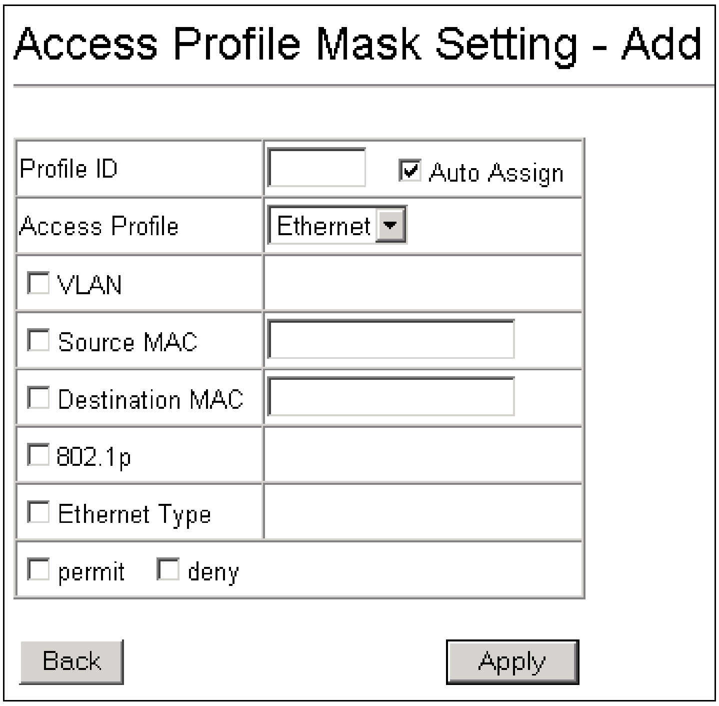
Total Entries: 3

	Profile ID	Access Profile	Access Profile Mask	
○	1	IP	source_ip_mask 255.255.255.255 /	deny
○	2	IP	source_ip_mask 255.255.255.255 /	deny
●	5	Ethernet	vlan /	deny

Figure 6- 54. Access Profile Mask Setting window

To create an Access Profile Mask:

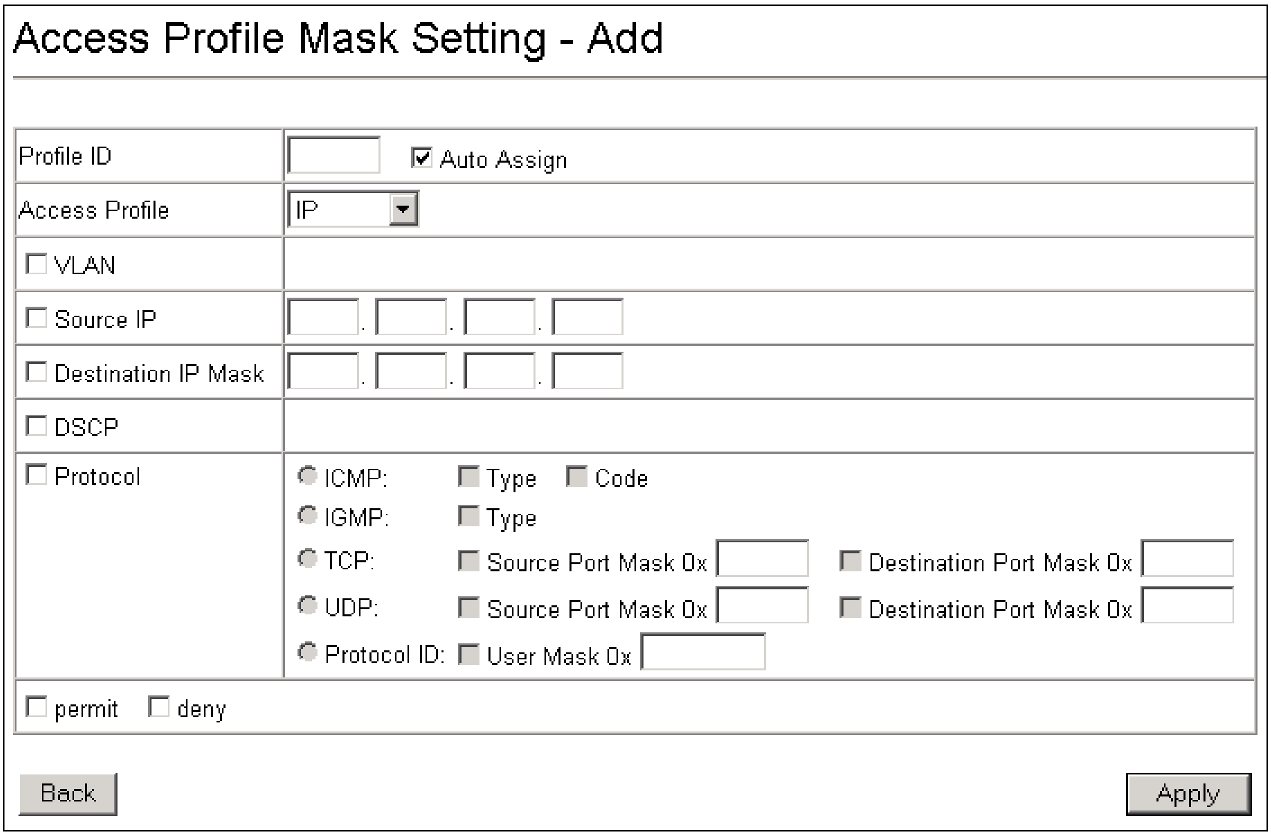
Click the **New** button in the window above. A new window is displayed. Use this to create an access profile and specify what criteria are used to examine frames. Once the profile has been created you can set up the rule applied to the profile as described later in this section.



Access Profile Mask Setting - Add

Profile ID	☑ Auto Assign
Access Profile	Ethernet ▾
□ VLAN	
□ Source MAC	
□ Destination MAC	
□ 802.1p	
□ Ethernet Type	
□ permit □ deny	

Figure 6- 55. Access Profile Mask Setting – Add (Ethernet) window



Access Profile Mask Setting - Add

Profile ID	☑ Auto Assign
Access Profile	IP ▾
□ VLAN	
□ Source IP	. . .
□ Destination IP Mask	. . .
□ DSCP	
□ Protocol	○ ICMP: □ Type □ Code ○ IGMP: □ Type ○ TCP: □ Source Port Mask 0x □ Destination Port Mask 0x ○ UDP: □ Source Port Mask 0x □ Destination Port Mask 0x ○ Protocol ID: □ User Mask 0x
□ permit □ deny	

Figure 6- 56. Access Profile Mask Setting – Add (IP) window

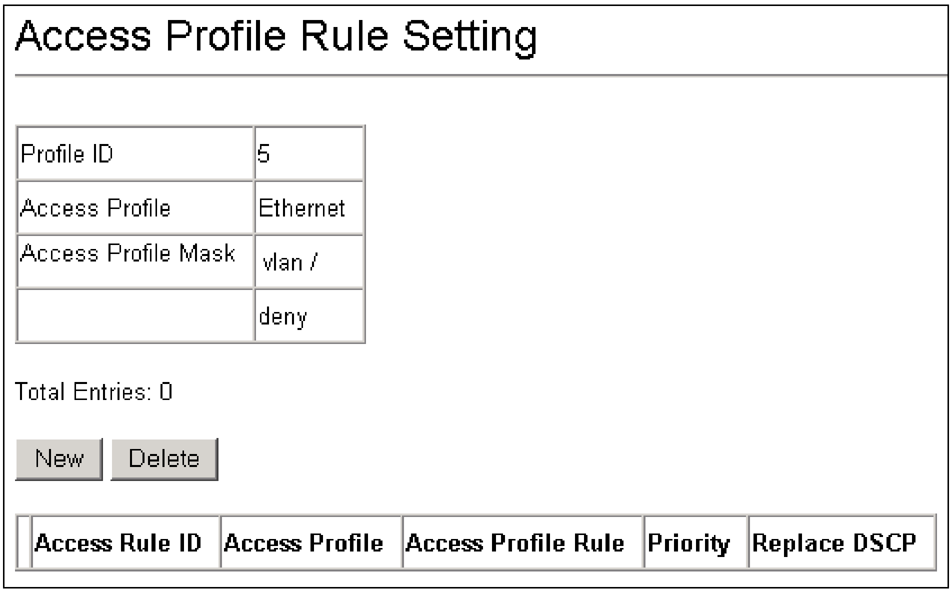
Configure the following Access Profile Mask settings:

Parameter	Description
Profile ID	Type in a unique identifier number for this profile set or allow an ID to be automatically assigned by checking the Auto Assign option. This value can be set from 1 – 255.
Access Profile	Select profile based on Ethernet (MAC Address) or IP address. This will change the menu according to the requirements for the type of profile. 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.
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 MAC/IP Mask	Source MAC Mask - Enter a MAC address mask for the source MAC address. Source IP Mask - Enter an IP address mask for the source IP address.
Destination MAC/IP Mask	Destination MAC Mask - Enter a MAC address mask for the destination MAC address. Destination IP Mask - Enter an IP 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.
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.
Ethernet Type (for Ethernet Access Profiles only)	Selecting this option instructs the switch to examine the Ethernet type value in each frame's header.
Protocol (for IP address Access Profiles only)	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 cod 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. *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). 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). Select *Protocol ID* to instruct the switch to examine each frame's Protocol ID field. *User Mask 0x* – Specify that the rule applies to the IP protocol ID and the mask options behind the IP header.
Permit/Deny	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.

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

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



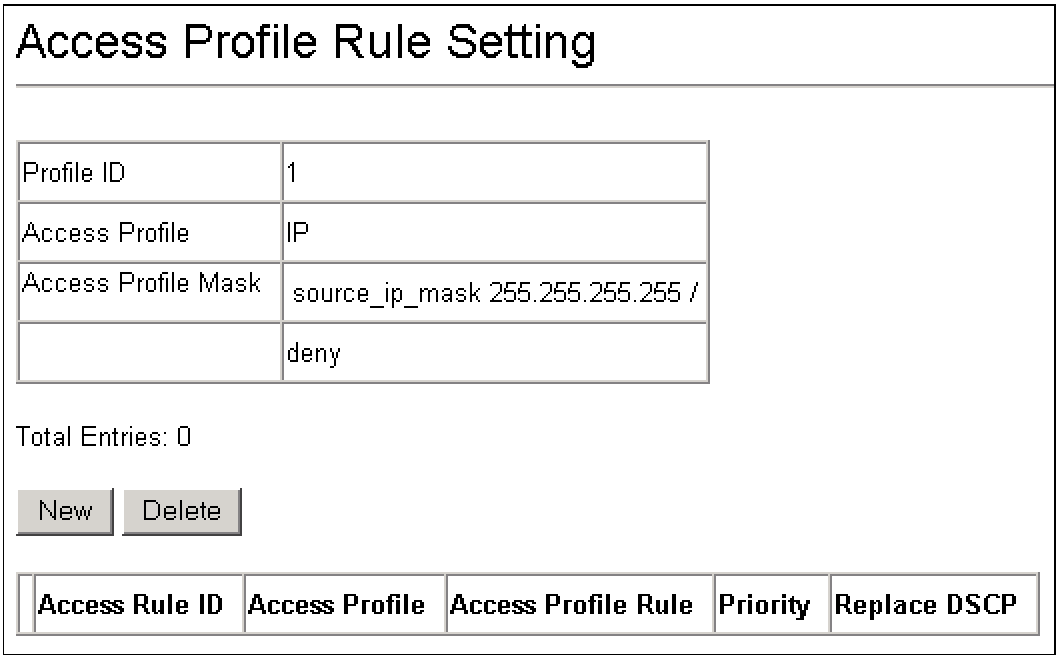
Access Profile Rule Setting

Profile ID	5
Access Profile	Ethernet
Access Profile Mask	vlan /
	deny

Total Entries: 0

	Access Rule ID	Access Profile	Access Profile Rule	Priority	Replace DSCP

Figure 6- 57. Access Profile Rule Setting (Ethernet) window



Access Profile Rule Setting

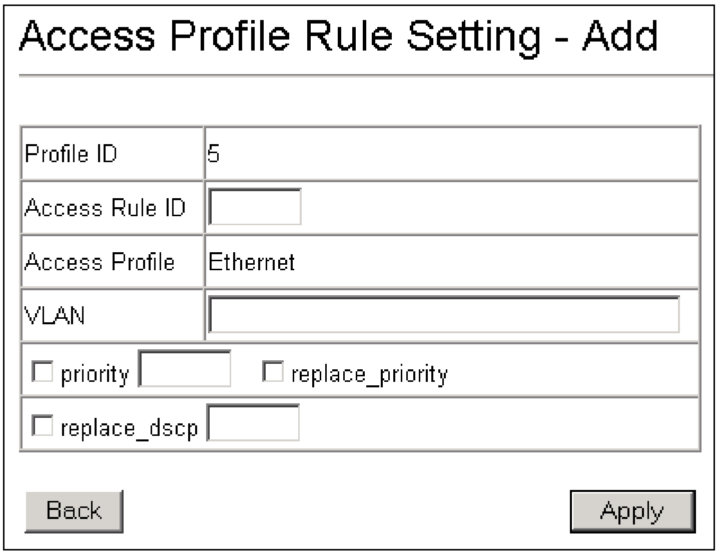
Profile ID	1
Access Profile	IP
Access Profile Mask	source_ip_mask 255.255.255.255 /
	deny

Total Entries: 0

	Access Rule ID	Access Profile	Access Profile Rule	Priority	Replace DSCP

Figure 6- 58. Access Profile Rule Setting (IP) window

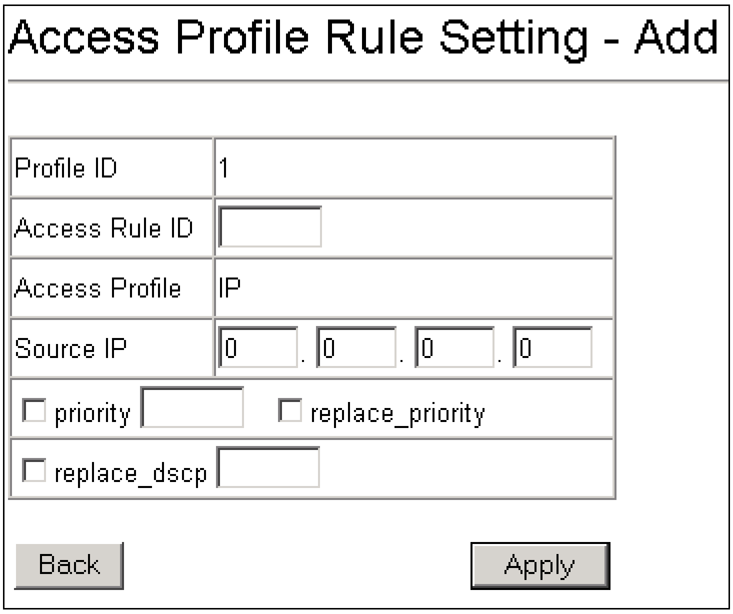
To create a new rule set for the access profile click the **New** button. A new window is displayed. To remove a previously created rule, select it and click the **Delete** button.



