Dimension ES-2008

Ethernet Switch

User's Guide

Version 1.02
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ZyXEL
Unleash Networking Power

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The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective operation and safety requirements. The Industry Canada does not guarantee that the equipment will operate to a user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

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For their own protection, users should ensure that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution

Users should not attempt to make such connections themselves, but should contact the appropriate electrical inspection authority, or electrician, as appropriate.

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This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the radio interference regulations of Industry.

Interference Statements and Warnings

FCC Interference Statement

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operations.

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 in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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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.

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警告使用者
這是甲類的資訊產品, 在居住的環境使用時,
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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Refer to the product page at www.zyxel.com.

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When contacting your Customer Support Representative, please have the following information ready:

- ➢ Product model and serial number.
- ➢ Firmware version information.
- ➢ Warranty Information.
- ➢ Date you received your product.
- ➢ Brief description of the problem and the steps you took to solve it.

METHOD LOCATION	E-MAIL SUPPORT/SALES	TELEPHONE/FAX	WEB SITE/ FTP SITE	REGULAR MAIL
WORLDWIDE	support@zyxel.com.tw sales@zyxel.com.tw	+886-3-578-3942 +886-3-578-2439	www.zyxel.com www.europe.zyxel.com ftp.europe.zyxel.com	ZyXEL Communications Corp., 6 Innovation Road II, Science-Based Industrial Park, Hsinchu 300, Taiwan
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Preface

Congratulations on your purchase of the ES-2008 Ethernet Switch.

About The ES-2008 Series Switches

The ES-2008 switch allows you to easily configure and manage your network via a web browser. Just click your mouse instead of typing cryptic command strings. Moreover, the ES-2008 can also be managed via SNMP.

There are four ES-2008 Ethernet switch models.

MODEL	DESCRIPTION
ES-2008	Eight port 10/100M Ethernet switch.
ES-2008-SC	Eight port 10/100M Ethernet switch with multi-mode fiber port.
ES-2008-SC30	Eight port 10/100M Ethernet switch with single-mode fiber port.
ES-2008-GTP	Eight port 10/100M Ethernet switch with one gigabit port.

About this User's Guide

This manual is designed to guide you through the configuration of your ES switch for its various applications. All ES models are discussed together in this guide.

Unless specified, images of the ES-2008-SC are used throughout this document. Images that directly relate to the other two models are used when referring to the key differences between the models.

General Syntax Conventions

- "Enter" means for you to type one or more characters and press the carriage return. "Select" or "Choose" means for you to use one from the predefined choices.

- The SMT menu titles and labels are in **Bold Times New Roman** font. Predefined field choices are in **Bold Arial** font. Command and arrow keys are enclosed in square brackets. [ENTER] means the Enter, or carriage return key; [ESC] means the Escape key and [SPACE BAR] means the Space Bar.

- For brevity's sake, we will use "e.g." as shorthand for "for instance", and "i.e." as shorthand for "that is" or "in other words" throughout this manual.

- The Dimension ES-2008 Ethernet Switch models will be referred to as the ES-2008 or simply as "the switch" in this manual.

Glossary

www.zyxel.com contains an online glossary of networking terms.

Part I:

Getting Started

Part I covers Getting to Know Your Switch, Hardware Installation, and Introducing the Web Configurator.

Chapter 1
Getting to Know Your ES-2008

The ES-2008 is a multi-port switch that can be used to build high-performance switched workgroup networks. This switch uses a store-and-forward switching scheme, in which incoming data frames are first stored in buffer memory and checked for errors before being forwarded; thus offering minimum delay for high-speed networking. It is the ideal switch for small-to-medium sized enterprise workgroups, departments or backbone computing environments.

The embedded web configurator makes managing and configuring the ES-2008 easy, enabling system management as well as individual port control and monitoring.

In addition, the ES-2008 can be managed via Telnet, the console port, or SNMP.

1.1 Features

  ➢ Conforms to IEEE 802.3, 802.3u, and 802.3x Ethernet Standards
  ➢ IEEE802.3ab Gigabit copper for ES models with a gigabit port.
  ➢ 8 auto-negotiating (100M Full/half-duplex, or 10M Full/half-duplex mode) Ethernet RJ-45 ports
  ➢ Auto MDI/MDIX (auto-sensing) Ethernet ports
  ➢ One fixed 100Mbps Fiber (SC/SC single- mode) or gigabit port (not available on all switch models)
  ➢ One console port for local configuration
  ➢ Full duplex and half duplex mode flow control
  ➢ Store-and-Forward switching scheme
  ➢ 2 megabits memory buffer
  ➢ Automatic MAC address learning; MAC address table can contain up to 8,000 entries
  ➢ Performs non-blocking full wire speed (switch fabric bandwidth 3.8 Gbps) switching
  ➢ PWR, 100M, LK/ACT and FD/COL LEDs
  ➢ Ten-inch desktop size design

1.2 Management Features

  ➢ Web-based management
  ➢ SNMP network management

- ➢ Supports port-based and tagged VLAN Groups
- ➢ Port Trunking and IEEE 802.3ad LACP
- ➢ MIB II (RFC1213) supported
- ➢ IP multicast
- ➢ IGMP snooping
- ➢ Quality of Service (QoS)
- ➢ Supports port mirror, broadcast filter, static MAC address, port security and GVRP
- ➢ Configure/Manage individual ports
- ➢ Enable/Disable individual ports

1.3 Management Methods

The switch supports the following management methods:

- Local console management
- Telnet management
- Web configurator
- SNMP network management

1.3.1 Console and Telnet Management

Managing the switch through the console port requires a direct connection between the computer and the switch using an RS-232 console cable. You can also telnet into the switch from any computer on your network (provided you know the IP address of the switch).

1.3.2 Web Configurator

The switch comes with an embedded HTML web configurator. It offers advanced management features and allows you to manage the switch from anywhere on the network through Microsoft Internet Explorer (version 5.0 or later).

1.4 Applications

The switch is ideally suited as a workgroup switch or a bridge for large network segmentation.

For ES-2008 models that come with a fiber port, you can also use the fiber port to connect to other network switches. The distance between two switches via fiber cable can be up to 2 Km (multi-mode) or 30 Km (single-mode).

1.4.1 Standalone Workgroup

The switch can be used as a standalone switch to which computers, servers and printer servers are directly connected to form a small workgroup.
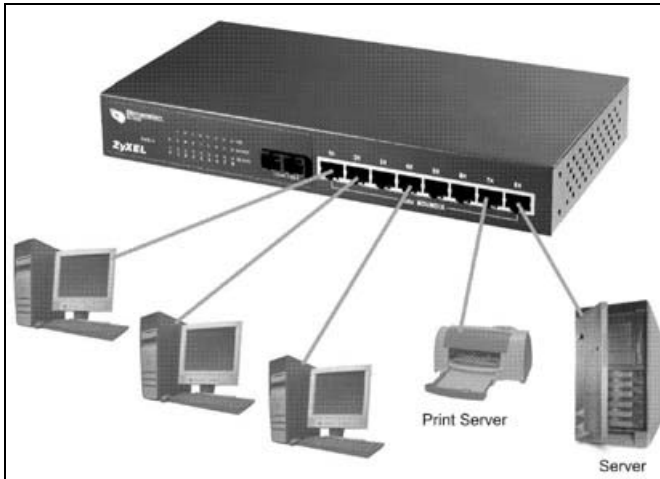
Figure 1-1 Standalone Workgroup Example

1.4.2 Bridging Application

For enterprise networks where large data broadcasts are constantly processed, this switch is an ideal solution for department users to connect to the corporate backbone.

In the next illustration, two Ethernet switches with attached computers, print server and local server, are all connected to the switch. All devices in this network can communicate with each other through the switch and also access the server.
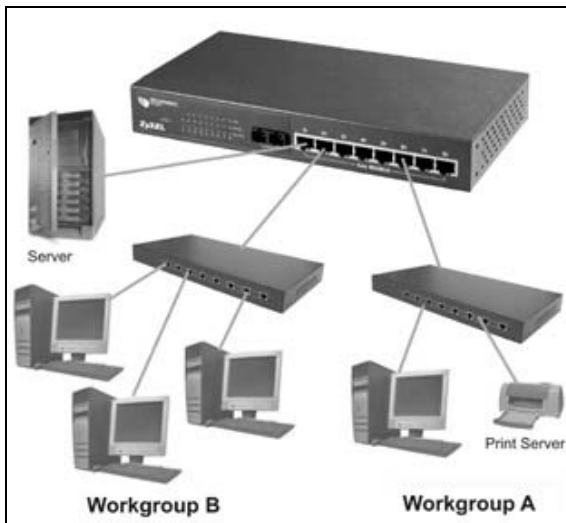
Figure 1-2 Bridging Application Example

1.4.3 VLAN Application

VLAN (Virtual Local Area Network) allows a physical network to be partitioned into multiple logical networks. Stations on a logical network belong to one group. A station can belong to more than one group. With VLAN, a station cannot directly talk to or hear from stations that are not in the same group(s); the traffic must first go through a router.

As well as security, VLANs also increase network performance by limiting broadcasts to a smaller and more manageable logical broadcast domain. In traditional switched environments, all broadcast packets go to each and every individual port. With VLAN, broadcasts are confined to the members of the VLAN. Note that VLANs are unidirectional - they only govern outgoing traffic.

Port-based VLANs are VLANs where the packet forwarding decision is based on the destination MAC address and its associated port.
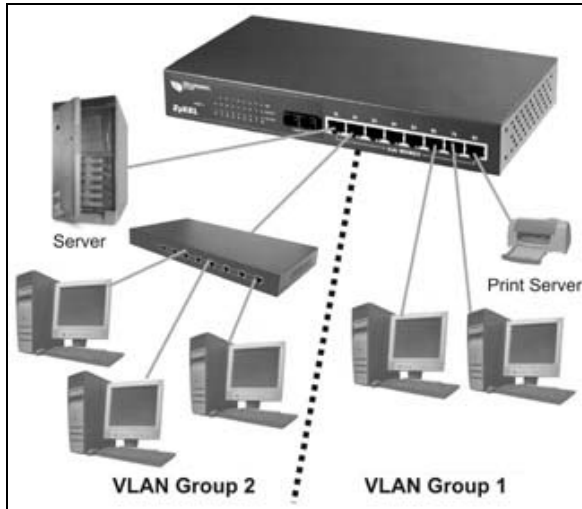
Figure 1-3 VLAN Application Example

Chapter 2
Hardware Description and Installation

This chapter describes the switch hardware and installation

2.1 Hardware Installation

The switch is suitable for an office environment where it can be placed on a desktop.