Access Profile Rule Setting - Add

Profile ID	5
Access Rule ID	
Access Profile	Ethernet
VLAN	
□ priority	□ replace_priority
□ replace_dscp	

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



Access Profile Rule Setting - Add

Profile ID	1
Access Rule ID	
Access Profile	IP
Source IP	0 . 0 . 0 . 0
□ priority	□ replace_priority
□ replace_dscp	

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

Configure the following Access Rule Configuration settings (additional parameters are described in earlier sections):

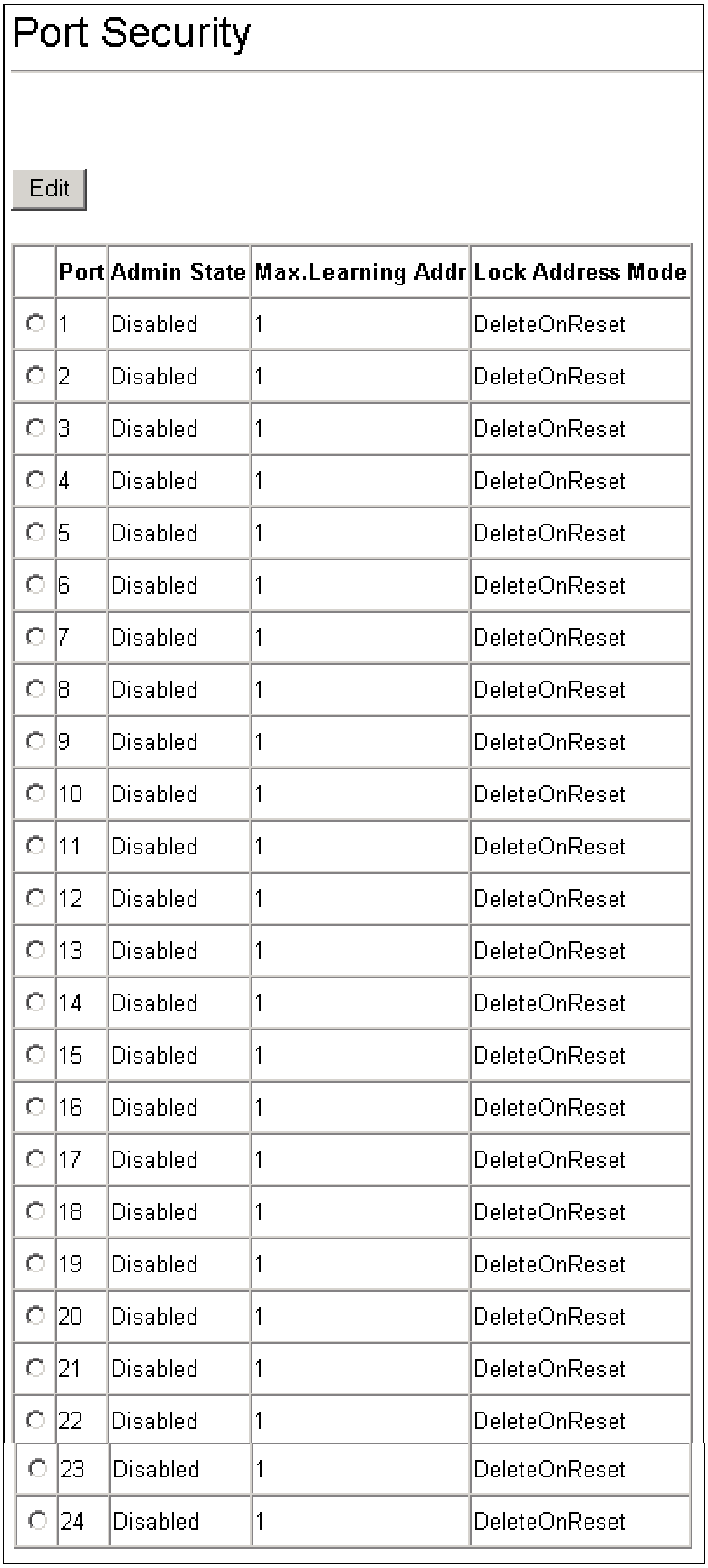
Parameter	Description
Profile ID	This is the identifier number for this profile set.
Access ID	Type in a unique identifier number for this access. This value can be set from 1 to 255.
Priority	Select this option to instruct the switch to use the 802.1p priority value entered in the adjacent field for packets that meet the criteria. A number between 0 – lowest priority, and 7 – highest priority, can be

	entered.
replace priority	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	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.

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*, 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.

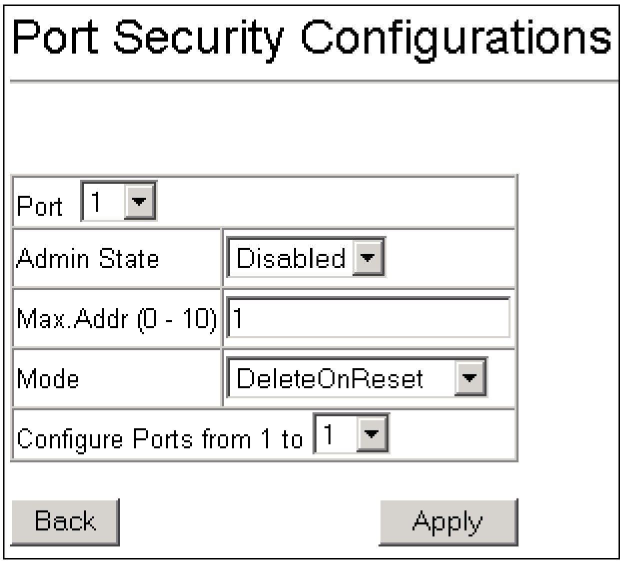


Port Security

	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
○	24	Disabled	1	DeleteOnReset

Figure 6- 61. Port Security window

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



Port Security Configurations

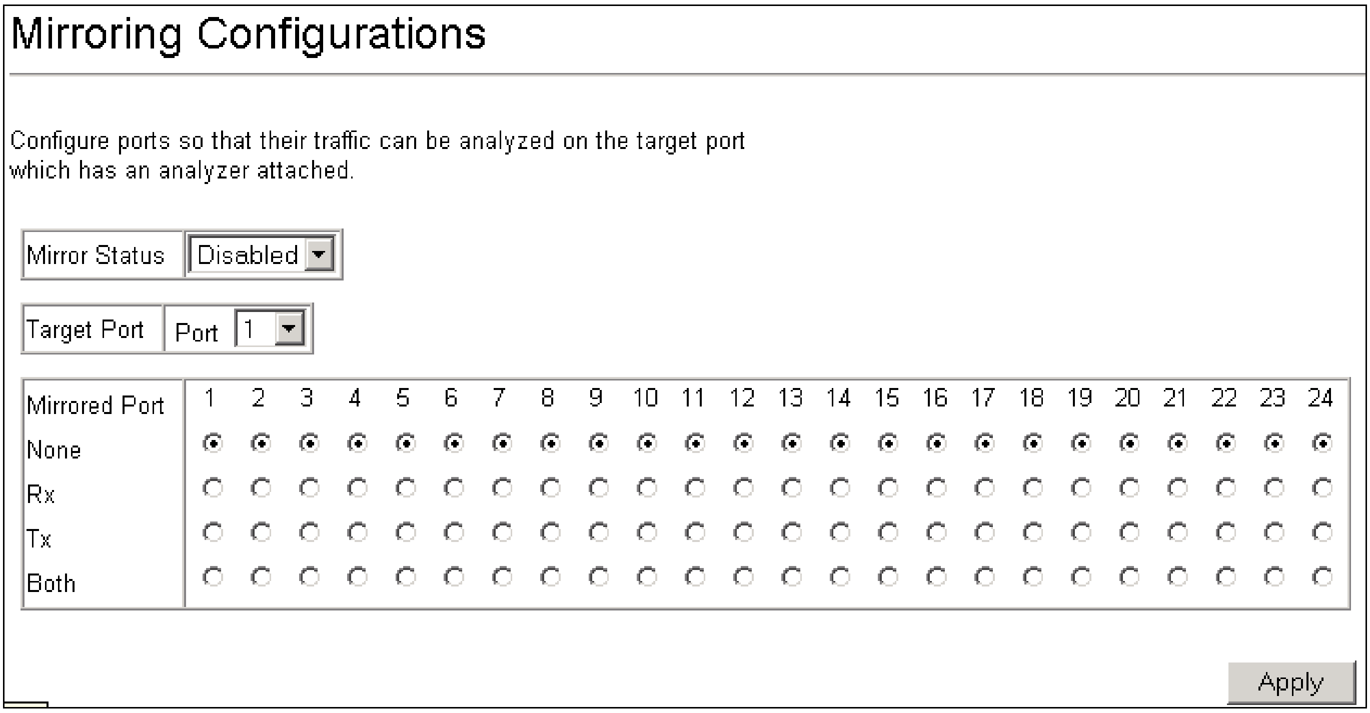
Port	1
Admin State	Disabled
Max.Addr (0 - 10)	1
Mode	DeleteOnReset
Configure Ports from 1 to 1	

Figure 6- 62. Port Security Configurations 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 *<Delete On Reset>*	Select *Delete On Timeout* to clear dynamic entries for the ports on timeout of the Forwarding Data Base (FDB). Specify *Delete On Reset* to delete all FDB entries, including static entries upon system reset or rebooting.
Configure Ports from __ to	Use this to specify a consecutively numbered group of ports on the switch for configuration.

Mirroring Configurations



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- 63. 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.

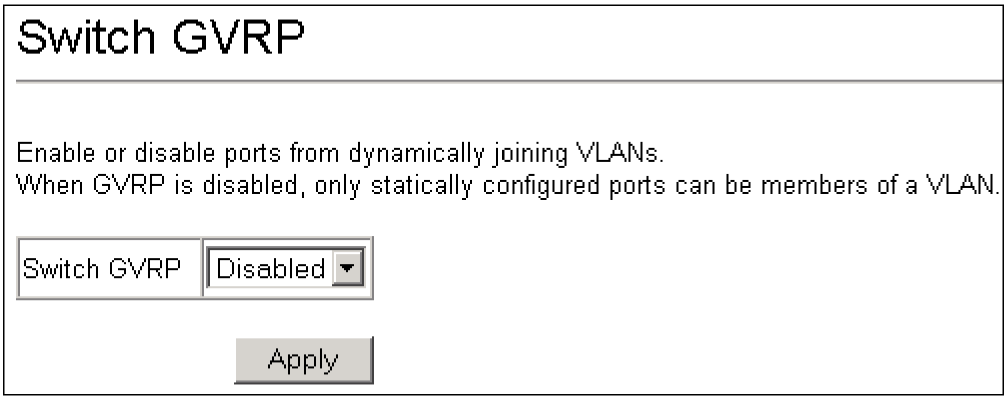
The following fields can be set:

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 **Switch GVRP**, **802.1Q VLANs**, and **IEEE 802.1Q Settings**.

Switch GVRP



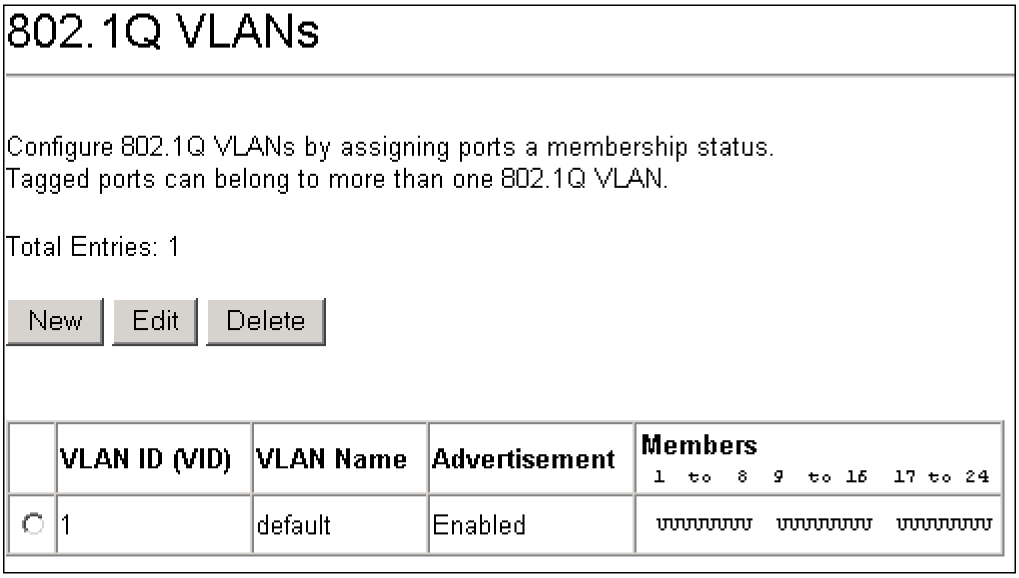
Switch GVRP

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- 64. Switch GVRP window

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.

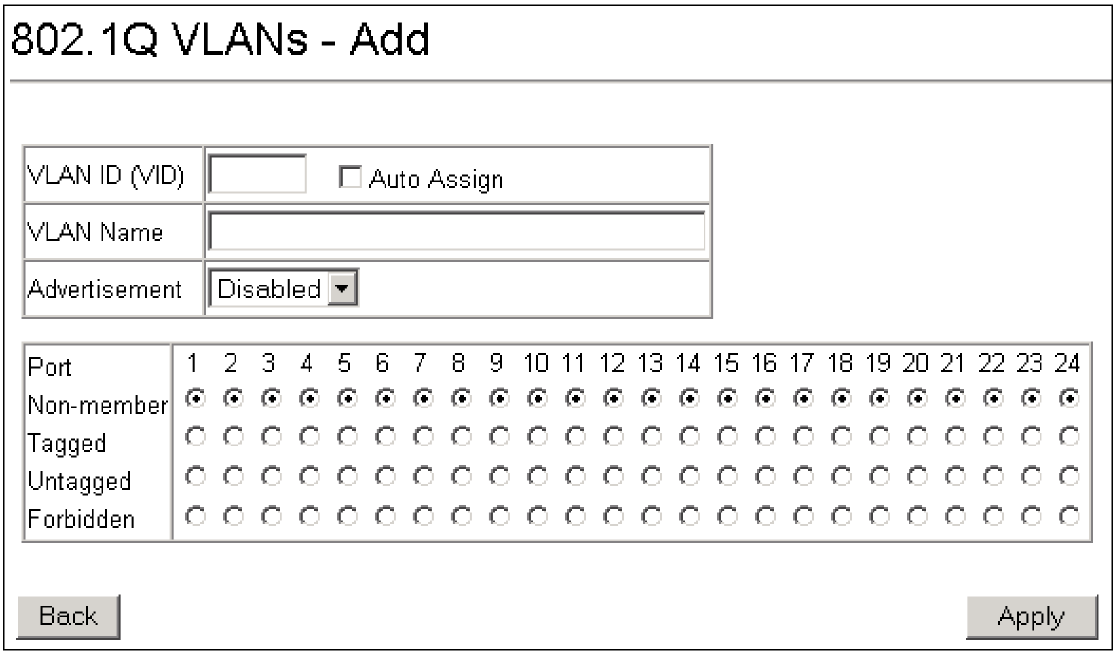
Total Entries: 1

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

Figure 6- 65. 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 Add button:

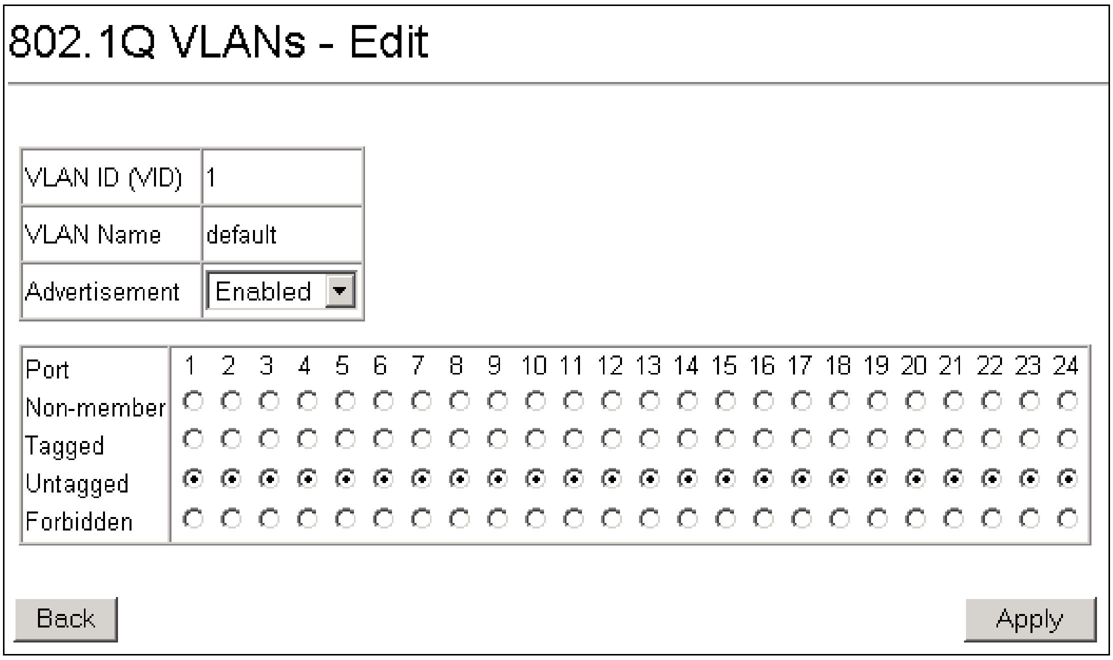


802.1Q VLANs - Add

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- 66. 802.1Q VLANs – Add window



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- 67. 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. Advertising disable, then switch does not send any GARP/GVRP messages of the VLAN.