Step 1. Make sure the switch is clean and dry.

Step 2. Attach the supply rubber feet to the bottom of the switch.

Step 3. Set the switch on a smooth and sturdy flat space strong enough to support the weight of the switch and the connected cables. Make sure there is a power outlet nearby.

Step 4. Make sure there is enough clearance around the switch to allow air circulation and the attachment of cables and the power cord.

> **Do not block the ventilation holes. Leave space between switches when stacking.**

2.2 Hardware Connections

2.2.1 Front Panel

The front panel of the switch consists of eight auto-sensing, auto-negotiating 10/100Base-TX Ethernet RJ-45 ports and/or one 100Base-FX fiber or gigabit port.

The LEDs are also located on the front panel of the switch.

Figure 2-1 ES-2008

Figure 2-2 ES-2008 with Fiber Port

Figure 2-3 ES-2008 with Gigabit Port

2.2.2 The Ethernet Connections

Auto-Sensing 10/100Base-TX RJ-45 Ports (Auto MDI/MDIX)

The ES-2008 has eight auto-negotiating, auto-sensing 10/100Base-TX Ethernet RJ-45 ports. All these ports support auto-sensing, a built-in function that automatically recognizes the type (straight/crossover) of the attached cable. This feature effectively removes all wiring troubles caused by a cable type mismatch. Although a crossover cable is usually required to cascade a switch to another switch, auto MDI/MDI-X lets you use a normal straight cable to do the task.

Auto-Negotiating 10/100Base-TX RJ-45 Ports

The auto-negotiation feature allows the switch to detect the speed of incoming transmission and adjust appropriately without manual intervention. It allows data transfers of either 10 Mbps or 100 Mbps in either half-duplex or full-duplex mode depending on your Ethernet network.

2.2.3 Network Cable Types

The following table describes the types of network cable used for the different connection speeds. The fiber and gigabit ports are not available on all ES models.

Make sure the 10/100 Base-TX and/or 1000Base-T cable length between connections does not exceed 100 meters (328 feet).

Table 2-1 Network Cable Types

SPEED	NETWORK CABLE TYPE
10 Base-TX	100Ω 2-pair UTP/STP Category 3, 4 or 5
100 Base-TX	100Ω 2-pair UTP/STP Category 5
1000BASE-T	100Ω 4-pair UTP/STP Category 5
100BASE-FX (multi-mode)	50~62.5/125 micron multi-mode fiber-optics
100BASE-FX (single-mode)	8~10/125 micron single-mode fiber-optics

2.3   Front Panel LEDs

All the LEDs are found on the front panel of the switch to indicate real-time status of the ports and the switch.

2.3.1 The PWR LED

The **PWR** LED on the front panel indicates whether the switch is receiving power.

Table 2-2 The Switch Power LED Description

LED	COLOR	STATUS	DESCRIPTION
Power	Green	On	The switch is receiving power.
		Off	The switch is not receiving power.

2.3.2 10/100M Ethernet Port LEDs

The LEDs for the 10/100M Ethernet ports give real-time system information and status.

Figure 2-4 Ethernet Port LEDs

The following table describes the LEDs for the Ethernet ports on the front panel.

Table 2-3 Ethernet Port LED Descriptions

LED	COLOR	STATUS	DESCRIPTION
100	Green	On	The port is operating at 100Mbps.
		Off	No device is attached or the port is operating at 10Mbps.
LK/ACT	Green	On	The port is connecting with a device.
		Blinking	The port is receiving or transmitting data.
		Off	No device is attached.
FD/COL	Orange	On	The port is operating in full-duplex mode.
		Blinking	Packet collisions are occurring
		Off	No device is attached or the device is in half-duplex mode.

2.3.3 The Fiber Port

The 100FX fiber module is designed to extend the distance between the switch and other Ethernet devices by up to 2 km using multi-mode fiber or 30 km using single-mode fibers. The fiber port is not available on all switch models.

The LEDs provide real-time system status information of the fiber port. The following table is a summary of LED status and meaning.

Table 2-4 100FX Module LED Descriptions

LED	COLOR	STATUS	DESCRIPTION
LK/ACT	Orange	On	The fiber port is connected to an Ethernet device.
		Blinking	This fiber port is transmitting data.
		Off	No data is being transmitted.
FD/COL	Orange	On	The port is operating in full-duplex mode.
		Blinking	Packet collision is occurring on this port.

Table 2-4 100FX Module LED Descriptions

LED	COLOR	STATUS	DESCRIPTION
		Off	No device is attached or the port is operating in half-duplex mode

2.3.4 The Gigabit Port

The gigabit port module is capable of transferring data at a speed up to 1000 mbps. The gigabit port is not available on all switch models.

The following table describes the gigabit port LEDs.

Table 2-5 Gigabit Module LED Descriptions

LED	COLOR	STATUS	DESCRIPTION
1000	Green	On	The port is connected at 1000 Mbps.
		Off	The port is not connected at 1000 Mbps.
LK/ACT	Orange	On	The fiber port is connected to an Ethernet device.
		Blinking	This fiber port is transmitting data.
		Off	No data is being transmitted.
FD/COL	Orange	On	The port is operating in full-duplex mode.
		Blinking	Packet collision is occurring on this port.
		Off	No device is attached or the port is operating in half-duplex mode

2.4   Rear Panel

The console port and the power socket are located on the rear panel as shown in the next figure.
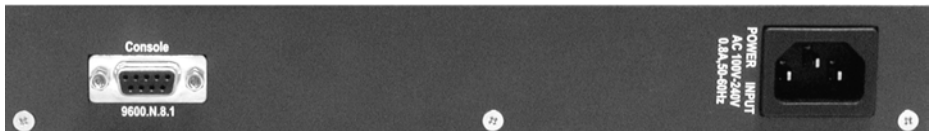
Figure 2-5 Rear Panel

2.4.1 Console Port

Local switch management is done through the console port. It requires a direct connection between the switch and a computer via an RS-232 console cable. Refer to chapters on SMT configurations.

2.5   Turning On the Switch

Connect one end of the power cord to the power receptacle on the rear panel of the switch and the other end to the power outlet. Refer to the product specifications for the right power source.

The **PWR** LED on the front panel turns on.

Chapter 3
Introducing the Web Configurator

This chapter describes how to access the embedded web configurator and view general switch information.

3.1 Accessing the Web Configurator

Follow the steps below to access the web configurator.

Step 1. Make sure your switch is properly connected (refer to instructions in *Chapter 2*).

Step 2. Prepare your computer to connect to the switch. Set your computer to use a static IP address in the same subnet as the IP address of the switch (refer to the *Setting Your Computer's IP Address* appendix).

Step 3. Launch your Internet Explorer.

> **You *must* use Internet Explorer 5.0 or later versions.**

Step 4. Type "192.168.1.1"as the URL.

Step 5. Type "admin" (default) as the user name and "1234" (default) as the password and click **OK**.

Figure 3-1 Login Window

Step 5. You should now see the welcome screen as shown next.

Figure 3-2 Welcome Screen

3.1.1 The Navigation Panel

The navigation panel on the left of all web pages provides a consistent way to access all program functions. Click **Administrator** to expanded the menu and configure the switch.

Figure 3-3 Menu

Figure 3-4 Expanded Menu

3.1.2 The Web Configurator Front Panel Display

The front panel graphic is displayed on all web screens to indicate the real-time port status of the switch.

Figure 3-5 Web Configurator Front Panel Display

A port in green means a device is connected to the port. To view port information, click on the ports to open a read-only status window as shown next.

Port	1
State	On
Link	Up
TxGoodPkt	1731
TxBadPkt	0
RxGoodPkt	70122
RxBadPkt	1577
TxAbort	0
Collision	3

Figure 3-6 Port Status

Refer to the *Port Statistics* section for field descriptions.

3.2   Commonly Used Buttons

The following table describes the buttons found in most screens.

Table 3-1 Commonly Used Button

BUTTON	DESCRIPTION
Apply	Click **Apply** to save the changes.
Default	Click **Default** to set the screen settings back to factory defaults.
Delete	Click **Delete** to remove a selected item.
Help	Click **Help** to open a web-based HTML help window. The **Help** button is *not* available in all web configurator screens.

3.3 General Switch Information

To view general information such as firmware version and MAC address click **Administrator**, **Switch Configuration** and click on the **Basic** tab. The following screen displays as shown.

Switch Configuration

Basic	**Advanced**

Description	Dimension Switch ES-2008
MAC Address	00001c01016c
Firmware Version	v1.02
Hardware Version	A3.00
Kernel Version	v1.06

Figure 3-7 Web Configurator: View Switch Information

The table below describes the read-only fields in this screen.

Table 3-2 View Switch Information

FIELD	DESCRIPTION
Description	This field displays a short description of the switch.
MAC Address	This field displays the MAC address of the switch without the ":" separator.
Firmware Version	This field displays the version of the firmware the switch is using.
Hardware Version	This field displays the hardware version of the switch.
Kernel Version	This field displays the version of the kernel on which the firmware is based.

3.4 Switch Console Port Settings

To view the console port settings of the switch click **Administrator** and **Serial Port Information**.

Serial Port Information

Baudrate(bits/sec)	9600
Data Bits	8
Parity Check	none
Stop Bits	1
Flow Control	none

Figure 3-8 Web Configurator: Serial Port Information

Use the information in this screen to set the communication parameters of a terminal emulation program to access the switch via the console port.

Chapter 4
Basic Switch Configuration

This chapter describes how to set the IP address of the switch, reset and reboot the switch.

4.1 Setting the IP Address of the Switch

To configure the Ethernet TCP/IP settings of the switch click **Administrator** and then **Network Configuration** to display the screen shown next.

Figure 4-1 Network Configuration

Follow the instructions in the table below to set the fields in this screen.

Table 4-1 Network Configuration

FIELD	DESCRIPTION	EXAMPLE
IP Address	Enter a LAN IP address for the switch in dotted decimal notation.	192.168.1.1
Subnet Mask	Enter a subnet mask in dotted decimal notation. Refer to the *Subnetting* appendix to calculate a subnet mask if you are implementing subnetting.	255.255.255.0
Gateway	Enter the LAN IP address of the gateway device.	

> **You must reboot the switch if you change the IP address to make the changes take effect.**

4.2 Changing System Username and Password

Use the **User Authentication** screen to change the switch system username and password.

Click **Administrator** and then **User Authentication** to display the screen shown next.

Figure 4-2 User Authentication

Follow the instructions in the next table to set the fields in this screen.

Table 4-2 User Authentication

FIELD	DESCRIPTION
User name	Type in your new switch system user name.
Assign/Change Password	Type in your new switch system password.
Reconfirm password	Re-type your new switch system password for confirmation.

4.3 Resetting the Switch

Restoring to factory defaults resets the switch's parameters. The user name will be reset to "admin", the password to "1234" and the LAN IP address to 192.168.1.1.

> **This function erases the current configuration before restoring a previous back up configuration; please do not attempt to restore unless you have a backup configuration file stored on disk.**

Follow the steps to restore your switch back to factory defaults.

Step 1. Click **Factory Default** to display the screen shown next.

Figure 4-3 Factory Default

Step 2. Click the **Factory Default** button and wait until the switch finishes rebooting before accessing the switch again.

4.4 Rebooting the Switch

You *must* reboot the switch after you make changes to the switch's IP address and uploads a firmware or configuration file.

Step 1. Click **System Reboot** to display the screen as shown next.

System Reboot

Reboot Help

Figure 4-4 System Reboot

Step 2. Click **Reboot** and wait until the switch finishes rebooting before accessing the switch again.

Part II:

Advanced Settings

Part II covers advanced port settings such as trunking, port security and filtering.

Chapter 5
Advanced Switch Configuration

This chapter shows you how to configure the Advanced Switch Settings screen.

5.1   Switch Configuration

Use the **Switch Configuration** screen to configure advanced features of the switch.

From the main menu, click **Administrator**, **Switch Configuration** and then click on the **Advanced** tab to display the screen as shown next.

Figure 5-1 Switching Configuration: Advanced

Follow the instructions in the table below to configure this screen.

Table 5-1 Switching Configuration: Advanced

FIELD	DESCRIPTION
MAC Table Address Entry Age-out time	Select this check box to remove a MAC address from the MAC address table after a duration specified in the field provided.
	Enter the duration in seconds between 300 and 765 that an inactive MAC address remains in the switch's MAC address table. The default is **300** seconds.
Bridge Transmit Delay Bound	Select **1 sec**, **2 sec** or **4 sec** from the pull down list box to limit the packet queuing time in the switch. If enabled, the packets queued beyond the time period specified here will be dropped.
	Select **OFF** to disable this feature. This is the default setting.
Broadcast Storm Filter Mode	Threshold is the percentage of the port's total bandwidth used by broadcast traffic. When broadcast traffic for a port increases above the threshold, broadcast storm control becomes active.
	Select a percentage number from the drop-down list box to set the threshold of the ports.
	Select **OFF** to disable this feature. This is the default setting.
Priority Queue Service	
Select a priority queuing type.	
First Come First Served	Select this option to send packets in the order of arrival.
All High Before Low	Select this option to send all high priority packets before sending packet with low priority.
WRR	Select the Weighted Round Robin (WRR) option to send packets depending on the weight (or priority) in the **Packet Weight** field.
	For example, if **Packet Weight** is 2, then the switch sends out two packets with higher priority for every one low priority packet sent.
Packet Weight (High: Low)	This is the high weight and low weight ratio.
	Specify the number of high priority packets to send. The number must be bigger than 1.
	Note: The default value for the low weight value is 1. You cannot change this number.
Enable Delay Bound	Select this option and specify a time in the **Max Delay Time** field (in milliseconds) to specify a time period a low priority packet is allowed to queue in the switch.

Table 5-1 Switching Configuration: Advanced

FIELD	DESCRIPTION
Max Delay Time	Specify a time period a low priority packet is allowed to queue in the switch before the packet is dropped.
Priority Queue Assignment (Checked for High Priority)	With QoS (Quality of Service) organizations can differentiate traffic by setting the precedence values in the IP header at the periphery of the network to enable the backbone to prioritize traffic.
Level1 … Level7	Select the check box(es) to add the packets with the level bits to the high priority queue.
Protocol Enable Settings	
Enable Spanning Tree Protocol	Select this option to activate Spanning Tree Protocol (STP). Refer to the *STP* chapter for more information.
Enable IGMP Protocol	Select this option to activate Internet Group Multicast Protocol (IGMP). Refer to *Section 8.1* for more information.
IGMP Query Mode	Select **Auto** to allow the network to automatically find the IGMP server. The multicast device with the lowest numerical IP address to be the IGMP server. This is the default setting. Select **Enable** to force this switch to be the IGMP server even when there is already an IGMP server on the network. Selecting this option may affect network performance. Select **Disable** to forcibly disallow this switch from being an IGMP server.
VLAN Operation Mode	Select **No VLAN**, **802.1Q with GVRP**, **802.1Q without GVRP** or **Port-Based** from the drop-down list box. Select **No VLAN** to disable VLANs. Select **802.1Q with GVRP** to set up tag-based VLAN groups that extend beyond the local switch. Select **802.1Q without GVRP** to set up tag-based VLAN groups on the switch only. Select **Port-Based** to set up port-based VLANs. Refer to the chapter on VLANs.

Chapter 6
Port Control

This chapter shows you how to configure the Ethernet ports and view port status.

6.1   Configuring the Ethernet Ports

The **Port Configuration** screen allows you to configure settings for individual Ethernet ports on the switch and view the status of all the ports.

Click **Administrator** and then **Port Configuration** to display the screen as shown next.

Port Configuration

Port	State	Auto Negotiation	Speed	Duplex	Flow Control
1 2 3 4	Enable ▾	Enable ▾	100 ▾	Full ▾	Enable ▾

Apply

Port Status

The following information provides a view of the current status of the unit.

Port	State		Link Status	Auto Negotiation		Speed Status		Duplex Status		Flow Control	
	Config	Actual		Config	Actual	Config	Actual	Config	Actual	Config	Actual
1	On	On	Up	Auto	Auto	100	100	Full	Half	On	On
2	On	Off	Down	Auto	N/A	100	N/A	Full	N/A	On	N/A
3	On	Off	Down	Auto	N/A	100	N/A	Full	N/A	On	N/A
4	On	Off	Down	Auto	N/A	100	N/A	Full	N/A	On	N/A
5	On	Off	Down	Auto	N/A	100	N/A	Full	N/A	On	N/A
6	On	Off	Down	Auto	N/A	100	N/A	Full	N/A	On	N/A
7	On	Off	Down	Auto	N/A	100	N/A	Full	N/A	On	N/A
8	On	Off	Down	Auto	N/A	100	N/A	Full	N/A	On	N/A
9	On	Off	Down	N/A	---	100	N/A	Full	N/A	On	N/A

Figure 6-1 Port Configuration

Follow the instructions in the next table to configure the Ethernet ports.

Table 6-1 Port Configuration

FIELD	DESCRIPTION
Port Configuration	
Port	Select a port to configure from the selection list.
State	Select **Enable** from the drop-down list box to activate the port.

Table 6-1 Port Configuration

FIELD	DESCRIPTION
Auto Negotiation	Select **Enable** from the drop-down list box to have the port detect the speed of incoming transmission and adjust appropriately without manual intervention.
Speed	Select from the drop-down list box to set the transmission speed of the port. Choices are **10** Mbps and **100** Mbps. All ports are set to **100** Mbps by default.
Duplex	Select either **Full** or **Half** from the drop-down list box to set the duplex mode of the port. All ports are set to **Full** duplex mode by default.
Flow Control	Select **Enable** from the drop-down list box to activate flow control on this port.

6.2   View Port Status

The bottom half of the **Port Configuration** screen displays status of all ports on the switch.

You may also view the port status information in the **Port Status** screen

Refer to *Table 6-1* for field descriptions. The **Config** fields display the configured port settings while the **Actual** fields displays the real-time status of the port.

6.3   Port Statistics

Click **Port Statistics** in the menu to display the screen as shown next.

Figure 6-2 Port Statistics

The following table describes the fields in this screen.

Table 6-2 Port Statistics

FIELD	DESCRIPTION
Port	This field displays the port number of each entry.
State	This field indicates whether the port is connected (**On**) to an Ethernet device or not connected (**Off**).
Link	This field indicates whether the port has a successful connection (**Up**) or no connection (**Down**).
TxGoodPKT	This field displays the number of packets transmitted successfully.
TxBadPKT	This field displays the number of packet transmission failures.
RxGoodPKT	This field displays the number of packets received successfully.
RxBadPKT	This field displays the number of bad packets received.
TxAbort	This field displays the number of aborted data transmissions.
Collision	This field displays the number of collisions that occurred on the port.

Click **Clear** to reset the counters

Chapter 7
Port Trunking

This chapter describes how to configure trunk groups and IEEE 802.3ad link aggregation.

7.1   Introduction

Port Trunking (or link aggregation) lets you group physical ports into one logical high-capacity link. It may be more cost-effective to group multiple lower-speed ports than to under-utilize a higher-speed, but more costly, port.

However, the more ports you aggregate, the higher bandwidth capacity you obtain, but the fewer available ports you have.

7.1.1   Trunk Groups

Trunk groups are manually configured aggregate links containing multiple ports.

7.1.2   Dynamic Port Trunking

The switch supports IEEE 802.3ad standard for port trunking. This standard describes the Link Aggregate Control Protocol (LACP), which is a protocol that allows a switch to dynamically create and manage trunk groups.

When you enable LACP trunking on a port, the port can automatically negotiate with the ports at the remote end of a link to establish trunk groups.

Besides dynamic trunking, LACP provides port redundancy. When an operational port fails, one of the "standby" ports becomes operational without user intervention.

7.1.3   Requirements

When you configure the settings, note the following points.

1. You cannot add a port to a trunk group if LACP is enabled on the port.
2. You must connect all ports point-to-point to the same Ethernet device and configure them for LACP trunking if required.
3. LACP only works on full-duplex links.
4. All ports on the same trunk group must have the same media type, speed, duplex mode and flow control settings.
5. Configure trunk groups or LACP before you connect the Ethernet device to prevent network topology loops.