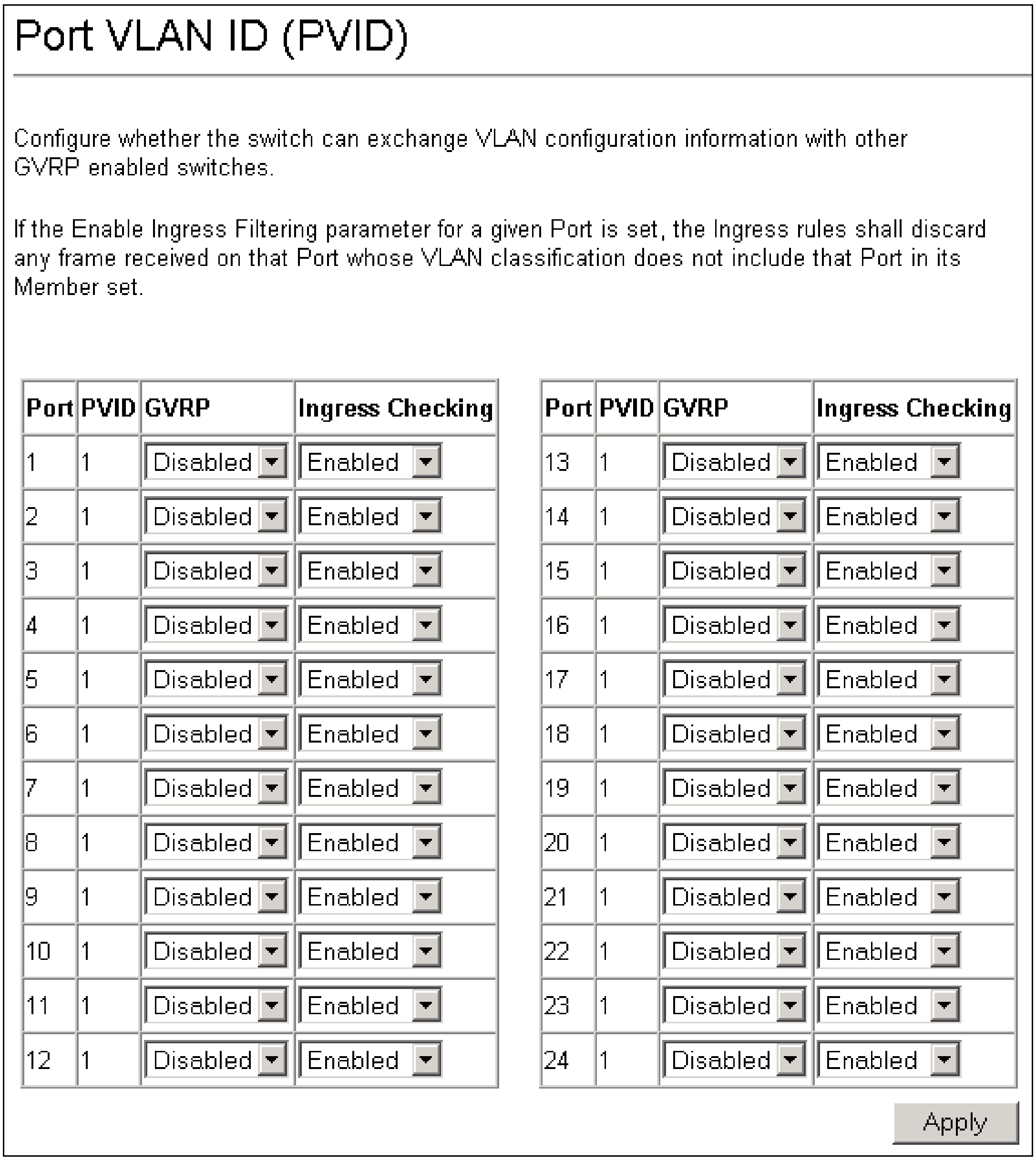
Port Allows an individual port to be specified as member of a VLAN.

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.

Port VLAN ID (PVID)



Port VLAN ID (PVID)

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.

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

Figure 6- 68. Port VLAN ID (PVID) 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.

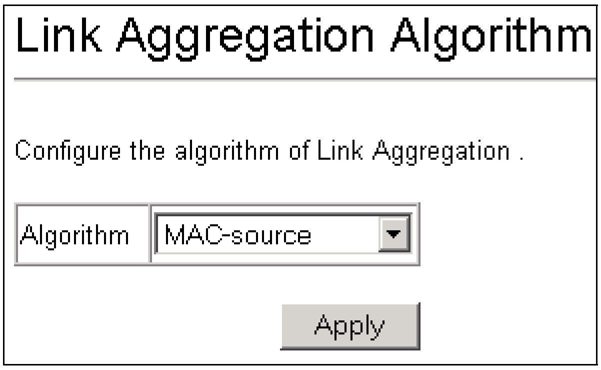
The information on the window is described as follows:

- **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* or *Disabled*.
- **Ingress Checking** – 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.

Link Aggregation

Link Aggregation Algorithm



Link Aggregation Algorithm

Configure the algorithm of Link Aggregation .

Algorithm: MAC-source

Figure 6- 69. Link Aggregation Algorithm window

The information on the window is described as follows:

- **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.

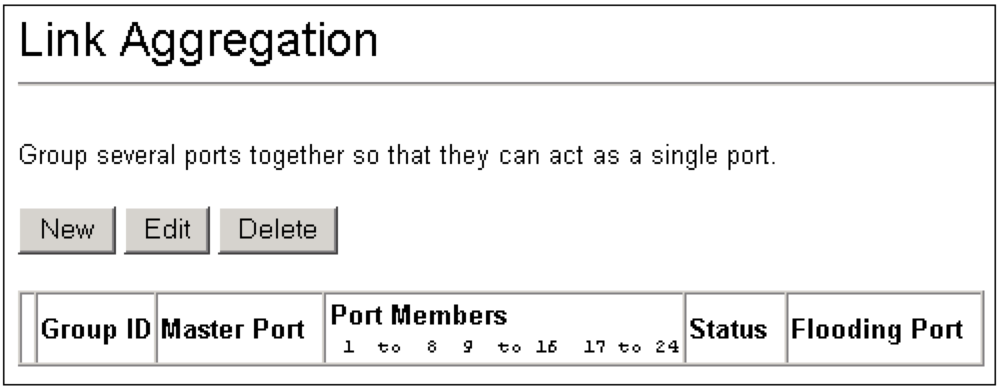
Link aggregation is most commonly used to link a bandwidth intensive network device or devices – such as a server – to the backbone of a network.

The switch allows the creation of up to 32 link aggregation groups, each group consisting of up of up to eight links (ports). The aggregated links must be contiguous (they must have sequential port numbers) except the four mini-GBIC ports – which 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.

The configuration of the lowest numbered port in the group becomes the configuration for all of the ports in the aggregation group. This port is called 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.

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.



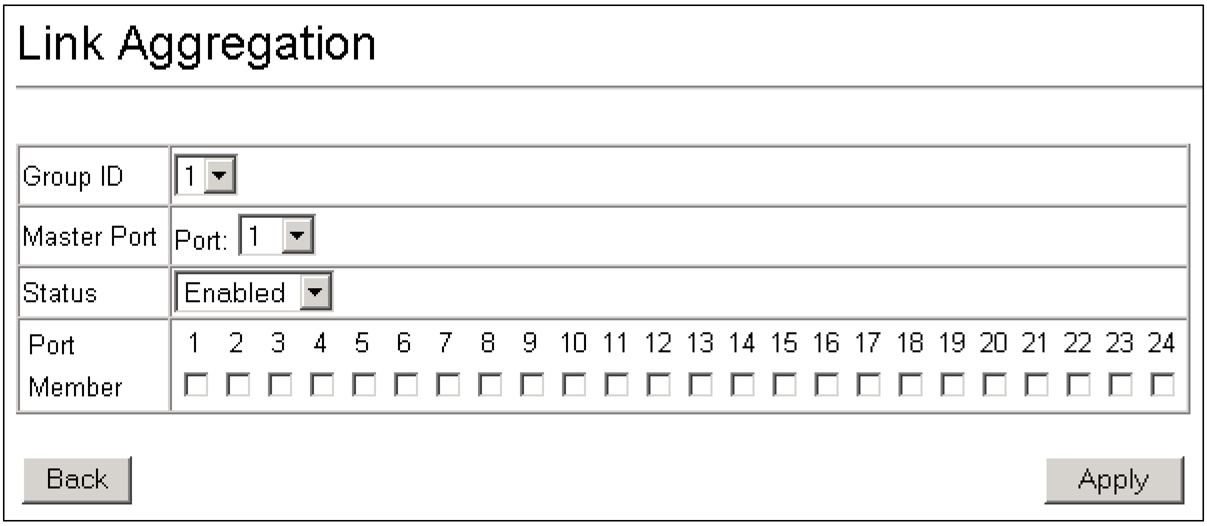
Link Aggregation

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

	Group ID	Master Port	Port Members 1 to 8 9 to 16 17 to 24	Status	Flooding Port

Figure 6- 70. first Link Aggregation window

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



Link Aggregation

Group ID	1
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- 71. second Link Aggregation window

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

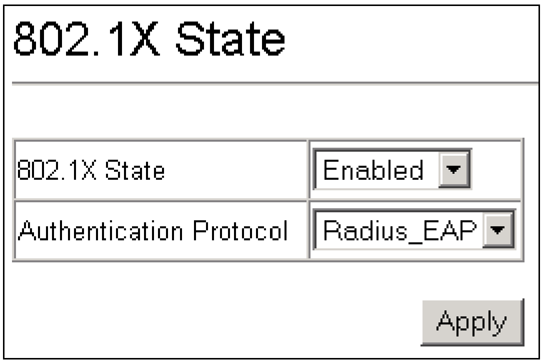
	the Group ID of the currently selected link aggregation group – when editing and existing entry.
Master Port <*1*>	The Master port of link aggregation group.
Status <*Disabled*>	This field can be toggled between *Enabled* and *Disabled*. This is used to turn a link aggregation group on or off. This is 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.

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- 72. 802.1X State window

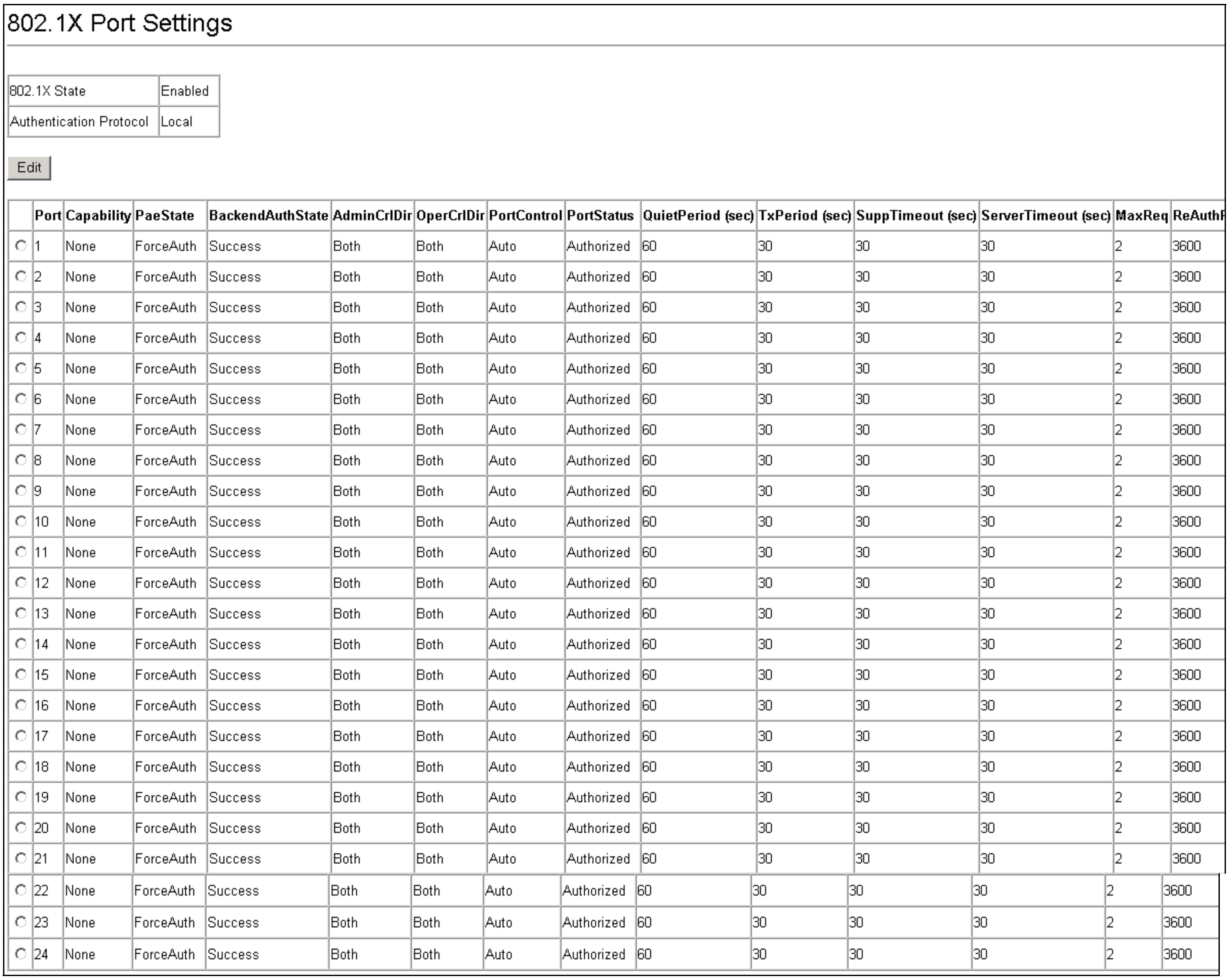
The following fields can be set:

Parameter	Description
802.1X State	The 802.1x State can be set to *Local* or *Radius_EAP*. RADIUS Extensible

	Authentication Protocol (EAP) supports multiple authentication mechanisms that are negotiated during the authentication phase.
Authentication Protocol	This displays the current Authentication Protocol.

802.1X Port Settings

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



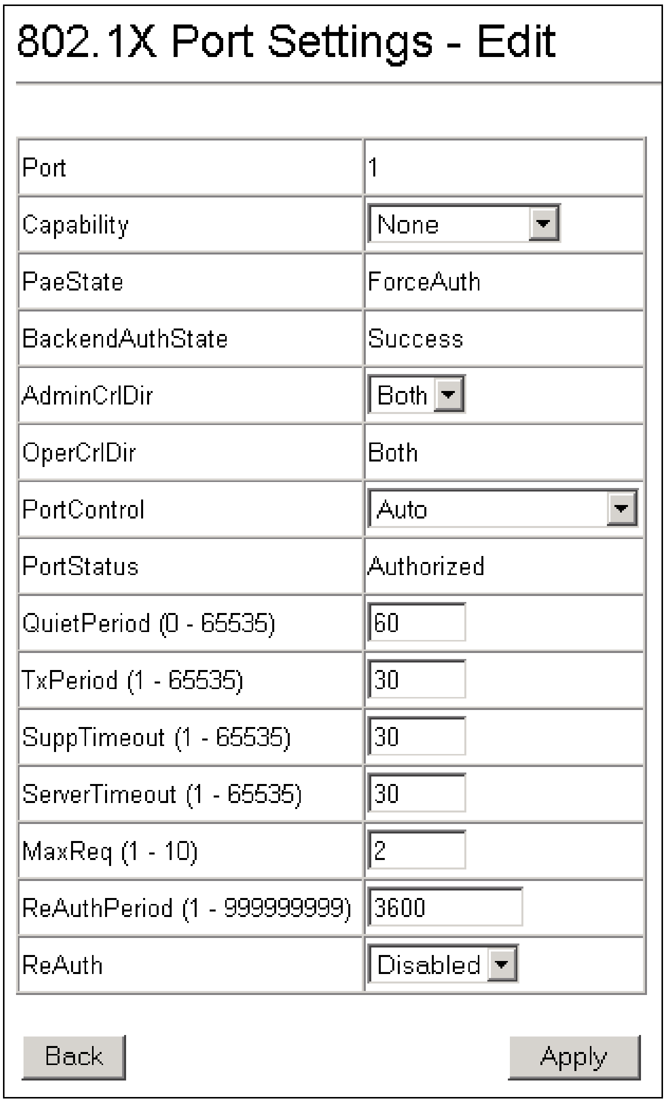
802.1X Port Settings

802.1X State	Enabled
Authentication Protocol	Local

	Port	Capability	PaeState	BackendAuthState	AdminCrlDir	OperCrlDir	PortControl	PortStatus	QuietPeriod (sec)	TxPeriod (sec)	SuppTimeout (sec)	ServerTimeout (sec)	MaxReq	ReAuthP
○	1	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	2	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	3	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	4	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	5	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	6	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	7	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	8	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	9	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	10	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	11	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	12	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	13	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	14	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	15	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	16	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	17	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	18	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	19	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	20	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	21	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	22	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	23	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600
○	24	None	ForceAuth	Success	Both	Both	Auto	Authorized	60	30	30	30	2	3600

Figure 6- 73. 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
Capability	None
PaeState	ForceAuth
BackendAuthState	Success
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 - 999999999)	3600
ReAuth	Disabled

Figure 6- 74. 802.1X Port Settings – Edit window

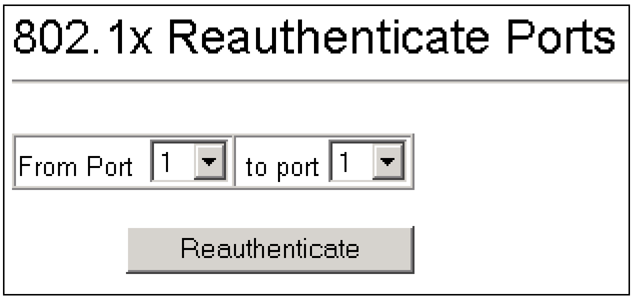
Configure the following 802.1x port settings:

Parameter	Description
Port	Port being configured for 802.1x settings.
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.
PaeState	Shows the current state of the Authenticator.
BackendAuthState	Shows the current state of the Backend Authenticator.

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 (1-999999999)	Select the time interval between successive re-authentications.
ReAuth	Enable or disable reauthentication.

802.1X Reauthenticate Ports

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



802.1x Reauthenticate Ports

From Port 1 to port 1

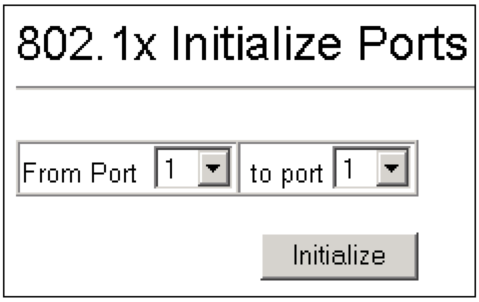
Figure 6- 75. 802.1x Reauthenticate Ports window

Select ports to be reauthenticated and then click the **Reauthenticate** button to let your change take effect.

The port number is the only parameter to be configured.

802.1x Initialize Ports

Use this window to initialize ports to their initial status.



802.1x Initialize Ports

From Port 1 to port 1

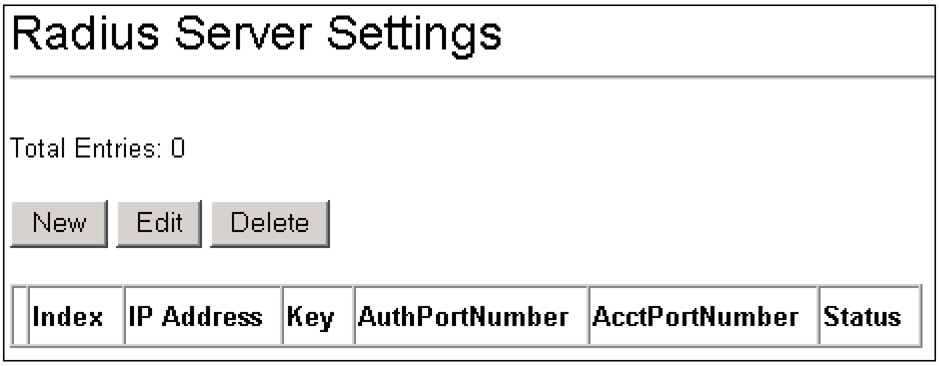
Figure 6- 76. 802.1x Initialize Ports window

Select ports to be initialized and then click the **Initialize** button 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.



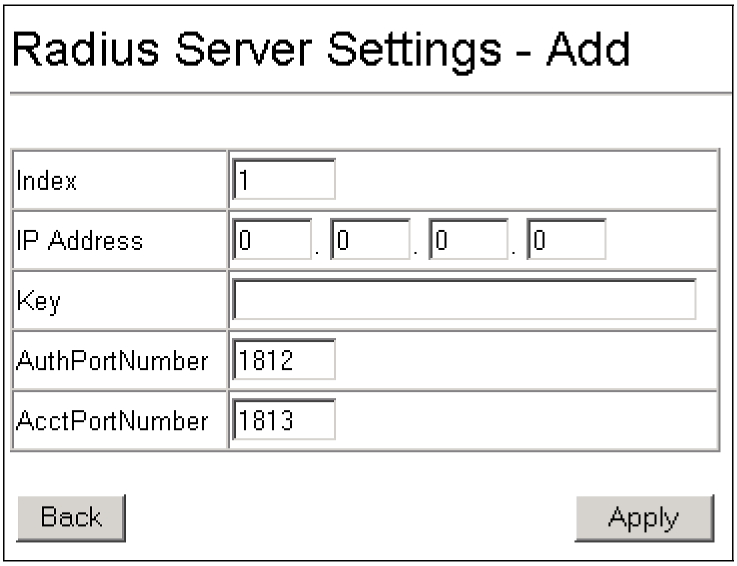
Radius Server Settings

Total Entries: 0

	Index	IP Address	Key	AuthPortNumber	AcctPortNumber	Status

Figure 6- 77. 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

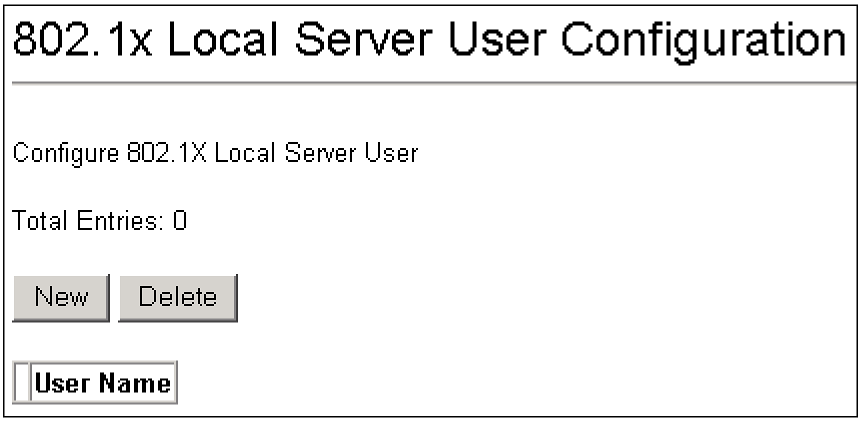
Figure 6- 78. RADIUS Server Settings – Add window

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.

Local Server User



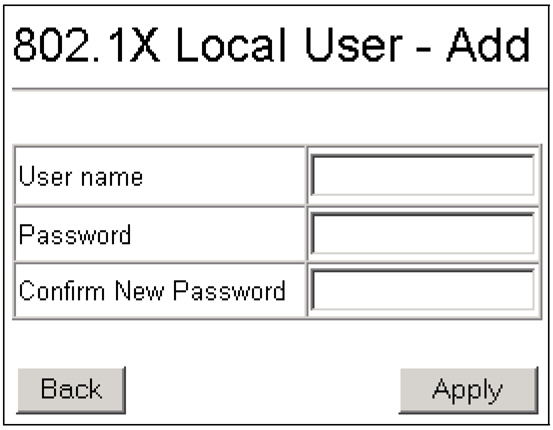
802.1x Local Server User Configuration

Configure 802.1X Local Server User

Total Entries: 0

Figure 6- 79. 802.1X Local Server User Configuration window

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



802.1X Local User - Add

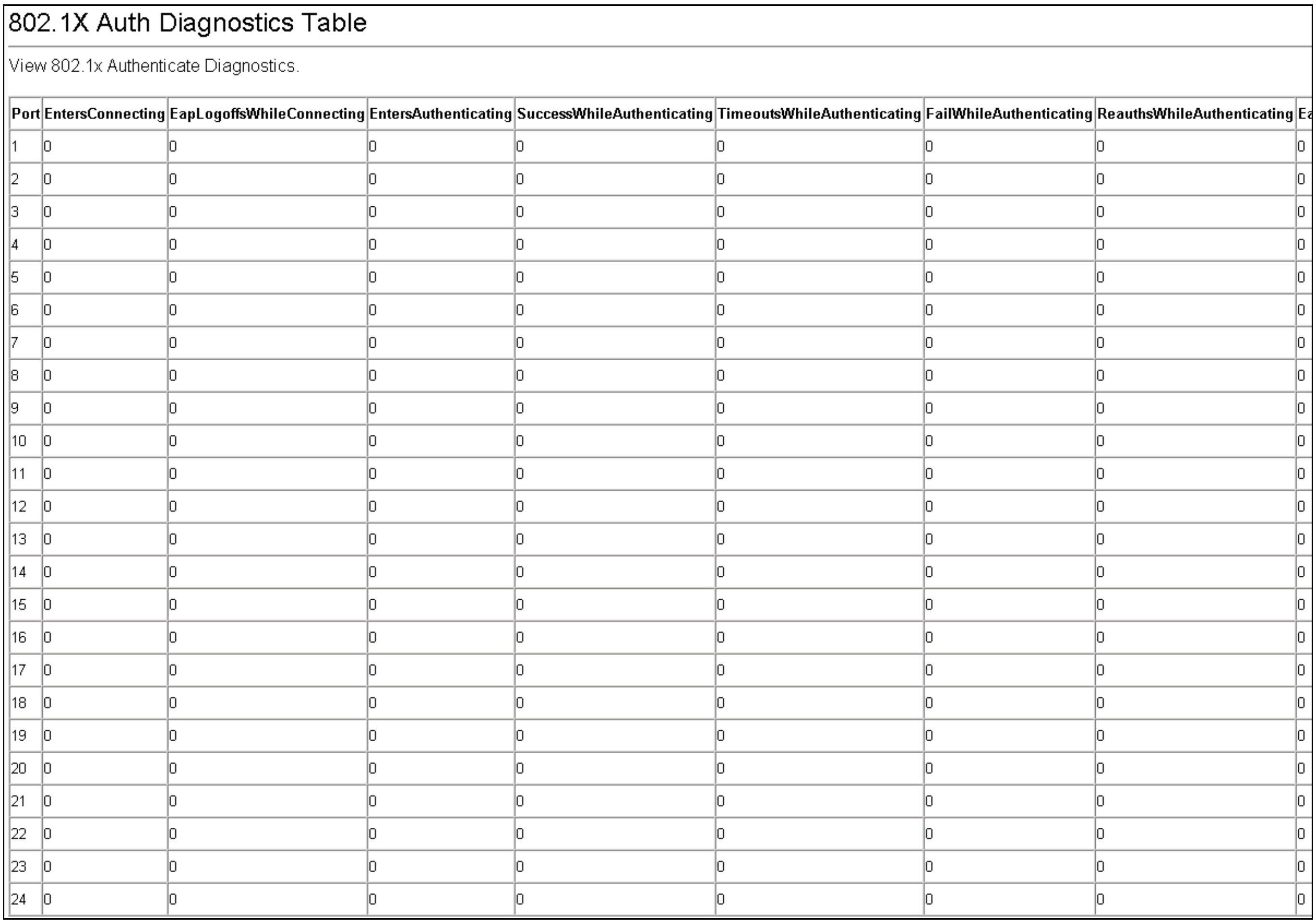
User name

Password

Confirm New Password

Figure 6- 80. 802.1X Local User – Add window

802.1X Diagnostics



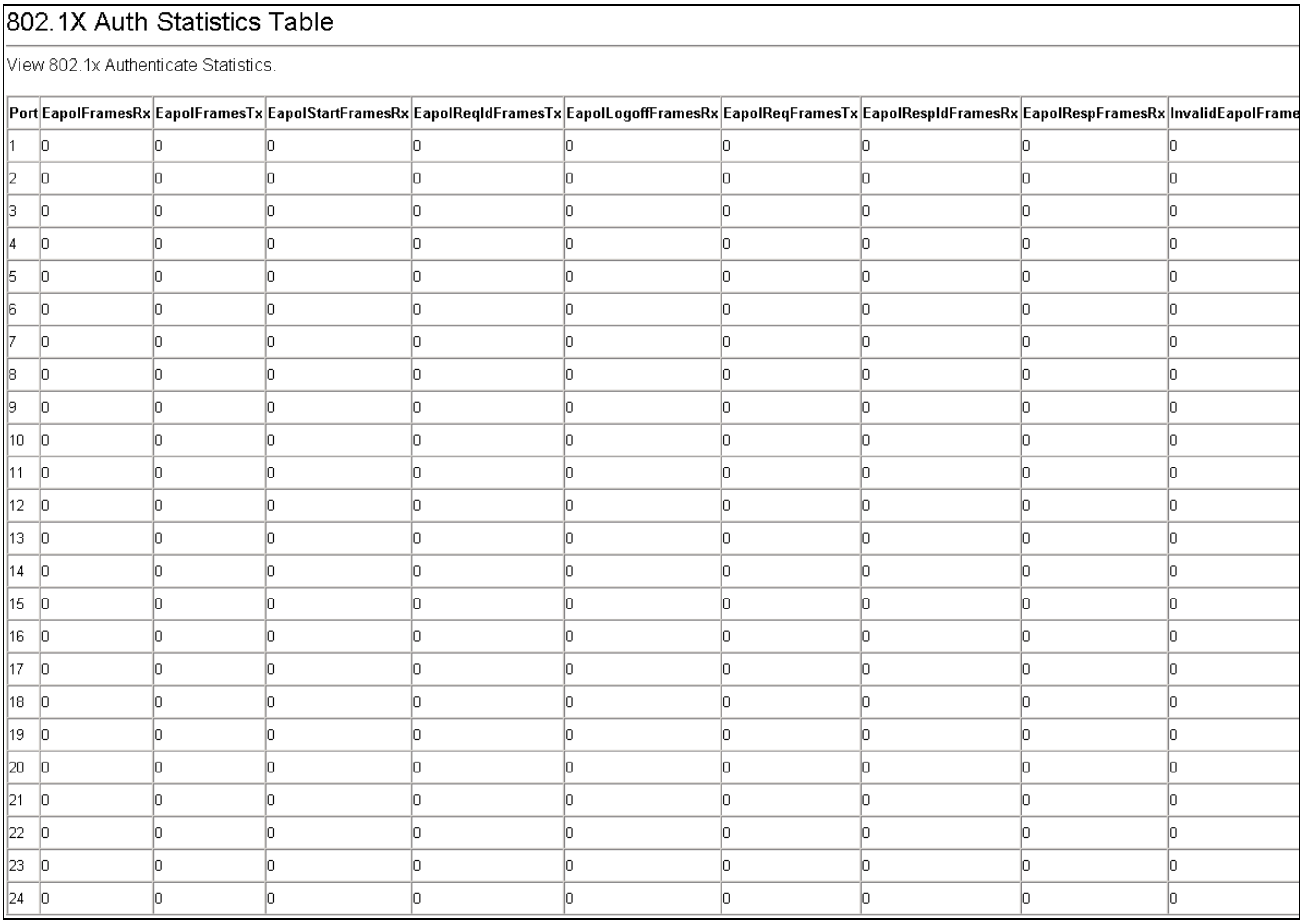
802.1X Auth Diagnostics Table

View 802.1x Authenticate Diagnostics.