7.2 Configuring Port Trunking

Port trunking lets you group up to eight consecutive ports into a single dedicated connection.

To configure port trunking, click **Administrator**, **Trunking** and the **Aggregator Setting** tab.

Figure 7-1 Trunking: Aggregator Setting

Follow the instruction in the table next to change the settings.

Table 7-1 Trunking: Aggregator Setting

FIELD	DESCRIPTION
System Priority	Enter a number to identify and set the priority of an active Link Aggregate Control Protocol (LACP). The smaller the number, the higher the priority level.
Group ID	Select a trunk group ID from the drop-down list menu and click **Select** to display the configured settings.
LACP	Select **Enable** from the drop-down list box to set the trunk group as a dynamic trunk group. Select **Disable** to set the trunk group as a local trunk group.

Table 7-1 Trunking: Aggregator Setting

FIELD	DESCRIPTION
Work Ports	Enter the number of ports that to be aggregated.
	If you select **Enable** in the **LACP** field, then enter any number greater than 0 and smaller than the total number of the trunk ports. The excess ports are in standby and can be aggregated if any of the other ports fail.
	If you select **Disable** in the **LACP** field, then the number of ports must be the same as the number of the trunk ports.
	By default, the total number of trunk ports is displayed.
Add	Select a port number on the right selection box and click **Add** to add the port to the trunk group on the left.
	Any ports that remain on the right are ports not assigned to any trunk groups.
Remove	Select a port number on the left selection box and click **Remove** to remove the port from the trunk group.

7.3   Viewing Static Trunk Group Information

The **Aggregator Information** screen displays static trunk groups (with the LACP feature).

Click **Administrator**, **Trunking** and then the **Aggregator Information** tab. A screen displays as follows.
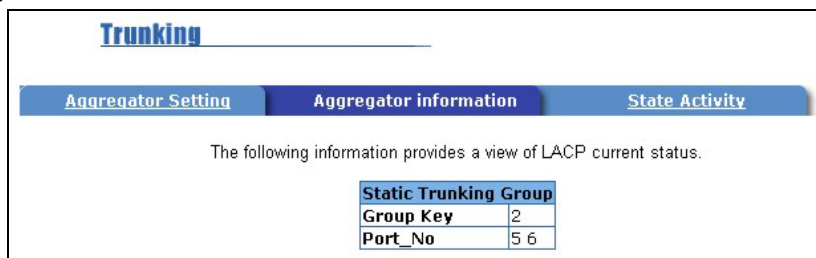
Figure 7-2 Trunking: Aggregator Information.

The following table describes the fields in this screen.

Table 7-2 Aggregator Information

FIELD	DESCRIPTION
Group Key	This field displays the trunk group number.

Table 7-2 Aggregator Information

FIELD	DESCRIPTION
Port No	This field displays the port number(s) belonging to a static trunk group.

7.4   State Activity

Ports in a dynamic trunk group can be in either active or passive state.

If a port is in active state, the port automatically sends LACP packets to negotiate a trunk link configuration with another link aggregation port on the other side of the link.

If a port is in passive state, the port only responds to LACP packets but cannot negotiate a trunk link configuration with another trunk port on the other end of the link.

Use the **State Activity** screen to set the state of the port(s) in a dynamic trunk group.
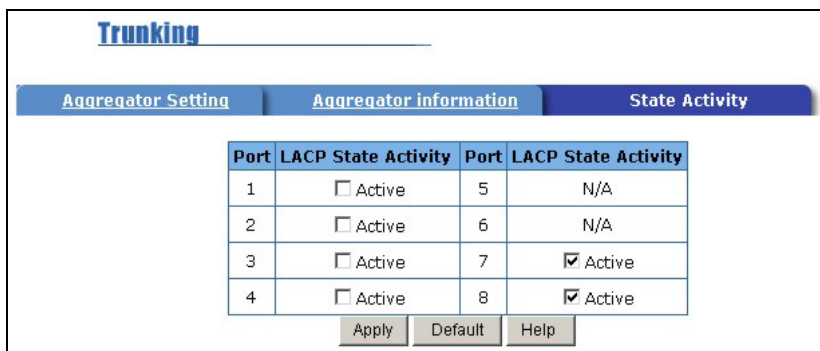
Figure 7-3 Trunk State Activity

The following table describes the fields in this screen.

Table 7-3 Trunk State Activity

FIELD	DESCRIPTION
Port	This field displays the port numbers.
LACP State Activity	This field is **N/A** for ports not in a dynamic trunk group.
	Select the **Status** check box to set the port to active state.
	If the **Status** check box is *not* selected, the port is set to passive state. This is the default setting for all ports in a dynamic trunk group.

Chapter 8
Filter and Security Setup

This chapter shows you how to set IGMP and MAC filters and port security.

8.1   IGMP

Traditionally, IP packets are transmitted in one of either two ways -Unicast (1 sender to 1 recipient) or Broadcast (1 sender to everybody on the network). Multicast delivers IP packets to just a group of hosts on the network.

IGMP (Internet Group Multicast Protocol) is a session-layer protocol used to establish membership in a multicast group - it is not used to carry user data. Refer to RFC 1112 and RFC 2236 for information on IGMP versions 1 and 2 respectively.

A layer-2 switch can passively snoop on IGMP Query, Report and Leave (IGMP version 2) packets transferred between IP multicast routers/switches and IP multicast hosts to learn the IP multicast group membership. It checks IGMP packets passing through it, picks out the group registration information, and configures multicasting accordingly. Without IGMP snooping, multicast traffic is treated in the same manner as broadcast traffic, that is, it is forwarded to all ports. With IGMP snooping, group multicast traffic is only forwarded to ports that are members of that group. IGMP Snooping generates no additional network traffic, allowing you to significantly reduce multicast traffic passing through your switch.

For each attached network, an IGMP server periodically sends a query message to request for group membership information. Hosts on the network that are members of a multicast group send report messages back to the IGMP server. When a host leaves a group, it sends a leave group message.

The following table describes the types of IGMP messages.

Table 8-1 IGMP Message Descriptions

TYPE	DESCRIPTION
Query	An IGMP server sends query messages asking for a response from each host belonging to the multicast group.
Report	A host sends report messages to the IGMP server to indicate that the host wants to be or is a member of a given group indicated in the report message.
Leave Group	A host sends a leave group message to the IGMP server to indicate that the host has terminated its membership of a specific multicast group.

8.1.1 Configuring IGMP

Follow the steps below to activate IGMP on the switch.

Step 1.   Click **Administrator** and then **Switch Configuration**.

Step 2.   In the **Switch Configuration** screen, click the **Advanced** tab.

Step 3.   Select the **Enable IGMP Protocol** check box under **Protocol Enable Setting**.

Step 4.   Select a choice from the **IGMP Query Mode field** drop-down list box.
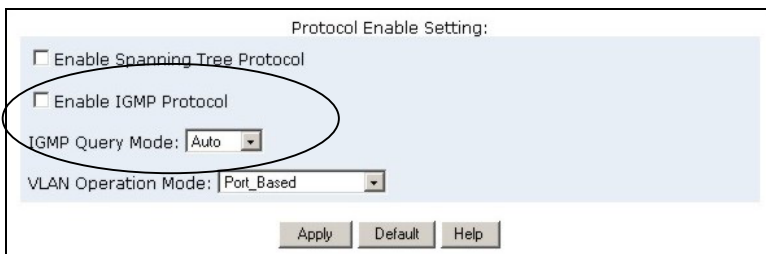
Figure 8-1 Configuring IGMP

The following table describes the options in the **IGMP Query Mode** field.

Table 8-2 IGMP Query Mode

FIELD	DESCRIPTION
IGMP Query Mode	Select **Auto** to allow the network to automatically find the IGMP server. The multicast device with the lowest numerical IP address to be the IGMP server. This is the default setting.
	Select **Enable** to force this switch to be the IGMP server even when there is already an IGMP server on the network. Selecting this option may affect network performance.
	Select **Disable** to forcibly disallow this switch from being an IGMP server.

8.1.2 IGMP Examples

This section presents IGMP examples for each IGMP query mode.

A source of multicasts, such as the Video-on-Demand server in our examples, should be as close to the IGMP server as possible in order to reduce broadcasts.

Example 1: Select an IGMP Server Automatically

In the figure below, when you select **Auto** in the **IGMP Query Mode** field on all switches, **Switch C** will become the IGMP server since it has the lowest numerical IP address on the network.
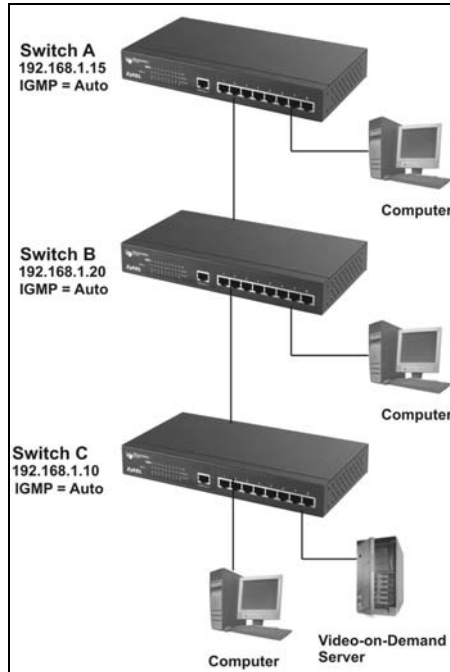
Figure 8-2 IGMP Example 1

Example 2: Select an IGMP Server Manually

To force **Switch A** to be the IGMP server, select **Enable** in the **IGMP Query Mode** field. However if another multicast device is set to **Auto** and it has a numerically lower IP address, it will act as the IGMP server also. This results in duplicated IGMP messages that might decrease your network performance.