Port	EntersConnecting	EapLogoffsWhileConnecting	EntersAuthenticating	SuccessWhileAuthenticating	TimeoutsWhileAuthenticating	FailWhileAuthenticating	ReauthsWhileAuthenticating	Ea
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- 81. 802.1X Auth Diagnostics Table window

802.1X Auth Statistics



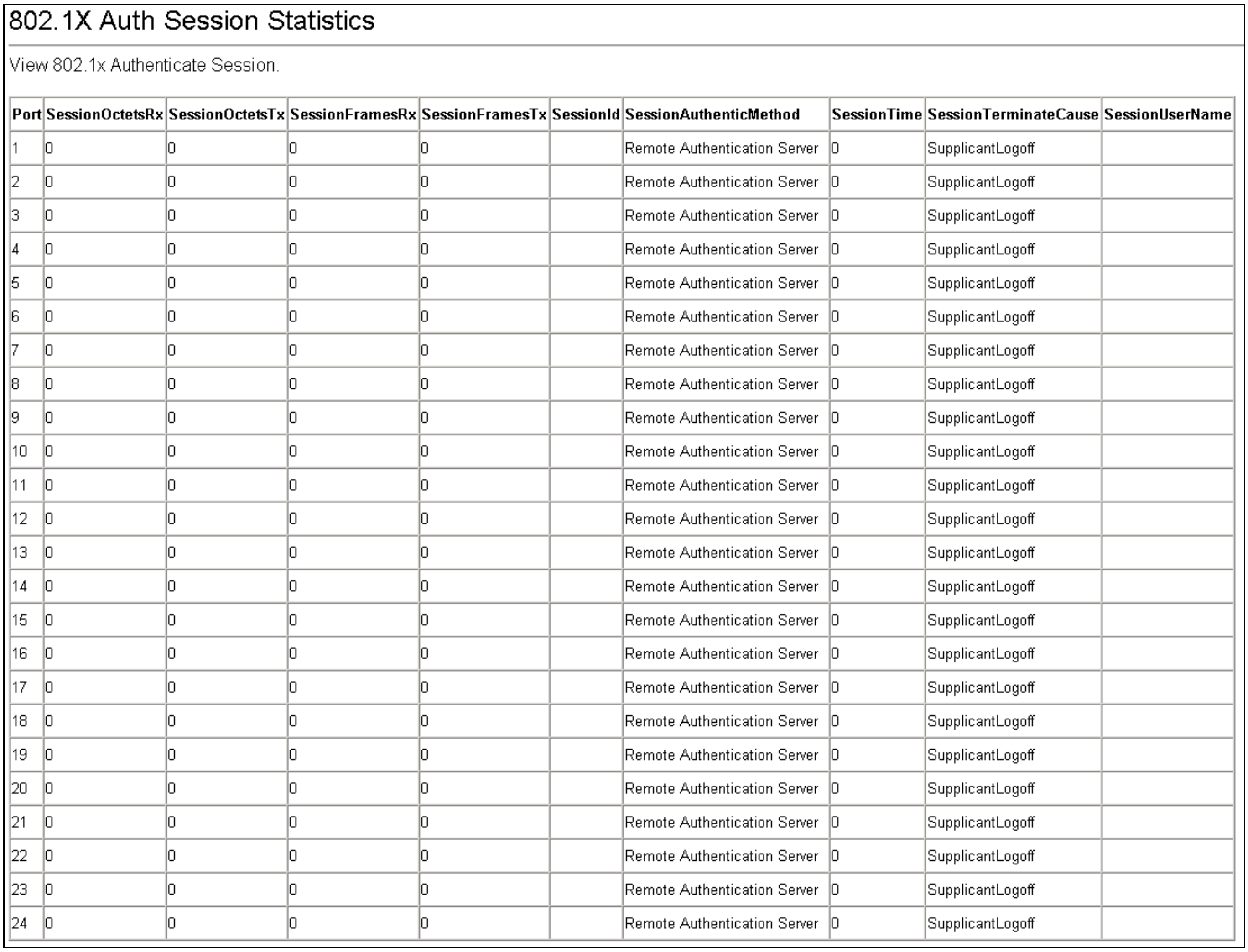
802.1X Auth Statistics Table

View 802.1x Authenticate Statistics.

Port	EapolFramesRx	EapolFramesTx	EapolStartFramesRx	EapolReqIdFramesTx	EapolLogoffFramesRx	EapolReqFramesTx	EapolRespIdFramesRx	EapolRespFramesRx	InvalidEapolFrame
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- 82. 802.1X Auth Statistics Table window

802.1X Auth Session



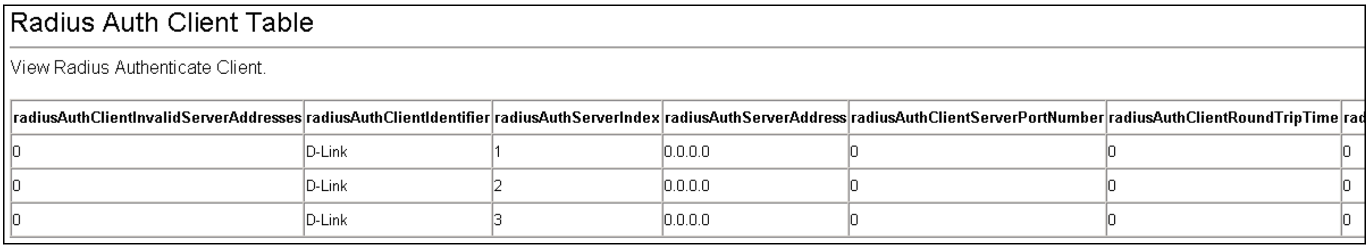
802.1X Auth Session Statistics

View 802.1x Authenticate Session.

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- 83. 802.1X Auth Session Statistics window

802.1X Auth Client



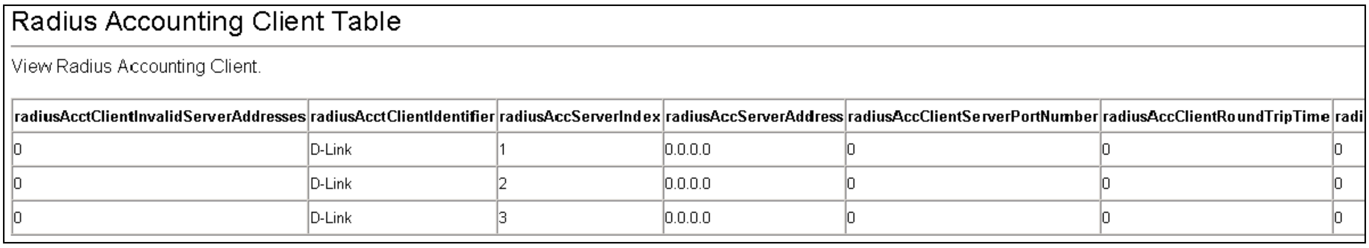
Radius Auth Client Table

View Radius Authenticate Client.

radiusAuthClientInvalidServerAddresses	radiusAuthClientIdentifier	radiusAuthServerIndex	radiusAuthServerAddress	radiusAuthClientServerPortNumber	radiusAuthClientRoundTripTime	rad
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- 84. RADIUS Auth Client Table window

802.1X Accounting Client



Radius Accounting Client Table

View Radius Accounting Client.

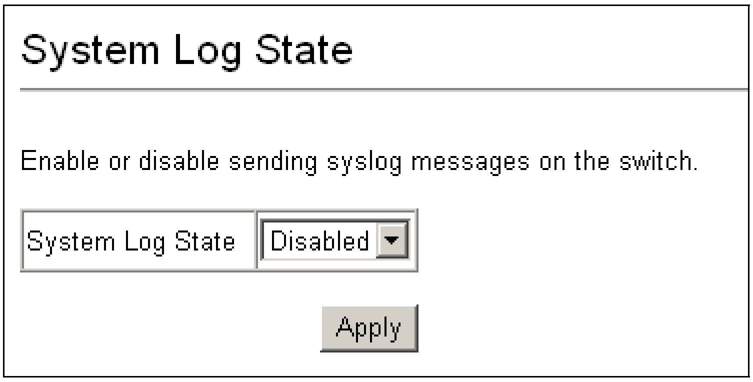
radiusAcctClientInvalidServerAddresses	radiusAcctClientIdentifier	radiusAccServerIndex	radiusAccServerAddress	radiusAccClientServerPortNumber	radiusAccClientRoundTripTime	radi
0	D-Link	1	0.0.0.0	0	0	0
0	D-Link	2	0.0.0.0	0	0	0
0	D-Link	3	0.0.0.0	0	0	0

Figure 6- 85. RADIUS Accounting Client Table 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

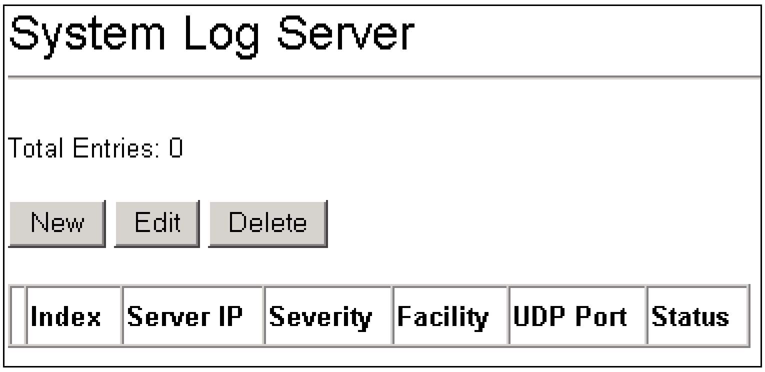
Enable or disable sending syslog messages on the switch.

System Log State: Disabled

Figure 6- 86. 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 Server



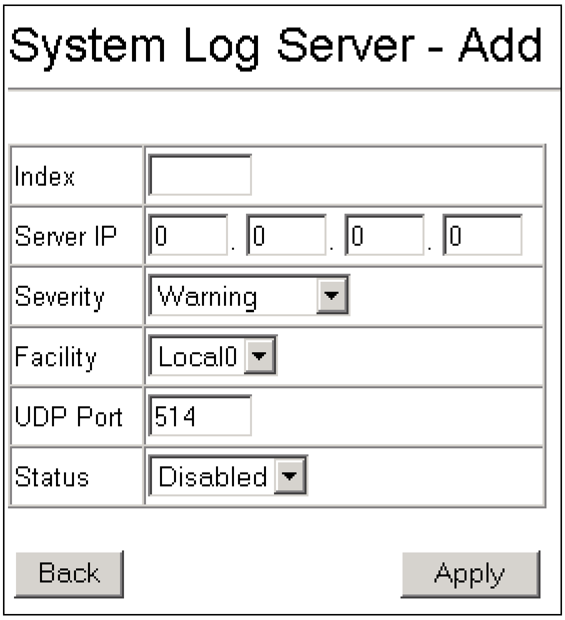
System Log Server

Total Entries: 0

Index	Server IP	Severity	Facility	UDP Port	Status

Figure 6- 87. System Log Server window

Click **New** to add an entry to this table:



System Log Server - Add

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

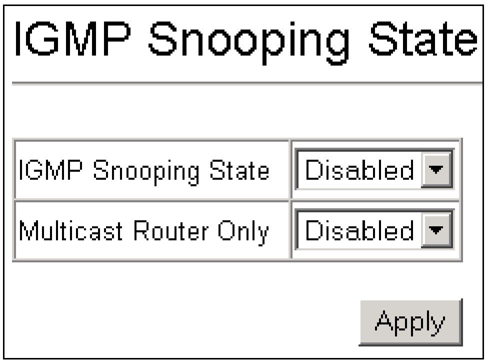
Figure 6- 88. System Log Server – Add window

Parameter	Description
Index	Syslog server settings index (1-4).
Server IP	Type in the IP address of the Syslog server receiving the message.
Severity	Select the level of message sent, select: *Warning*, *Information* 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



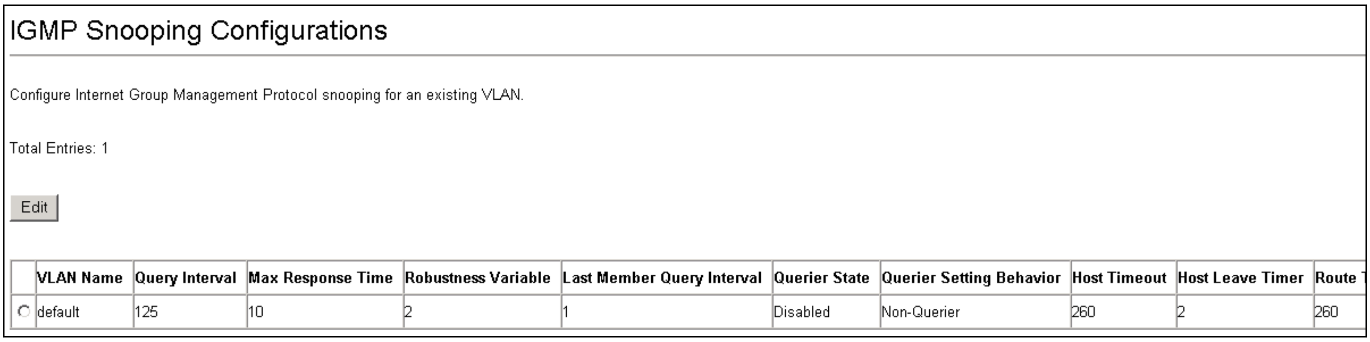
IGMP Snooping State

IGMP Snooping State	Disabled
Multicast Router Only	Disabled

Figure 6- 89. 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

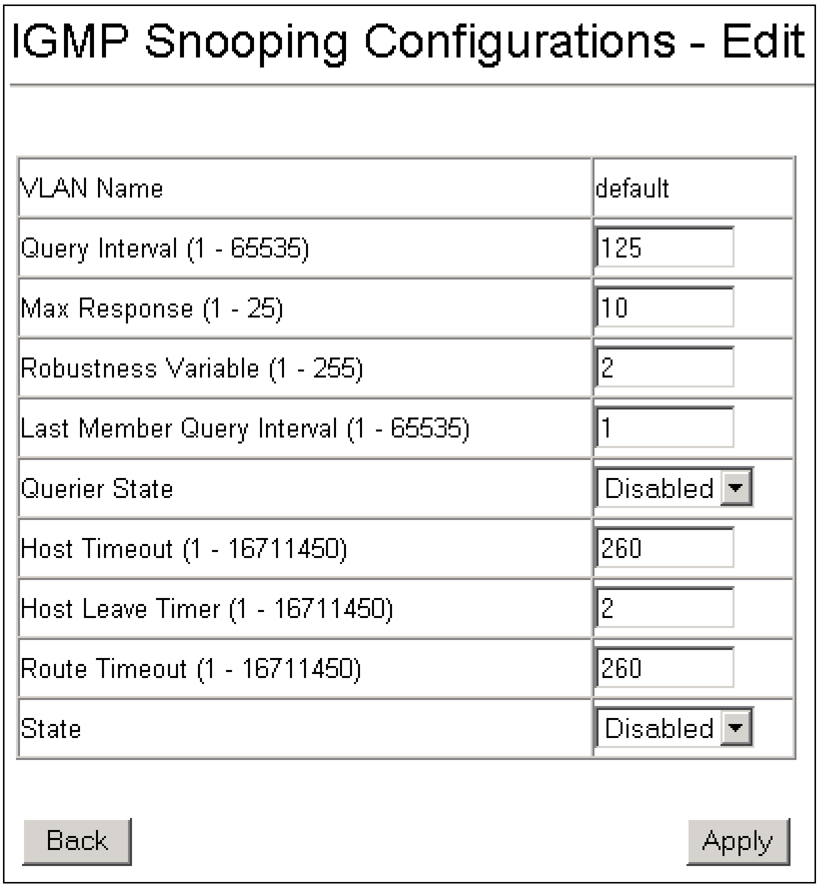
Configure Internet Group Management Protocol snooping for an existing VLAN.