Unless you can disable IGMP on the other multicast devices on your network, it is not recommended you select the **Enable** option.
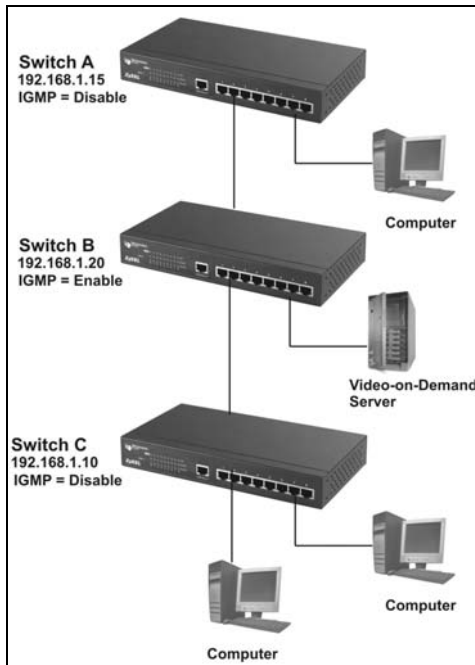
Figure 8-3 IGMP Example 2

Example 3: Disable IGMP on the Switch

When you want to set a multicast router on your network to be the IGMP server but the router does not have the lowest IP address, disable IGMP on all other multicast devices.
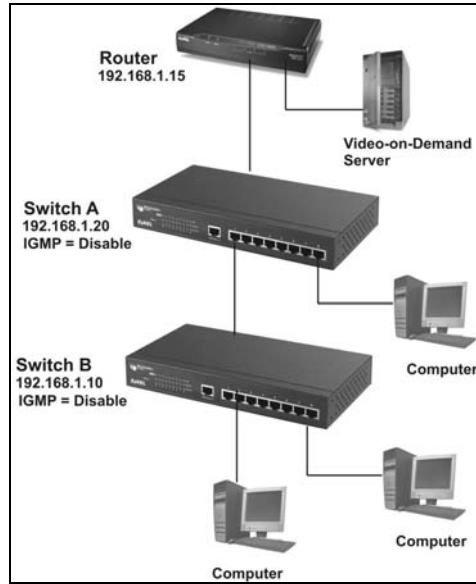
Figure 8-4 IGMP Example 2

8.1.3 Viewing IGMP Snooping Information

Click **Filter Setup** and then **IGMP Snooping** to display IGMP snooping information.

Figure 8-5 IGMP Snooping

The following table describes the read-only fields in this screen.

Table 8-3 IGMP Snooping

FIELD	DESCRIPTION
IP Address	This field displays the IP multicast address in the range 224.0.0.0 through 239.255.255.254.
VLAN ID	This field displays the VLAN or multicast group ID.
Member Port	This field displays the port number to which the Ethernet device is connected.

8.2   Static MAC Address

You can add a MAC address to the MAC address table on the switch. A static MAC address will remain in the MAC address table permanently even if the Ethernet device is not connected to the switch.

With static MAC addresses, the switch avoids re-learning the MAC addresses of the Ethernet devices every time the switch reboots or disconnects from the network.

8.2.1 Adding Static MAC Address

Follow the steps to add static MAC addresses.

Step 1.   Click **Administrator** and then **Filter Setup**.

Step 2.   Click the **Static MAC Addresses** tab to display the screen as shown in the figure below.

Figure 8-6 Static MAC Address

Step 3. Enter the MAC address (without the ":" separator) of an Ethernet device in the **MAC Address** field.

Step 4. Enter the port number that the Ethernet device is connected to in the **Port No.** field.

8.3 Port Security

A port with security mode turned on is prevented from re-learning a new MAC address of an Ethernet device. To secure a port, disable the port from learning new MAC addresses and then define a list of MAC addresses that are allowed to use the secured port. Thus, only incoming packets with the defined MAC addresses will be forwarded.

Follow the steps below to secure the ports on the switch.

Step 1. Click **Administrator** and then **Filter Setup**.

Step 2. Click the **Port Security** tab to display the screen as shown next.

Figure 8-7 Port Security

Step 3.   Select the check box beside the port number to stop the port from learning new MAC addresses.

Step 4.   Click **Apply**.

Step 5.   Follow *Section 8.2.1* to define static MAC addresses on the ports to allow only the computers with the static MAC addresses to send packets through the ports

> **If you do not configure static MAC address(es) on the port with port security feature, the port will drop all packets.**

8.4   MAC Address Filtering

You can set up the switch to drop packets from a computer based on the computer's MAC address. Follow the steps set up MAC address filtering.

Step 1.   Click **Administrator**, **Filter Setup** and then the **MAC Filtering** tab.

Figure 8-8 MAC Address Filtering

Step 2. Enter the MAC address (without the ":" separator) of an Ethernet device in the **MAC Address** field.

Step 3. If VLAN is enabled, enter the VLAN ID of a VLAN group the port belongs to in the **VLAN ID** field. This field is **N/A** if VLAN is not enabled.

Step 4. Click **Apply** to save the settings.

Part III:

Advanced Applications

Part III covers VLAN, Port Mirroring, STP, SNMP and firmware and configuration maintenance.

Chapter 9
VLAN

This chapter shows you how to set up Virtual LANs on the switch.

9.1 Introduction

A Virtual LAN (VLAN) is a logical network grouping that limits the broadcast domain. It allows you to isolate network traffic so only members of the VLAN group receive traffic from the same VLAN group members. Members on a different VLAN group cannot communicate with each other even though they are physically connected to the same switch.

Your switch supports port-based and tag-based VLANs.

> **By default, all ports belong to a default VLAN (VLAN ID 1). You cannot delete the default VLAN.**

9.2 VLAN Types

The following sections discussed the types of VLANs your switch supports.

9.2.1 Port-Based VLAN

Port-based VLAN is the most common and simplest form of VLAN. In a port-based VLAN, some ports are assigned to a VLAN group. A port can only belong to one VLAN group.

By default, all the ports on the switch belong to a VLAN group (VID 1). You cannot delete the default VLAN.

9.2.2 Tag-Based VLANs (IEEE 802.1Q VLAN)

Tag-based VLAN on the switch is based on the IEEE 802.1Q specification that allows you to create VLANs across switches from different vendors. IEEE 802.1Q VLAN inserts a "tag" into the Ethernet frames. The tag contains a VLAN Identifier (VID) that indicates the VLAN numbers.

The following lists the advantages of IEEE 802.1Q.

1. Multicast data traffic across different Ethernet devices is contained, thus improving performance.

2. A port can belong to more than one IEEE 802.1Q VLAN.

3. Improved security with logical grouping of users.

Dynamic VLANs

GARP VLAN Registration Protocol (GVRP) is a Generic Attribute Registration Protocol (GARP) application that provides VLAN registration services through dynamic configuration (or registration) and distribution of VLAN membership information across the network.

With GVRP, the switch is able to register necessary VLAN members to create IEEE 802.1Q-compliant VLANs on links with other devices that are running GVRP. GVRP automatically provides consistent VLAN ID across the network to reduce VLAN configuration errors. GVRP propagates VLAN information to other GVRP-aware devices automatically, without the need to manually configure the VLANs on each device. In addition, if the VLAN configuration on a device changes, GVRP automatically changes the VLAN configurations of the affected devices.

9.3   Selecting VLANSupport

Select the type of VLANs to support in the **Switch Configuration** screen. Click **Administrator**, **Switch Configuration** and then the **Advanced** tab to set the **VLAN Operation Mode** field.

Figure 9-1 Switch Configuration: Enable Protocols

Follow the instructions in the table next to select the VLAN mode.

Table 9-1 VLAN Operation Mode

FIELD	DESCRIPTION
VLAN Operation Mode	Select **No VLAN**, **802.1Q with GVRP**, **802.1Q without GVRP** or **Port-Based** from the drop-down list box.
	Select **No VLAN** to disable VLANs.
	Select **802.1Q with GVRP** to set up tag-based VLAN groups that extend beyond the local switch.
	Select **802.1Q without GVRP** to set up tag-based VLAN groups on the switch only.
	Select **Port-Based** to set up port-based VLANs.

9.4 Port-Based VLAN Configuration

Follow the steps below to configure port-based VLANs.

Step 1. In the **Switch Configuration** screen, select **Port-Based** from the **VLAN Operation Mode** drop-down list box. Then click **Apply**.

Step 2. Click **VLAN Configuration** in the navigation menu to display the setup screen as shown next.
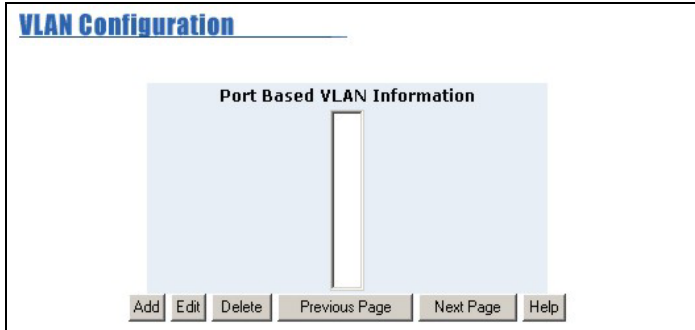
Figure 9-2 VLAN Setup: Port-based VLAN Information

Step 3. Click **Add** to configure a new port-based VLAN. The following screen displays.
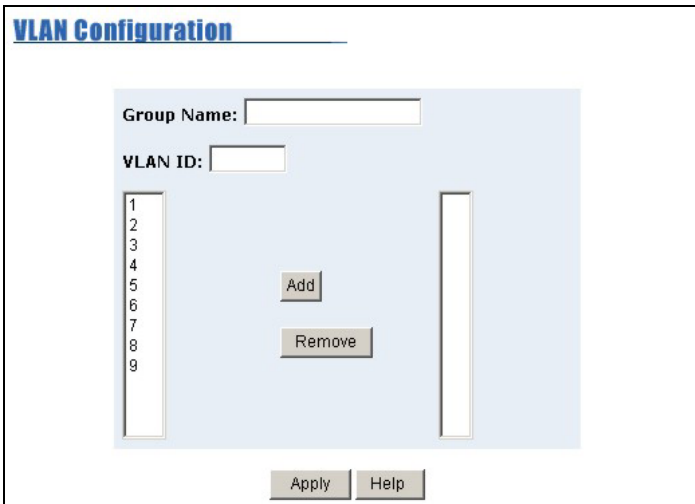
Figure 9-3 VLAN Setup: Port-based Configuration

Follow the instructions in the table next to configure this screen.

Table 9-2 VLAN Setup: Port-based Configuration

FIELD	DESCRIPTION
Group Name	Enter a descriptive name to identify the VLAN.
VLAN ID	Enter a VLAN identification number. The number must be between 1 and 4094.
Add	Select a port number from the left selection list and click **Add** to add the port to the VLAN.
Remove	Select a port number from the right selection list and click **Remove** to remove the port from the VLAN.

Ports in the same VLAN must be in the same trunk group.

9.5   Tag-Based VLAN Configuration

Follow the steps below to configure VLANs on the switch.

Step 1.   In the **Switch Configuration** screen, select either **802.1Q with GVRP** or **802.1Q without GVRP** from the **VLAN Operation Mode** drop-down list box. Then click **Apply**.

Step 2.   Click **Administrator** and then **VLAN Configuration** to display the basic **VLAN** screen as shown next.
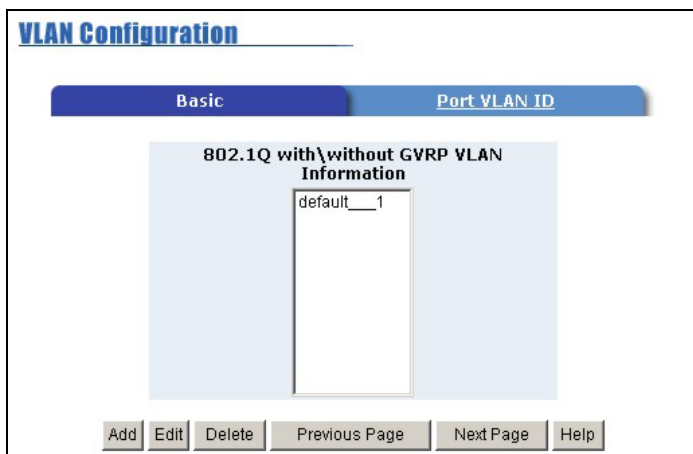
Figure 9-4 VLAN Setup – 802.1Q with/without GVRP VLAN Information

Step 3. Click **Add** to add a new VLAN. A setup screen displays.

Figure 9-5 Tag-Based VLAN: 802.1 Q VLAN Basic Setup

Follow the instructions in *Table 9-2* to set the fields in this screen.

All ports in the same VLAN must be in the same trunk group.

Step 4. Click **Next** to continue.

Figure 9-6 VLAN Setup: 802.1Q VLAN Port Tagging

Follow the instructions in the next table to set the fields in this screen.

Table 9-3 VLAN Setup: 802.1Q VLAN Port Tagging

FIELD	DESCRIPTION
VLAN Name	This read-only field displays the name of the VLAN.
VLAN ID	This read-only field displays the identification number of the VLAN group.
Port No	This read-only field displays the port number on the switch.
Setting	Select **Tag** from the drop-down list box to add VLAN ID to the outgoing frames on this port. Otherwise select **Untag**.

9.5.1 Configure Port Settings

Click **Administration**, **VLAN Configuration** and then **Port VLAN ID** to display the screen as shown next.

Figure 9-7 Tag-Based VLAN: Port VLAN ID

The following table describes the fields in this screen.

Table 9-4 Tag-Based VLAN: Port VLAN ID

FIELD	DESCRIPTION
Port	This read-only field displays the port number on the switch.
VLAN ID	Enter the VLAN ID (between 2 and 4094) that will be assigned to untagged traffic on a given port. For example, if the default VLAN ID of port 5 is 100, all untagged packets on port 5 will belong to VLAN 100.

	The default VLAN ID for all ports is **1**.
	This feature is useful for accommodating devices that you want to participate in the VLAN but that don't support tagging. Only one untagged VLAN is allowed per port.
Ingress Filtering	Select **Enable** from the drop-down list box to forward a frame whose VID is the same as the VID of the port.
	Select **Disable** to forward all frames, regardless of the port's VID.
Acceptable Frame Type	Select **All** from the drop-down list box to accept all untagged or tagged frames.
	Select **Tag Only** to drop all untagged frames.

Chapter 10
Spanning Tree Protocol

This chapter describes the basics and configuration of STP.

10.1 Introduction

Spanning Tree Protocol) is a standardized method (IEEE 802.1D) that eliminates loops in a network by disabling some ports and allowing other ports to forward traffic based on the parameters you configured. STP ensures that there is only one path between a specific source and destination so packets will not travel in loops.

STP provides path redundancy while preventing undesirable loops in the network. STP detects and breaks network loops and provides backup links between switches, bridges or routers. It allows a device to interact with other STP-aware devices in your network to ensure that only one path exists between any two stations on the network.

The root bridge is the base of the spanning tree; it is the bridge with the lowest identifier value (MAC address). Path cost is the cost of transmitting a frame onto a LAN through that port. It is assigned according to the speed of the link to which a port is attached. The slower the media, the higher the cost. Refer to the following table for the recommended path cost (in the allowed range between 1 and 65535) for each link speed.

Table 10-1 Recommended Path Cost

LINK SPEED	RECOMMENDED VALUE	RECOMMENDED RANGE
4Mbps	250	100 to 1000
10Mbps	100	50 to 600
16Mbps	62	40 to 400
100Mbps	19	10 to 60
1Gbps	4	3 to 10
10Gbps	2	1 to 5

On each bridge, the root port is the port through which a bridge communicates with the root. It is the port on this switch with the lowest path cost to the root (the root path cost). If there is no root port, then this switch has been accepted as the root bridge of the spanning tree network.

10.2 Activating Spanning Tree Protocol

Use the **Switch Configuration** screen to activate STP on the switch.

Step 1.   Click **Administrator**, **Switch Configuration** and then the **Advanced** tab.

Step 2.   Select the **Enable STP Protocol** check box under **Protocol Enable Settings:**.

Figure 10-1 Activating STP

Step 3.   Click **Apply** to save the changes.

10.3 Configuring Spanning Tree Parameters

To configure STP on the switch, click **Administrator** and then **Spanning Tree**.

Figure 10-2 Configure Spanning Tree Parameters

The following table describes the related fields to configure on a global basis (for the entire switch).

Table 10-2 Configure STP Parameter

FIELD	DESCRIPTION	EXAMPLE
Priority	To set the priority of this switch in a spanning tree, enter a number between 1 and 65535. A higher value indicates a lower priority; thus 0 means the highest priority. The default is 32768.	32768

Table 10-2 Configure STP Parameter

FIELD	DESCRIPTION	EXAMPLE
MAX Age	A time interval (in seconds) a root bridge waits without receiving a STP configuration message before initiating a topology change. Specify a number between 6 and 40.	20
Hello Time	The number of seconds the switch waits between STP configuration message transmissions. Specify a number between 1 and 10.	2
Forward-Delay Time	The number of seconds the switch waits before changing from its STP learning/listening state to forwarding state. Specify a number between 4 and 30.	15

10.4 Viewing Root Bridge Information

View the STP root bridge information in the **Spanning Tree** screen. These fields display the spanning tree parameter settings for the switch currently acting as the root.

Root Bridge Information	
Priority	32768
Mac Address	00001c01016c
Root Path Cost	0
Root Port	we are root
Max Age	20
Hello Time	2
Forward Delay	15

Figure 10-3 View STP Root Bridge Information

Refer to the following table for the field descriptions.

Table 10-3 View STP Root Bridge Information

FIELD	DESCRIPTION
Priority	This field displays the priority (between 1 and 65535) of the root bridge in a spanning tree. A higher value indicates a lower priority; thus 0 means the highest priority.
MAC Address	This field displays the MAC address of the root bridge.

Table 10-3 View STP Root Bridge Information

FIELD	DESCRIPTION
Root Path Cost	This field displays the path cost from this switch to the root bridge. The bigger the number, the higher the path cost. This field is 0 to indicate that this switch is the root bridge in a spanning tree.
Root Port	This field displays the port number through which your switch communicates with the root
MAX Age	A time interval (in seconds) a root bridge waits without receiving a STP configuration message before initiating a topology change.
Hello Time	The number of seconds root bridge waits between STP configuration message transmissions.
Forward-Delay Time	The number of seconds the root bridge waits before changing from its STP learning/listening state to forwarding state.

10.5 Configuring Spanning Tree Port Parameters

Configure the port parameters in the **Set Spanning Tree** screen.

Figure 10-4 Configuring STP Port Parameters

Follow the steps below to configure the port parameters.

Step 1. Select a port number from the **Port** scroll down list menu.

Step 2. Enter a number between 1 and 65535 in the **Path Cost** field. The smaller the number the lower the path cost is for the port. Refer to *Table 10-1* for recommended path cost.

Step 3. Enter a number between 0 and 255 in the **Priority** field. The smaller the number, the higher the priority.

Step 4. Click **Apply** to save the changes.

10.6 Viewing STP Port Status

View the STP port status information at the bottom of the **Spanning Tree** screen.

STP Port Status			
Port	Path Cost	Priority	Port State
1	10	128	DISABLED
2	10	128	FORWARDING
3	10	128	DISABLED
4	10	128	DISABLED
5	10	128	DISABLED
6	10	128	DISABLED
7	10	128	DISABLED
8	10	128	DISABLED

Figure 10-5 STP Port Status

The following table describes the read-only port status fields in this screen.

Table 10-4 STP Port Status

FIELD	DESCRIPTION
Port	This field displays the port number on the switch.
Path Cost	This field displays the cost of using this port to reach the root bridge. The bigger the number, the higher the path cost.
Priority	This field displays the priority level of the port. The higher the number the lower the priority level.
Port State	This field displays the state of the port. The state can be **FORWARDING**, **DISABLED**, **BLOCKING**, **LEARNING** and **LISTENING**.

Chapter 11
Port Mirroring

This introduces the port mirroring or port sniffer feature of the switch.

11.1 Introduction

You can monitor traffic on the ports by duplicating or mirroring the traffic to a port. You can monitor input traffic, output traffic or both. A port that mirrors the traffic of other ports is the analysis port or the sniffer port. A port whose traffic is analyzed is the monitor port or the source port.

You can configure up to nine monitor ports but only one mirror port.

11.2 Configuring Port Mirroring

Click **Administrator** and then **Port Mirroring** to display the screen shown next.

Figure 11-1 Port Mirroring

Follow the instructions in the table next to configure this screen.

Table 11-1 Port Mirroring

FIELD	DESCRIPTION
Port Mirroring State	Select **ENABLE** from the drop-down list box to activate port mirroring feature. Select **DISABLE** to deactivate port mirroring. This is the default setting.
Analysis Port	You must select a port from the drop-down list box to act as the sniffer port when you select **ENABLE** in the **Port Mirroring State** field. This field is **NONE** if the **Port Mirroring State** field is **DISABLE**.
Monitor Ports	This read-only field displays the port number of the switch.
Monitor Rx	Select this check box to monitor incoming traffic of the port.
Monitor Tx	Select this check box to monitor outgoing traffic of the port.