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 T
○	default	125	10	2	1	Disabled	Non-Querier	260	2	260

Figure 6- 90. IGMP Snooping Configurations window

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



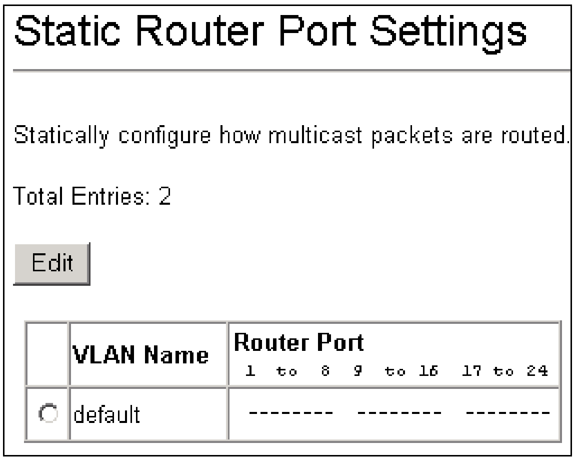
IGMP Snooping Configurations - Edit

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

Figure 6- 91. 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). 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

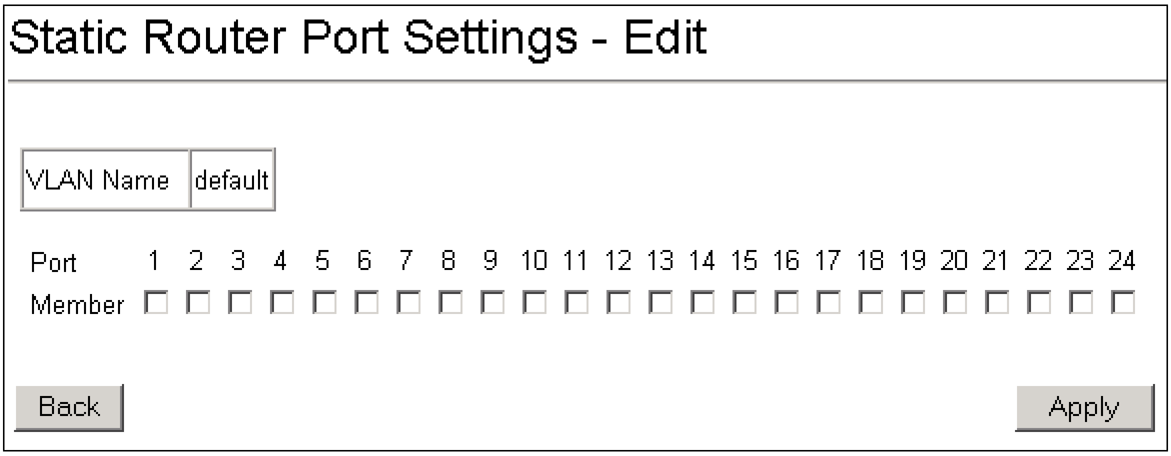
Statically configure how multicast packets are routed.

Total Entries: 2

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

Figure 6- 92. 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- 93. Static Router Port Settings – Edit window

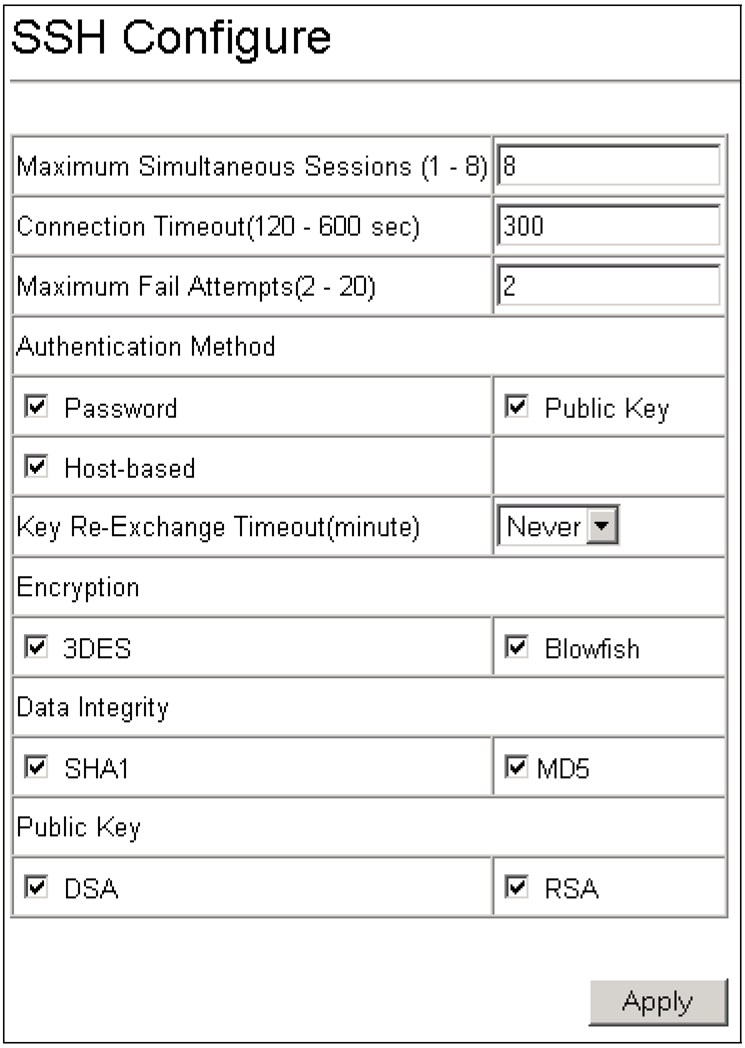
SSH Management

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 Global



SSH Configure

Maximum Simultaneous Sessions (1 - 8)	8
Connection Timeout(120 - 600 sec)	300
Maximum Fail Attempts(2 - 20)	2
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- 94. SSH Configure 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 on the window is described as following:

- **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.

- **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.

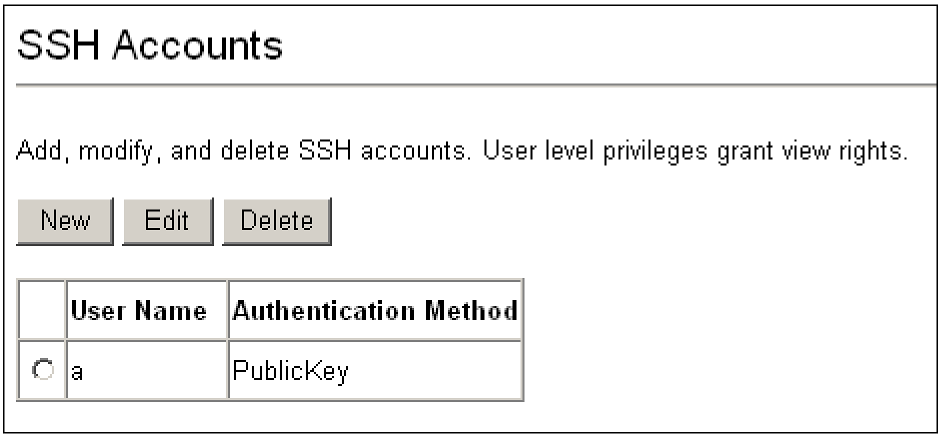
  MD5: Use the hmac-md5 MAC.

- **Public Key** – Specify the algorithm to use for the public key.

  DSA: Use the DSA algorithm.

  RSA: Use the RSA algorithm.

SSH Account Configuration



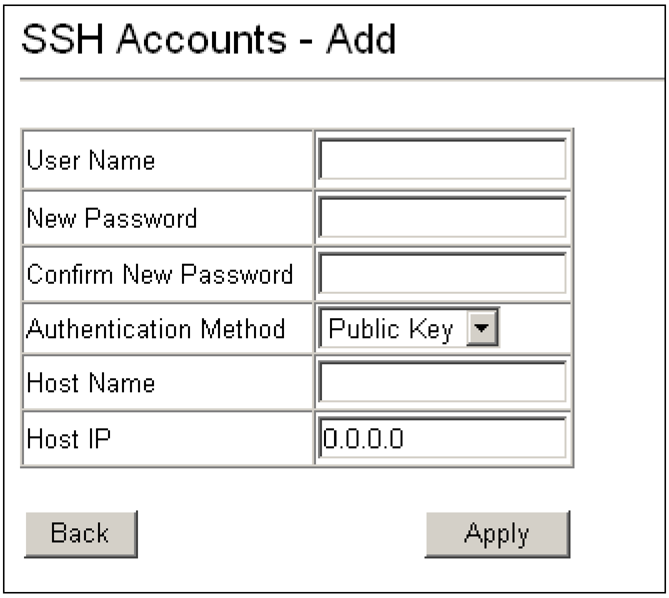
SSH Accounts

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

	User Name	Authentication Method
○	a	PublicKey

Figure 6- 95. SSH Accounts window

Click **New** to open the **SSH Accounts – Add** window:



SSH Accounts - Add

User Name	
New Password	
Confirm New Password	
Authentication Method	Public Key
Host Name	
Host IP	0.0.0.0

Figure 6- 96. SSH Accounts – Add window

The **SSH Accounts – Add** window can be used to specify user name, new password, authentication method, host name, host IP.

A

TECHNICAL SPECIFICATIONS

	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:	Half duplex	Full duplex
Ethernet:	10 Mbps	20 Mbps
Fast Ethernet:	100 Mbps	200 Mbps
Gigabit Ethernet:	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)	

	General
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 10/100/1000 Mbps ports 4 GBIC combo ports

	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

Performance

	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.

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

C

UNDERSTANDING AND TROUBLESHOOTING THE SPANNING TREE PROTOCOL

When the spanning-tree algorithm determines a port should be transitioned to the forwarding state, the following occurs:

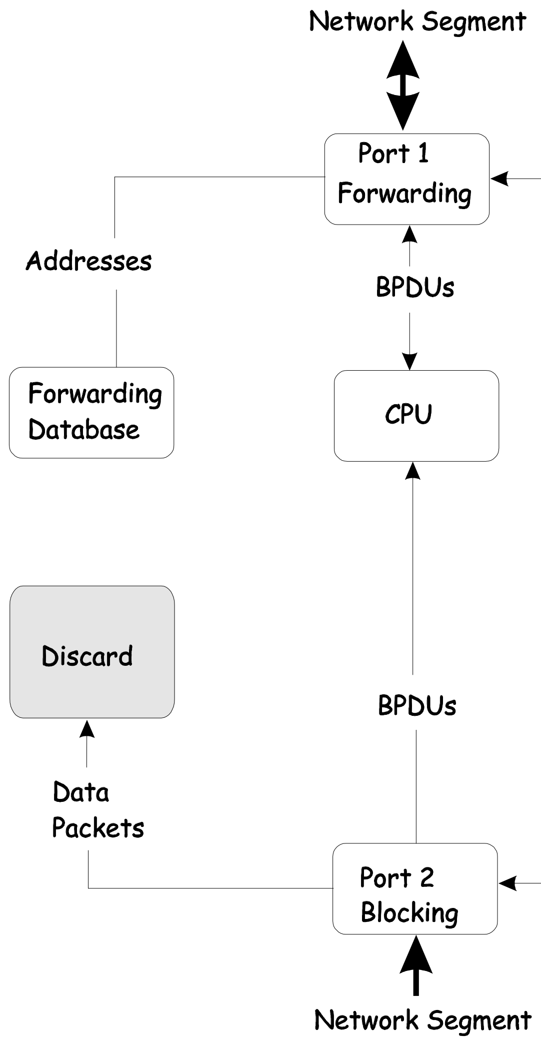
- The port is put into the listening state where it receives BPDUs and passes them to the switch's CPU. BPDU packets from the CPU are processed. If no BPDUs that suggest the port should go to the blocking state are received:
- The port waits for the expiration of the forward delay timer. It then moves to the learning state.
- In the learning state, the port learns station location information from the source address of packets and adds this information to its forwarding database.
- The expiration of forwarding delay timer moves the port to the forwarding state, where both learning and forwarding are enabled. At this point, packets are forwarded by the port.

Blocking State

A port in the blocking state does not forward packets. When the switch is booted, a BPDU is sent to each port in the switch putting these ports into the blocking state. A switch initially assumes it is the root, and then begins the exchange of BPDUs with other switches. This will determine which switch in the network is the best choice for the root switch. If there is only one switch on the network, no BPDU exchange occurs, the forward delay timer expires, and the ports move to the listening state. All STP enabled ports enter the blocking state following switch boot.

A port in the blocking state does the following:

- Discards packets received from the network segment to which it is attached.
- Discards packets sent from another port on the switch for forwarding.
- Does not add addresses to its forwarding database
- Receives BPDUs and directs them to the CPU.
- Does not transmit BPDUs received from the CPU.
- Receives and responds to network management messages.



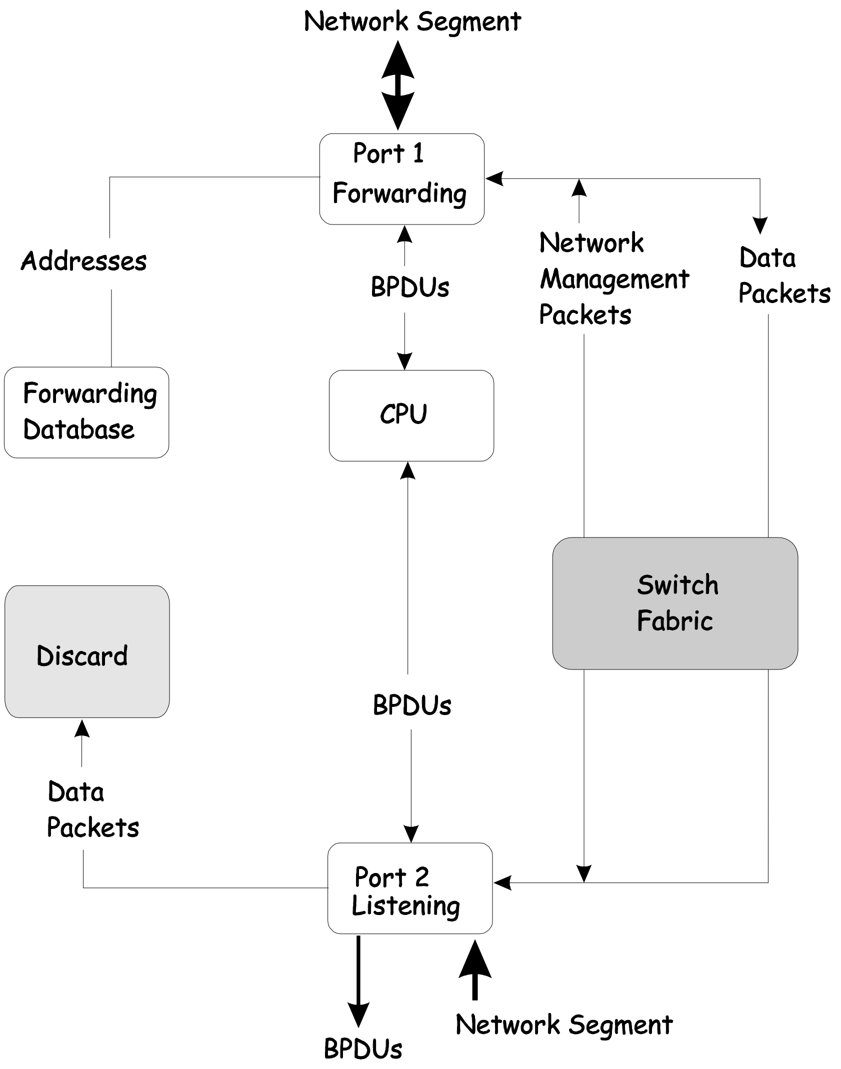
Listening State

The listening state is the first transition for a port from the blocking state. Listening is an opportunity for the switch to receive BPDUs that may tell the switch that the port should not continue to transition to the forwarding state, but should return to the blocking state (that is, a different port is a better choice).

There is no address learning or packet forwarding from a port in the listening state.

A port in the listening state does the following:

- Discards frames received from the network segment to which it is attached.
- Discards packets sent from another port on the switch for forwarding.
- Does not add addresses to its forwarding database
- Receives BPDUs and directs them to the CPU.
- Processes BPDUs received from the CPU.
- Receives and responds to network management messages.