Chapter 12
SNMP

This chapter explains SNMP in the web configurator.

12.1 About SNMP

Simple Network Management Protocol (SNMP) is a protocol used for exchanging management information between network devices. SNMP is a member of the TCP/IP protocol suite. Your switch supports SNMP version one (SNMPv1). The next figure illustrates an SNMP management operation.
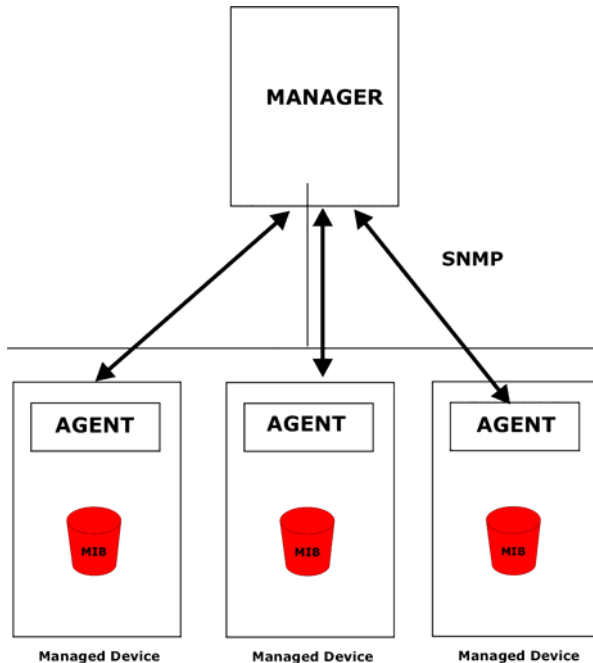
Figure 12-1 SNMP Management Model

An SNMP managed network consists of two main components: agents and a manager.

An agent is a management software module that resides in a managed device. An agent translates the local management information from the managed device into a form compatible with SNMP. The manager is the console through which network

administrators perform network management functions. It executes applications that control and monitor managed devices.

The managed devices contain object variables/managed objects that define each piece of information to be collected about a device. Examples of variables include such as number of packets received, node port status etc. A Management Information Base (MIB) is a collection of managed objects. SNMP allows a manager and agents to communicate for the purpose of accessing these objects.

SNMP itself is a simple request/response protocol based on the manager/agent model. The manager issues a request and the agent returns responses using the following protocol operations:

- Get - Allows the manager to retrieve an object variable from the agent.
- GetNext - Allows the manager to retrieve the next object variable from a table or list within an agent. In SNMPv1, when a manager wants to retrieve all elements of a table from an agent, it initiates a Get operation, followed by a series of GetNext operations.
- Set - Allows the manager to set values for object variables within an agent.
- Trap - Used by the agent to inform the manager of some events.

12.1.1 Trap Manager

A trap manager is a management station that receives traps (the system alerts generated). If no trap manager is defined, then no traps are generated.

12.2 Configuring SNMP

Click **Administrator** and then **SNMP Management** to display the screen shown next.

Figure 12-2 SNMP Management

The following table describes the fields in this screen.

Table 12-1 SNMP Management

FIELD	DESCRIPTION
System Options You must fill in all three fields.	
Name	Enter a descriptive name for the switch for identification purposes.
Location	Enter the location of the switch.
Contact	Enter the name of the contact person for the switch.
Community Strings	
Current Strings	This list box displays the current configured community strings of the switch. To remove a string, select the string in the list and click **Remove**.
New Community Strings	Fill in the field below to add a new community string (or password) and click **Add**.
String	Enter a new community string or password.

Table 12-1 SNMP Management

FIELD	DESCRIPTION
RO	Select **RO** to enable the request accompanied by this string to display MIB information.
RW	Select **RW** to enable the request accompanied by this string to display MIB information and set MIB objects on the switch.
Trap Managers	
Current Manager	This field displays the current configured management station (the trap manager) on the switch. To remove a trap manager, select the trap manager in the list and click **Remove**.
New Manager	Fill in the fields below to add a new trap manager and click **Add**.
IP Address	Enter the IP address of the management station.
Community	Enter the community string (or the password) of the management station.

Part IV:

Using the SMT and System Maintenance

Part IV introduces configuration using the SMT screens and firmware/ configuration maintenance.

Chapter 13
Introducing the SMT

This chapter introduces the basics of managing the switch.

13.1 Introduction

The System Management Terminal (SMT) is a menu – driven interface that you use to configure the switch. You may access the SMT using either Telnet or the console port.

If there is no activity for longer than 5 minutes after you log in, your switch will automatically log you out.

13.2 Accessing the SMT Using Telnet

Follow the steps below to access the SMT screens using a Telnet program.

Step 1. Launch a Telnet program. In Windows, click **Start** and then **Run**.

Step 2. Type "telnet" followed by a space and the IP address of the switch, (192.168.1.1 is the default) and then click **OK** to display the password screen. Refer to *Figure 13-3*.
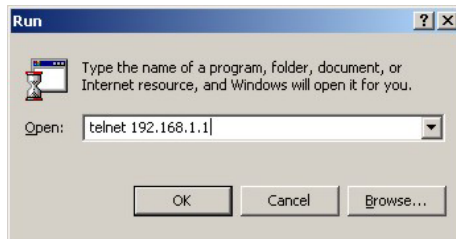
Figure 13-1 Starting a Telnet Session

13.3 Accessing the SMT Using the Console Port

The console configuration is for local management and initial configuration of the switch.

Use an RS-232 console cable with a female DB-9 connector to connect a terminal or computer to the console port.

13.3.1 Establishing a Console Port Connection

After the switch is directly connected to a computer, turn on the computer and run a terminal emulation program (for example, Hyper Terminal in Windows) and configure its communication parameters as follows:

- ➢ 9600 bits per second.
- ➢ Parity none, 8 data bits, 1 stop bit, flow-control none.
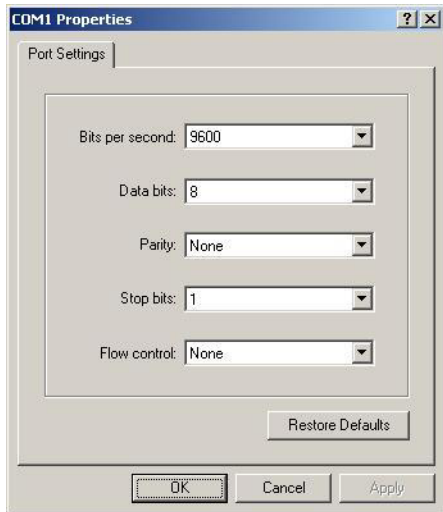
Figure 13-2 HyperTerminal Communication Parameter Settings Example

13.4 Initial SMT Screen

Press [ENTER] to display the login screen. For your first login, enter the default user name "admin" and default password "1234" and then press [ENTER].

The user name and password are case sensitive.

```
                Dimension Switch ES-2008


                    User Name:
                    Password:
```
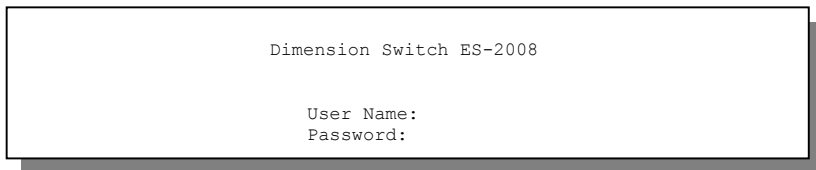
Figure 13-3 SMT: Login Screen

13.5 The SMT Overview

The following figure gives you an overview of the various SMT menu screens of your switch.
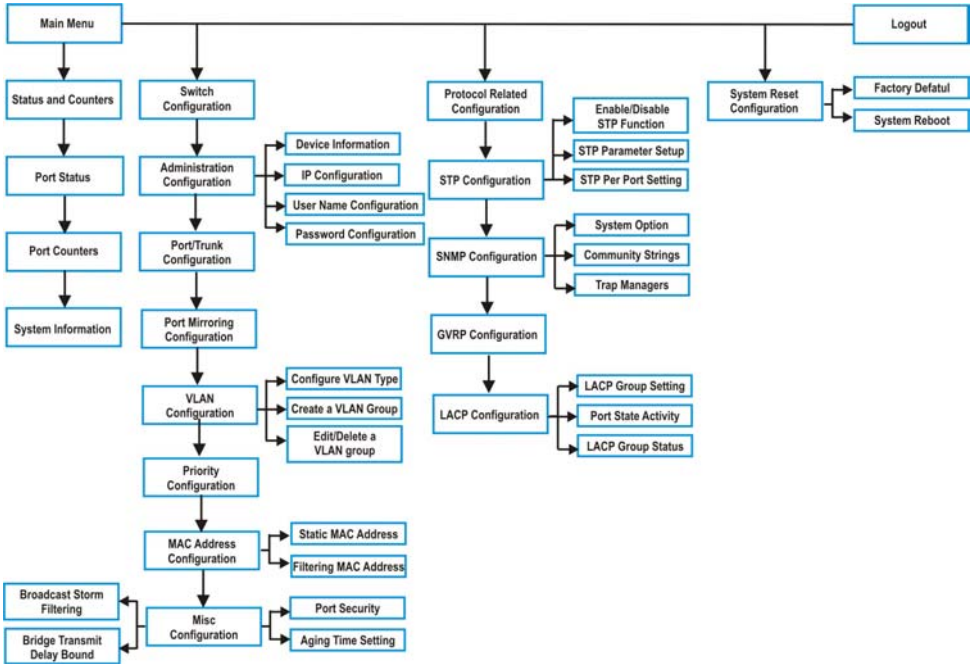
Figure 13-4 SMT Overview

13.6 Navigating the SMT Interface

Familiarize yourself with the SMT operations before you attempt to modify the configuration.