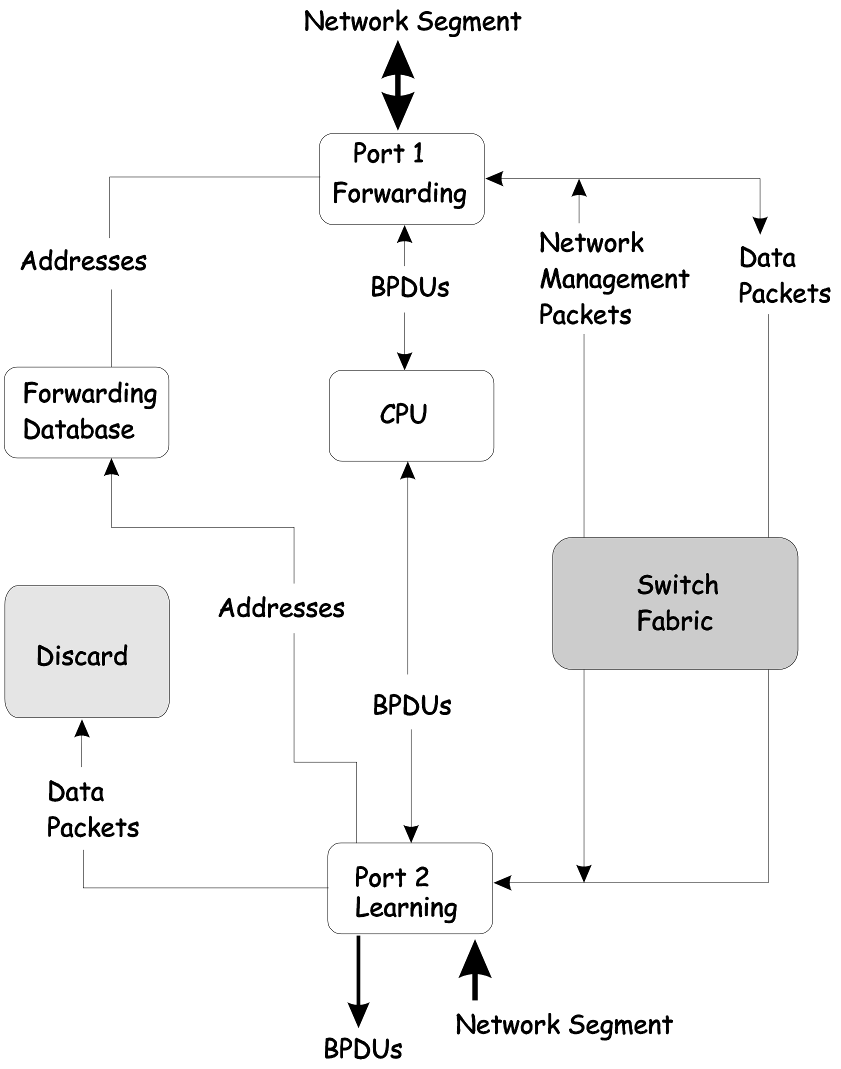


Learning State

A port in the learning state prepares to participate in frame forwarding. The port enters the learning state from the listening state.

A port in the learning state does the following:

- Discards frames received from the network segment to which it is attached.
- Discards packets sent from another port on the switch for forwarding.
- Adds addresses to its forwarding database.
- Receives BPDUs and directs them to the CPU.
- Processes and transmits BPDUs received from the CPU.
- Receives and responds to network management messages.

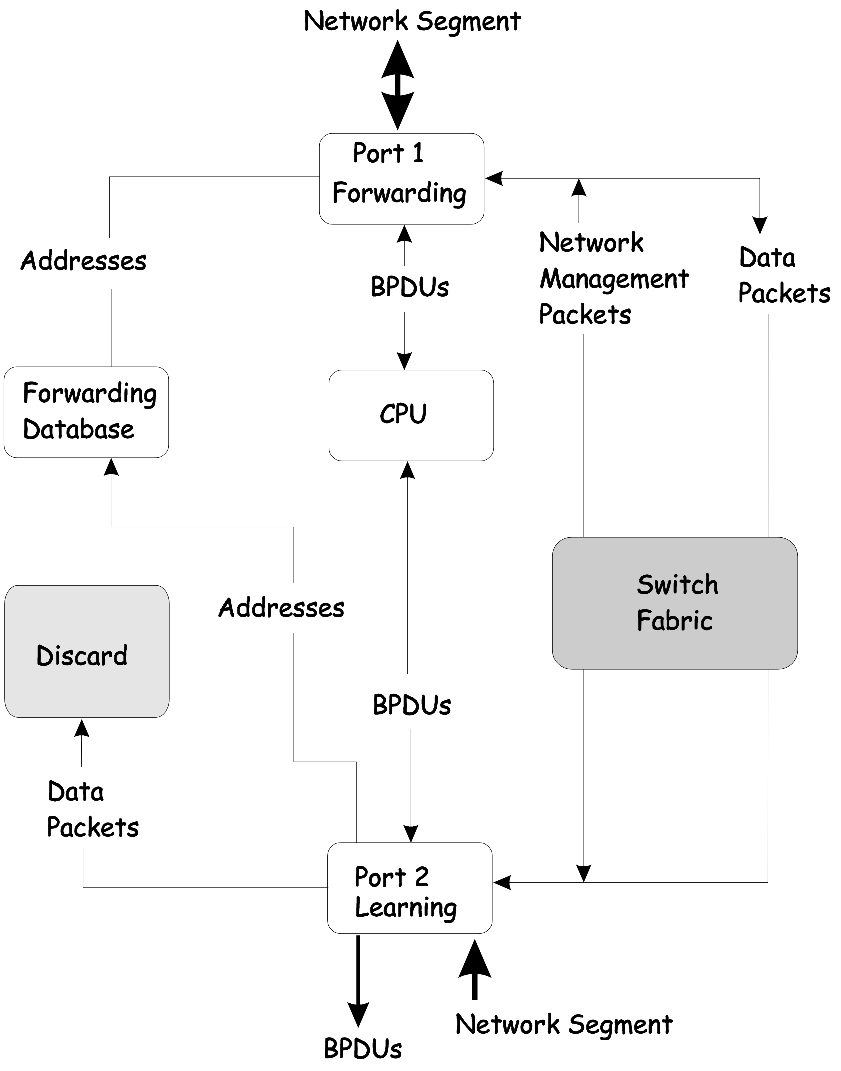


Forwarding State

A port in the forwarding state forwards packets. The port enters the forwarding state from the learning state when the forward delay timer expires.

A port in the forwarding state does the following:

- Forwards packets received from the network segment to which it is attached.
- Forwards packets sent from another port on the switch for forwarding.
- Incorporates station location information into its address database.
- Receives BPDUs and directs them to the system CPU.
- Receives and responds to network management messages.

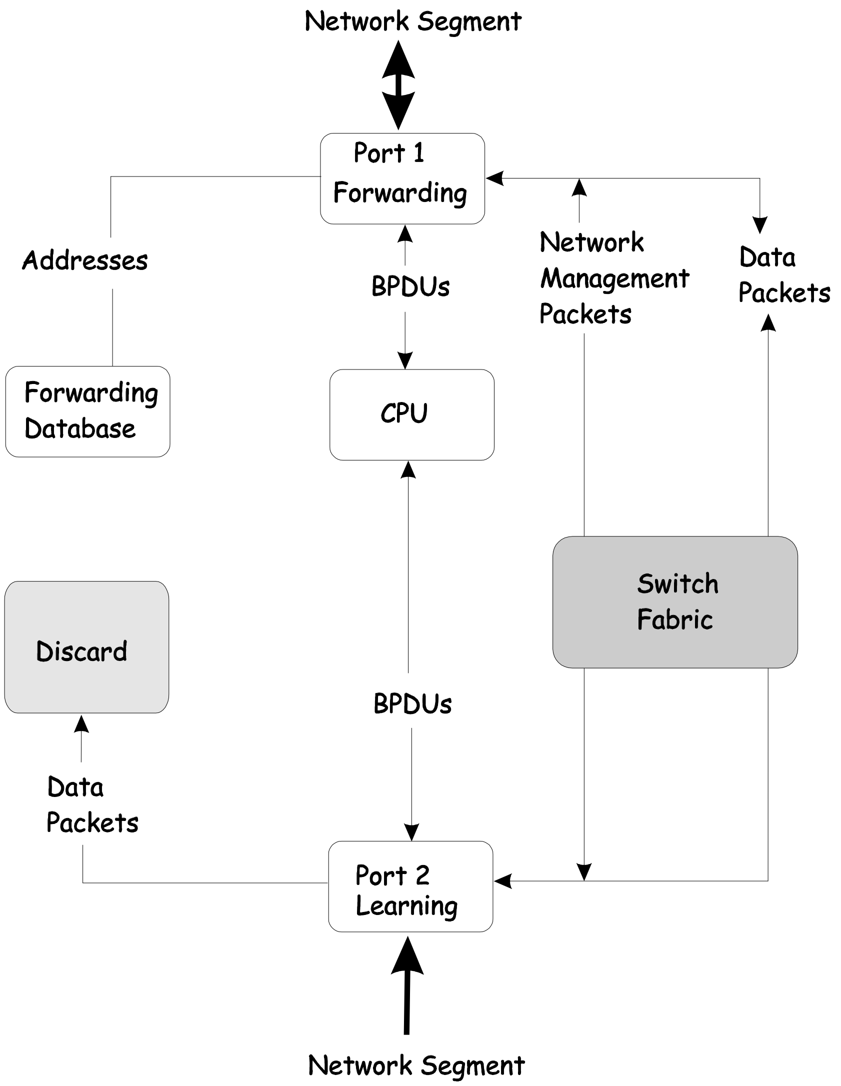


Disabled State

A port in the disabled state does not participate in frame forwarding or STP. A port in the disabled state is virtually non-operational.

A disabled port does the following:

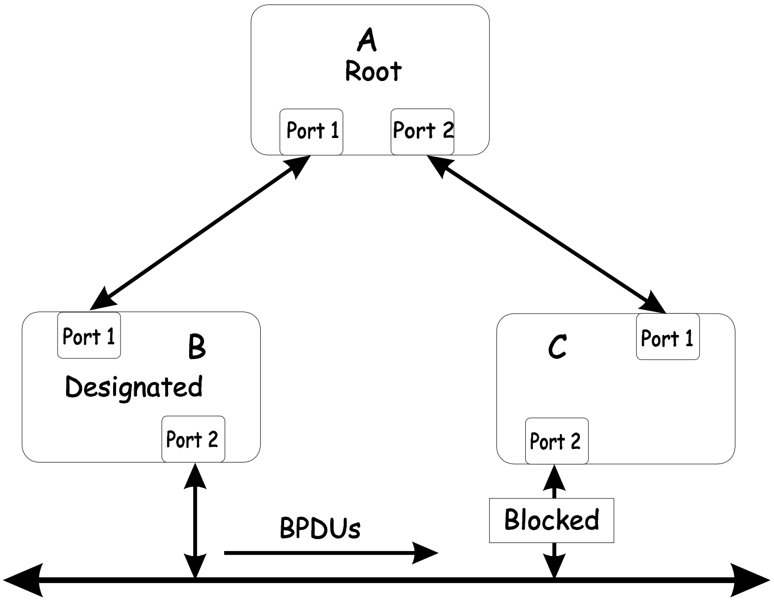
- Discards packets received from the network segment to which it is attached.
- Discards packets sent from another port on the switch for forwarding.
- Does not add addresses to its forwarding database.
- Receives BPDUs, but does not direct them to the system CPU.
- Does not receive BPDUs for transmission from the system CPU.
- Receives and responds to network management messages.



Troubleshooting STP

Spanning Tree Protocol Failure

A failure in the STA generally leads to a bridging loop. A bridging loop in an STP environment comes from a port that should be in the blocking state, but is forwarding packets.



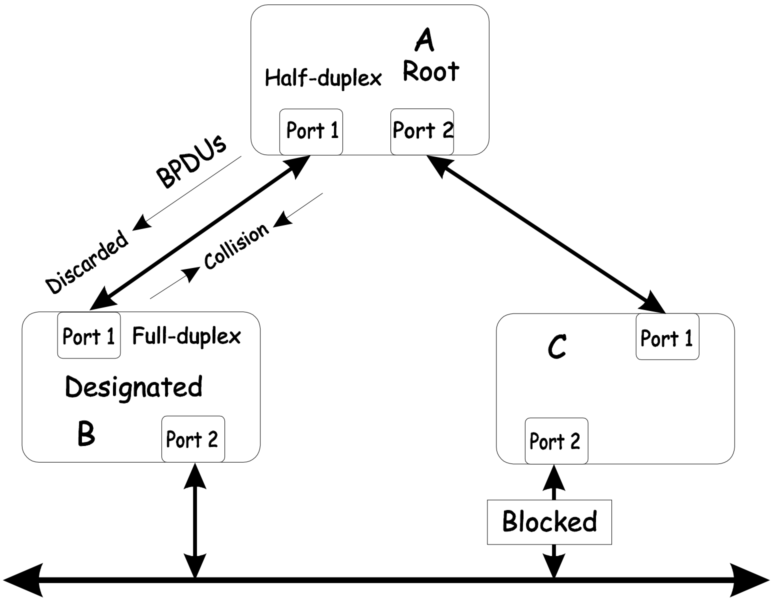
In this example, B has been elected as the designated bridge and port 2 on C is in the blocking state. The election of B as the designated bridge is determined by the exchange of BPDUs between B and C. B had a better BPDU than C. B continues sending BPDUs advertising its superiority over the other bridges on this LAN. Should C fail to receive these BPDUs for longer than the MAX AGE (default of 20 seconds), it could start to transition its port 2 from the blocking state to the forwarding state.

It should be noted: A port must continue to receive BPDUs advertising superior paths to remain in the blocking state.

There are a number of circumstances in which the STA can fail – mostly related to the loss of a large number of BPDUs. These situations will cause a port in the blocking state to transition to the forwarding state.

Full/Half Duplex Mismatch

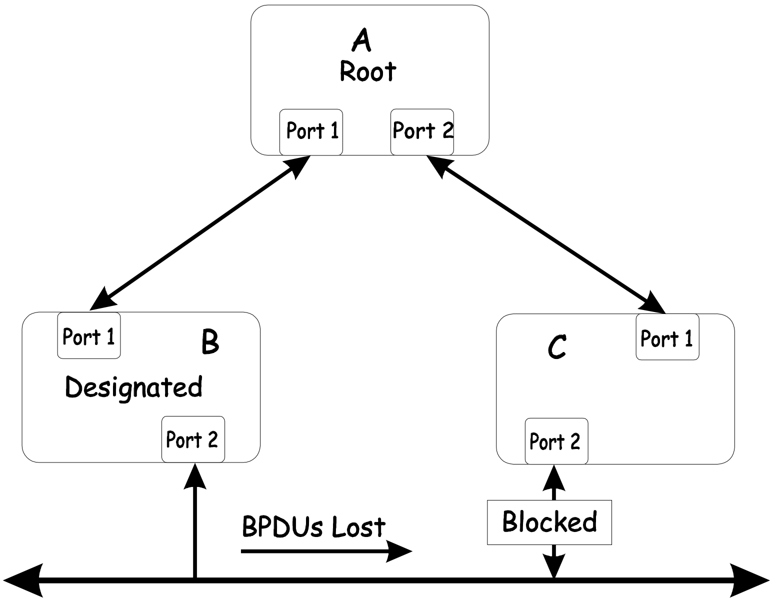
A mismatch in the duplex state of two ports is a very common configuration error for a point-to-point link. If one port is configured as a full duplex, and the other port is left in auto-negotiation mode, the second port will end up in half-duplex because ports configured as half- or full-duplex do not negotiate.



In the above example, port 1 on B is configured as a full-duplex port and port 1 on A is either configured as a half-duplex port, or left in auto-negotiation mode. Because port 1 on B is configured as a full-duplex port, it does not do the carrier sense when accessing the link. B will then start sending packets even if A is using the link. A will then detect collisions and begin to run the flow control algorithm. If there is enough traffic between B and A, all packets (including BPDUs) will be dropped. If the BPDUs sent from A to B are dropped for longer than the MAX AGE, B will lose its connection to the root (A) and will unblock its connection to C. This will lead to a data loop.

Unidirectional Link

Unidirectional links can be caused by an undetected failure in one side of a fiber cable, or a problem with a ports transceiver. Any failure that allows a link to remain up while providing one-way communication is very dangerous for STP.



In this example, port 2 on B can receive but not transmit packets. Port 2 on C should be in the blocking state, but since it can no longer receive BPDUs from port 2 on B, it will transition to the forwarding state. If the failure exists at boot, STP will not converge and rebooting the bridges will have no effect. (Note: Rebooting would help temporarily in the previous example).

This type of failure is difficult to detect because the Link-state LEDs for Ethernet links rely on the transmit side of the cable to detect a link. If a unidirectional failure on a link is suspected, it is usually required to go to the console or other management software and look at the packets received and transmitted for the port. A unidirectional port will have many packets transmitted but none received, or vice versa, for example.

Packet Corruption

Packet corruption can lead to the same type of failure. If a link is experiencing a high rate of physical errors, a large number of consecutive BPDUs can be dropped and a port in the blocking state would transition to the forwarding state. The blocking port would have to have the BPDUs dropped for 50 seconds (at the default settings) and a single BPDU would reset the timer. If the MAX AGE is set too low, this time is reduced.

Resource Errors

The DGS-3224TGR performs its switching and routing functions primarily in hardware, using specialized ASICs. STP is implemented in software and is thus reliant upon the speed of the CPU and other factors to converge. If the CPU is over-utilized, it is possible that BPDUs may not be sent in a timely fashion. STP is generally not very CPU intensive and is given priority over other processes, so this type of error is rare.

It can be seen that very low values for the MAX AGE and the FORWARD DELAY can result in an unstable spanning tree. The loss of BPDUs can lead to data loops. The diameter of the network can also cause problems. The default values for STP give a maximum network diameter of about seven. This means that two switches in the network cannot be more than seven hops apart. Part of this diameter restriction is the BPDU age field. As BPDUs are propagated from the root bridge to the leaves of the spanning tree, each bridge increments the age field. When this field is beyond the maximum age, the packet is discarded. For large diameter networks, STP convergence can be very slow.

Identifying a Data Loop

Broadcast storms have a very similar effect on the network to data loops, but broadcast storm controls in modern switches have (along with subnetting and other network practices) have been very effective in controlling broadcast storms. The best way to determine if a data loop exists is to capture traffic on a saturated link and check if similar packets are seen multiple times.

Generally, if all the users of a given domain are having trouble connecting to the network at the same time, a data loop can be suspected. The port utilization data in the switch's console will give unusually high values in this case.

The priority for most cases is to restore connectivity as soon as possible. The simplest remedy is to manually disable all of the ports that provide redundant links. Disabling ports one at a time, and then checking for a restoration of the user's connectivity will identify the link that is causing the problem, if time allows. Connectivity will be restored immediately after disabling a data loop.

Avoiding Trouble

Know where the root is located.

Although the STP can elect a root bridge, a well-designed network will have an identifiable root for each VLAN. Careful setup of the STP parameters will lead to the selection of this best switch as the root for each VLAN. Redundant links can then be built into the network. STP is well suited to maintaining connectivity in the event of a device failure or removal, but is poorly suited to designing networks.

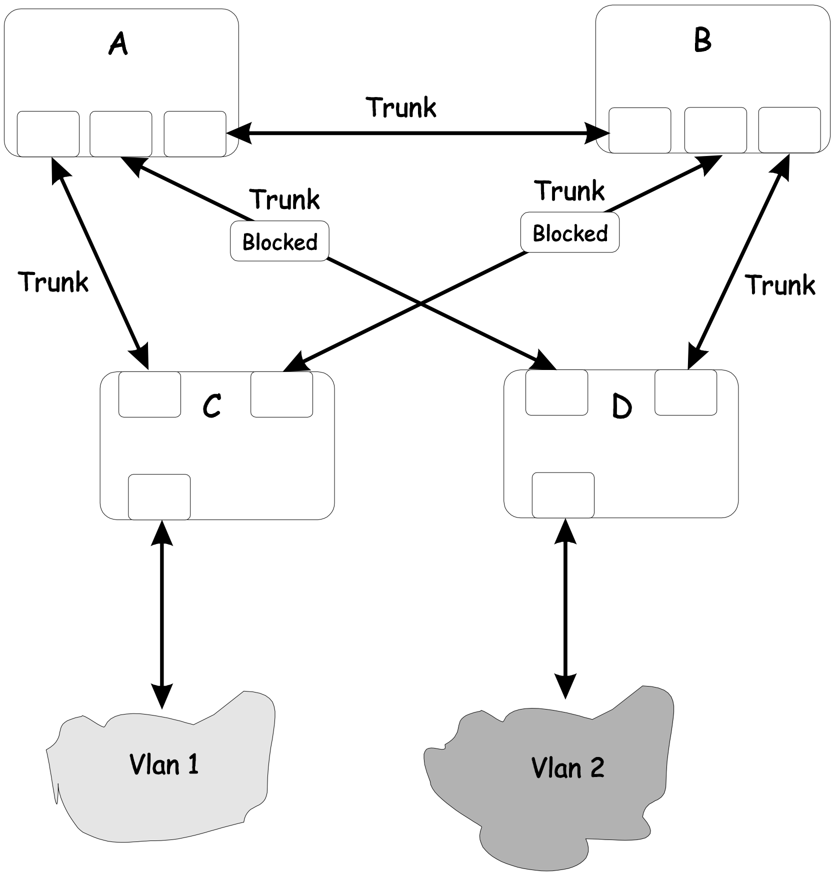
Know which links are redundant.

Organize the redundant links and tune the port cost parameter of STP to force those ports to be in the blocking state.

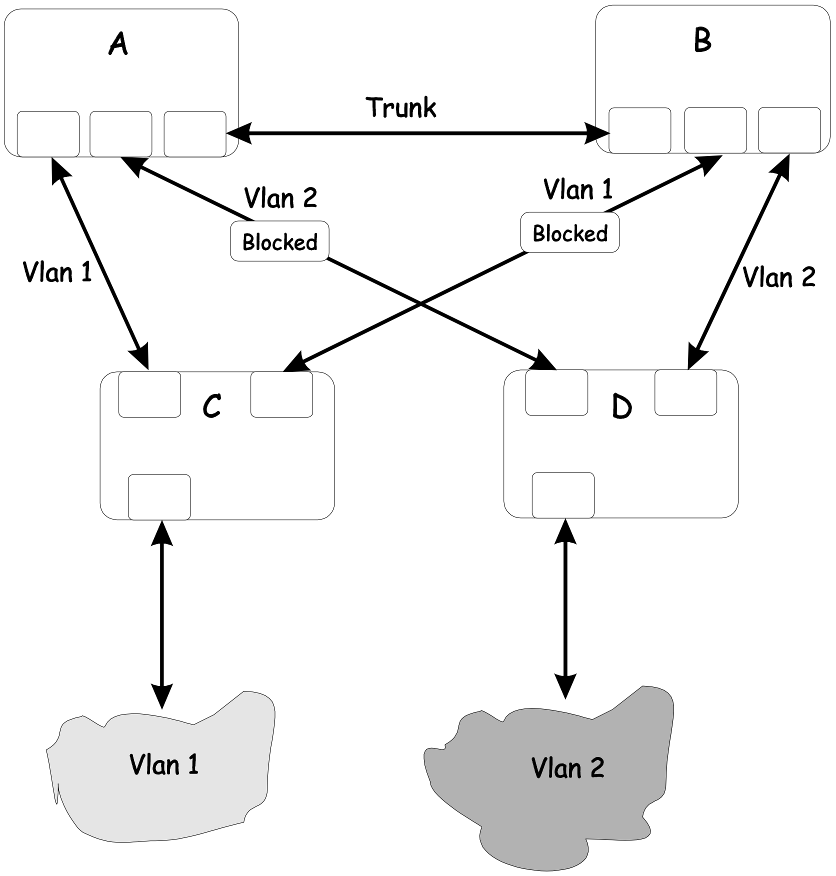
For each VLAN, know which ports should be blocking in a stable network. A network diagram that shows each physical loop in the network and which ports break which loops is extremely helpful.

Minimize the number of ports in the blocking state.

A single blocking port transitioning to the forwarding state at an inappropriate time can cause a large part of a network to fail. Limiting the number of blocked ports help to limit the risk of an inappropriate transition.



This is a common network design. The switches C and D have redundant links to the backbone switches A and B using trunks. Trunks, by default, carry all the VLAN traffic from VLAN 1 and VLAN 2. So switch C is not only receiving traffic for VLAN 1, but it is also receiving unnecessary broadcast and multicast traffic for VLAN 2. It is also blocking one port for VLAN 2. Thus, there are three redundant paths between switches A and B and two blocked ports per VLAN. This increases the chance of a data loop.



In this example, the VLAN definitions are extended to switches A and B. This gives only a single blocked port per VLAN and allows the removal of all redundant links by removing switch A or B from the network.

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.

(USA Only)

Subject to the terms and conditions set forth herein, D-Link Systems, Inc. (“D-Link”) provides this Limited warranty for its product only to the person or entity that originally purchased the product from:

- D-Link or its authorized reseller or distributor and
- Products purchased and delivered within the fifty states of the United States, the District of Columbia, U.S. Possessions or Protectorates, and U.S. Military Installations, addresses with an APO or FPO.

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

5-Year Limited Warranty for the Product(s) is defined as follows:

- Hardware (excluding power supplies and fans) Five (5) Years
- Power Supplies and Fans Three (3) Year
- Spare parts and spare kits Ninety (90) days

D-Link’s sole obligation shall be to repair or replace the defective Hardware during the Warranty Period at no charge to the original owner or to refund at D-Link’s sole discretion. Such 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 in its sole discretion 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 from the date of original retail purchase. If a material defect is incapable of correction, or if D-Link determines in its sole discretion that it is not practical to repair or replace the defective Hardware, the 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 (“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 Warranty Period, the magnetic media on which D-Link delivers the Software will be free of physical defects. D-Link’s sole obligation shall be 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 at D-Link’s sole discretion. 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. Software will be warranted for the remainder of the original Warranty Period from the date or original retail purchase. 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 of D-Link's products, will not be applied to and does not cover 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: Any claim under this limited warranty must be submitted in writing before the end of the Warranty Period to an Authorized D-Link Service Office.

- The customer must submit 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.
- The original product owner must obtain a Return Material Authorization (“RMA”) number from the Authorized D-Link Service Office and, if requested, provide written proof of purchase of the product (such as a copy of the dated purchase invoice for the product) before the warranty service is provided.
- 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 shipping charges to D-Link. No Charge on Delivery (“COD”) is allowed. Products sent COD will either be rejected by D-Link or become the property of D-Link. Products should be fully insured by the customer and shipped to D-Link Systems, Inc., 53 Discovery Drive, Irvine, CA 92618. 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 via UPS Ground or any common carrier selected by D-Link, with shipping charges prepaid. Expedited shipping is available if 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: This limited warranty provided by D-Link does not cover: Products, if 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; 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. Repair by anyone other than D-Link or an Authorized D-Link Service Office will void this 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 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 the product owner may also have other rights which vary from state to state.

D-Link® Offices

Australia **D-Link Australasia**
Unit 16, 390 Eastern Valley Way, Roseville, NSW 2069 Australia
TEL: 61-2-9417-7100 FAX: 61-2-9417-1077 TOLL FREE (Australia): 1800-177100
TOLL FREE (New Zealand): 0800-900900
URL: www.dlink.com.au E-MAIL: support@dlink.com.au & info@dlink.com.au

Level 1, 434 St. Kilda Road, Melbourne, Victoria 3004 Australia
TEL: 61-3-9281-3232 FAX: 61-3-9281-3229 MOBILE: 0412-660-064

Canada **D-Link Canada**
2180 Winston Park Drive, Oakville, Ontario, L6H 5W1 Canada
TEL: 1-905-829-5033 FAX: 1-905-829-5095 BBS: 1-965-279-8732
TOLL FREE: 1-800-354-6522 URL: www.dlink.ca
FTP: ftp.dlinknet.com E-MAIL: techsup@dlink.ca

Chile **D-Link South America**
Isidora Goyeechea 2934 of 702, Las Condes, Santiago, Chile, S. A.
TEL: 56-2-232-3185 FAX: 56-2-232-0923 URL: www.dlink.cl
E-MAIL: ccasassu@dlink.cl & tsilva@dlink.cl

China **D-Link China**
2F, Sigma Building, 49 Zhichun Road, Haidan District, 100080 Beijing, China
TEL: 86-10-88097777 FAX: 86-10-88096789 URL: www.dlink.com.cn
E-MAIL: liweii@digitalchina.com.cn

Denmark **D-Link Denmark**
Naverland 2, DK-2600 Glostrup, Copenhagen, Denmark
TEL: 45-43-969040 FAX:45-43-424347 URL: www.dlink.dk E-MAIL: info@dlink.dk

Egypt **D-Link Middle East**
7 Assem Ebn Sabet Street, Heliopolis, Cairo, Egypt
TEL: 20-2-635-6176 FAX: 20-2-635-6192 URL: www.dlink-me.com
E-MAIL: support@dlink-me.com & fateen@dlink-me.com

Finland **D-Link Finland**
Thlli-ja Pakkahuone Katajanokanlaituri 5, FIN– 00160 Helsinki
TEL: 358-9-622-91660 FAX: 358-9-622-91661 URL: www.dlink-fi.com

France **D-Link France**
Le Florilege #2, Allee de la Fresnerie, 78330 Fontenay le Fleury, France
TEL: 33-1-3023-8688 FAX: 33-1-3023-8689 URL: www.dlink-france.fr
E-MAIL: info@dlink-france.fr

Germany **D-Link Central Europe/D-Link Deutschland GmbH**
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TEL: 49-6196-77990 FAX: 49-6196-7799300 URL: www.dlink.de
BBS: 49-(0) 6192-971199 (analog) BBS: 49-(0) 6192-971198 (ISDN)
INFO: 00800-7250-0000 (toll free) HELP: 00800-7250-4000 (toll free)
REPAIR: 00800-7250-8000 E-MAIL: info@dlink.de

India **D-Link India**
Plot No.5, Kurla-Bandra Complex Rd., Off Cst Rd., Santacruz (E), Bombay, 400 098 India
TEL: 91-22-652-6696 FAX: 91-22-652-8914 URL: www.dlink-india.com
E-MAIL: service@dlink.india.com

Italy **D-Link Mediterraneo Srl/D-Link Italia**
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TEL: 39-02-2900-0676 FAX: 39-02-2900-1723 URL: www.dlink.it E-MAIL: info@dlink.it

Japan **D-Link Japan**
10F, 8-8-15 Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan
TEL: 81-3-5434-9678 FAX: 81-3-5434-9868 URL: www.d-link.co.jp
E-MAIL: kida@d-link.co.jp

Netherlands **D-Link Benelux**
Fellenoord 1305611 ZB, Eindhoven, the Netherlands
TEL: 31-40-2668713 FAX: 31-40-2668666 URL: www.d-link-benelux.nl

Norway **D-Link Norway**
Waldemar Thranesgt. 77, 0175 Oslo, Norway
TEL: 47-22-991890 FAX: 47-22-207039

Russia **D-Link Russia**
Michurinski Prospekt 49, 117607 Moscow, Russia
TEL: 7-095-737-3389 & 7-095-737-3492 FAX: 7-095-737-3390 URL: www.dlink.ru
E-MAIL: vl@dlink.ru

Singapore **D-Link International**
1 International Business Park, #03-12 The Synergy, Singapore 609917
TEL: 65-774-6233 FAX: 65-774-6322 E-MAIL: info@dlink.com.sg
URL: www.dlink-intl.com

South Africa **D-Link South Africa**
102 – 106 Witchhazel Avenue, Einstein Park 2, Block B, Highveld Technopark,
Centurion, South Africa
TEL: 27 (0) 12-665-2165 FAX: 27 (0) 12-665-2186 URL: www.d-link.co.za
E-MAIL: attie@d-link.co.za

Spain **D-Link Iberia**
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TEL: 34 93 4090770 FAX: 34 93 4910795 URL: www.dlinkiberia.es
E-MAIL: info@dlinkiberia.es

Sweden **D-Link Sweden**
P. O. Box 15036, S-167 15 Bromma, Sweden
TEL: 46-(0) 8-564-61900 FAX: 46-(0) 8-564-61901 E-MAIL: info@dlink.se
URL: www.dlink.se

Taiwan **D-Link Taiwan**
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TEL: 886-2-2910-2626 FAX: 886-2-2910-1515 URL: www.dlinktw.com.tw
E-MAIL: dssqa@tsc.dlinktw.com.tw

Turkey **D-Link Middle East**
Deniz Bilgisayar, Buyukdere Cad. Naci Kasim Sk., No. 5 Mecidiyekoy, Istanbul, Turkey
TEL: 90-212-213-3400 FAX: 90-212-213-3420 E-MAIL: smorovati@dlink-me.com

U.A.E. **D-Link Middle East**
CHS Aptec (Dubai), P.O. Box 33550 Dubai U.A.E.
TEL: 971-4-366-885 FAX: 971-4-355-941 E-MAIL: Wxavier@dlink-me.com

U.K. **D-Link Europe**
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TEL: 44 (0) 20-8731-5555 FAX: 44 (0) 20-8731-5511 BBS: 44 (0) 181-235-5511
URL: www.dlink.co.uk E-MAIL: info@dlink.co.uk

U.S.A. **D-Link U.S.A.**
53 Discovery Drive, Irvine, CA 92618, USA
TEL: 1-949-788-0805 FAX: 1-949-753-7033 BBS: 1-949-455-1779 & 1-949-455-9616
INFO: 1-800-326-1688 URL: www.dlink.com
E-MAIL: tech@dlink.com & support@dlink.com

Registration Card

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:

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 2000 □Windows XP
□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 □10BASE-T □100BASE-TX
□100BASE-T4 □100VGAnyLAN □1000BASE-T □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
HERE

TO: ______________________

____

____

D-Link®