13.6.1 SMT Screen Navigation

The following figure shows the breakdown of most SMT screens.

```
                    Intelligent Switch : Device Information          Screen Title
                    ===================


            Device Name : ES-2008SC Intelligent Switch
                                                                     The
            Device Content : Earth                                   configuration
                                                                     menu.
            Device Location : 8TP + 1FX Ports

            Device Description : ES-2008SC Intelligent Switch

                                                                     The actions
                                                                     menu.
  actions->        <Edit>           <Save>           <Quit>
                                                                     Status
                            Select the action menu.
  Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Actions menu
description.

Figure 13-5 SMT: Menu Breakdown

13.6.2 The Control Keys

The following table describes common control keys that you use in the SMT screens.

Table 13-1 Control Key Descriptions

KEY	DESCRIPTION
[TAB]	To move down through fields in the configuration menu.
	To move through fields in the actions menu.
[BACK SPACE]	To move up through fields in the configuration menu.
	To move back through fields in the actions menu.
[ENTER]	To select an item in the menu.
[SPACE BAR]	To cycle through the available choices in a field.
[ESC]	Press [ESC] to go back to the previous screen.
	Press [ESC] to move from the configuration menu to the actions menu.

Do NOT use the arrow keys to move between SMT menus.
Changes will be lost once you move to another menu using the
arrow keys.

13.7 SMT Main Menu

```
                    Main Menu
                    =========


           Status and Counters

           Switch Static Configuration

           Protocol Related Configuration

           System Reset Configuration

           Logout


                 Show the status of the switch.
  Tab=Next Item     BackSpace=Previous Item     Enter=Select Item
```

Figure 13-6 SMT: Main Menu

13.7.1 SMT Main Menu Summary

Table 13-2 SMT Menu Summary

MENU TITLE	FUNCTION
Status and Counters	Displays system or port statistics and information.
Switch Static Configuration	Use this menu to perform switch configuration such as port and VLAN settings and change login information.
Protocol Related Configuration	Use this menu to configure STP, SNMP, GVRP and LACP settings.
System Reset Configuration	Select this option to reset the switch.
Logout	Select this option to log out of the SMT menus.

Chapter 14
Basic System Setup

This chapter shows you how to set up the switch for administrative purposes.

14.1 Introduction

Use the menus in the **Switch Configurations** screen to configure the switch.

In the main menu, press [TAB] to select **Switch Configuration** and press [ENTER] to display the **Switch Configuration** menu as shown next.

```
          Dimension Switch ES-2008 : Switch Configuration
          ========================



              Administration Configuration

              Port/Trunk Configuration

              Port Mirroring Configuration

              VLAN Configuration

              Priority Configuration

              MAC Address Configuration

              Misc Configuration

              Main Menu

              Configure the system,IP,and password.
 Tab=Next Item      BackSpace=Previous Item      Enter=Select Item
```

Figure 14-1 SMT: Switch Configuration

The following table describes each submenu in this screen.

Table 14-1 Switch Configuration Menu Choice

SUBMENU	DESCRIPTION
Administration Configuration	Use this menu to set the system name, IP address and password
Port/Trunk Configuration	Use this menu to configure and display port settings and set up trunk groups.

Table 14-1 Switch Configuration Menu Choice

SUBMENU	DESCRIPTION
Port Mirror Configuration	Use this menu to configure port mirroring.
VLAN Configuration	Use this menu to display or set VLAN settings.
Priority Configuration	Use this menu to set the priority of each port on the switch.
MAC Address Configuration	Use this menu to add static MAC addresses to the MAC address table in the switch.
Misc Configuration	Use this menu to set other switch related parameters.

14.2 Administration Configuration

The menus in **Administration Configuration** allow you to change administrative settings of the switch.

In the main menu, select **Switch Configuration** and then **Administration Configuration** to display the screen as shown in the figure below.

```
        Dimension Switch ES-2008 : Administration Configuration
        ========================


                    Device Information

                    IP Configuration

                    User Name Configuration

                    Password Configuration

                    Previous Menu


              Configure the  device information.
    Tab=Next Item      BackSpace=Previous Item      Enter=Select Item
```

Figure 14-2 SMT: Device Configuration

14.2.1 General Setup

The **Device Information** menu contains system-related information.

In the **Administration Configuration** screen, select **Device Information** and press [ENTER] to display the screen shown next.

```
              Dimension Switch ES-2008 : Device Information
              ========================


         Device Name : ES-2008

         Device Contact :

         Device Location : 2F RM105

         Device Description : Ethernet Switch



 actions->        <Edit>            <Save>            <Quit>
                          Select the action menu.
Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 14-3 SMT: Device Information

To move to the configuration menu, press [TAB] to select **<Edit>** in the actions menu and press [ENTER]. The following table describes the fields in this menu.

Table 14-2 SMT: Device Information

FIELD	DESCRIPTION	EXAMPLE
Device Name	Enter a descriptive name for identification purposes.	ES-2008
Device Contact	Enter the name of the person in charge of this device.	
Device Location	Enter the location of the switch for administrative purposes.	2F RM105
Device Description	Enter a short description of the switch for administrative purposes.	Ethernet Switch
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.		

14.2.2 Ethernet IP Configuration

Use the **IP Configuration** screen to change the TCP/IP settings of the switch.

Step 1. In the **Administration Configuration** screen, press [TAB] to select **IP Configuration** and press [ENTER].

```
                    Dimension Switch ES-2008 : IP Configuration
                    ========================


              IP Address  : 192.168.1.1

              Subnet Mask : 255.255.255.0

              Gateway     : 192.168.1.10




 actions->         <Edit>            <Save>            <Quit>
                        Select the action menu.
 Tab=Next Item  BackSpace=Previous Item  CTRL+A=Action menu  Enter=Select Item
```
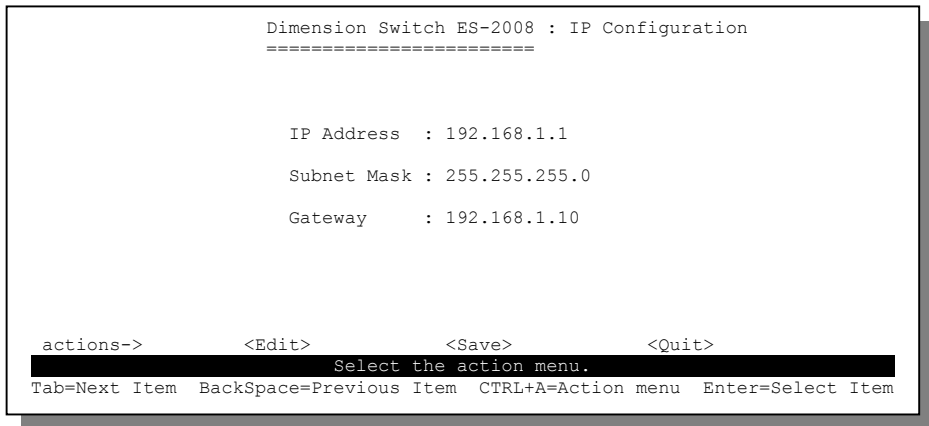
Figure 14-4 SMT: IP Configuration

To move to the configuration menu, press [TAB] to select **<Edit>** in the actions menu and press [ENTER]. The following table describes the fields in this screen.

Table 14-3 SMT: IP Configuration

FIELD	DESCRIPTION	EXAMPLE
IP address	Enter the (LAN) IP address for the switch in dotted decimal notation.	**192.168.1.1**
Subnet mask	Enter the subnet mask in dotted decimal notation. Refer to the *Subnetting* appendix to calculate a subnet mask if you are implementing subnetting.	**255.255.255.0**
Gateway	Enter the LAN gateway IP address in dotted decimal notation.	192.168.1.10
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.		

14.2.3 Changing the System User Name

Follow the steps to change the default system user name.

Step 1. In the **Administration Configuration** screen, press [TAB] to select **User Name Configuration** and press [ENTER].

Step 2. To move to the configuration menu, press [TAB] to select **<Edit>** in the actions menu and press [ENTER].

Step 3. Type in your new system user name in the **User Name** field.

Step 4.   Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.

```
         Dimension Switch ES-2008 : User Name Configuration.
         ========================



                   User Name : root



 actions->          <Edit>            <Save>            <Quit>
                         Select the action menu.
 Tab=Next Item  BackSpace=Previous Item  CTRL+A=Action menu  Enter=Select Item
```

Figure 14-5 SMT: Username Configuration

14.2.4 Changing the System Password

Follow the steps to change the default system password of the switch.

Step 1.   In the **Administration Configuration** screen, press [TAB] to select **Password Configuration** and press [ENTER].

Step 2.   Type in your existing system password in the **Old Password** field and press [ENTER].

Step 3.   Type in your new system password in the **new Password** field and press [ENTER].

Step 4.   Re-type your new system password in the **enter again** field and press [ENTER].

```
         Dimension Switch ES-2008 : Password Configuration
         ========================


                   Old Password:****

                   new password:****

                   enter again :****


          password changed successfully!press any key to return!
     Esc=Previous menu
```

Figure 14-6 SMT: Password Configuration

Chapter 15
Switch Configuration

This chapter introduces various switch configurations.

15.1 Port and Trunk Group Settings

Refer to the *Port Trunking* chapter for background information on trunking.

Follow the steps below to configure port parameters and set up trunk groups.

Step 1.   In the **Switch Configuration** screen, select **Port/Trunk Configuration** and press [ENTER] to display the screen as shown next.

Step 2.   Select **<Edit>** in the actions menu and press [ENTER] to move the cursor to the configuration fields.

```
        Dimension Switch ES-2008 : Port/Trunk Configuration
        =========================

  Port    Type      Enabled    Auto        Speed/Duplex  Flow      Group
                                Negotiate   Config        Control
  ------------------------------------------------------------------------
  1.      10/100TX  Yes        Enabled     100 Full      On        None
  2.      10/100TX  Yes        Enabled     100 Full      On        None
  3.      10/100TX  Yes        Enabled     100 Full      On        None
  4.      10/100TX  Yes        Enabled     100 Full      On        Trunk1
  5.      10/100TX  Yes        Enabled     100 Full      On        Trunk2
  6.      10/100TX  Yes        Enabled     100 Full      On        Trunk2
  7.      10/100TX  Yes        Enabled     100 Full      On        Trunk1
  8.      10/100TX  Yes        Enabled     100 Full      On        Trunk1
  9.      100FX     Yes        Disabled    100 Full      On        N/A


 actions->    <Quit>      <Edit>     <Save>
                     Select the Action menu.
 Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 15-1 SMT: Port/Trunk Configuration

Follow the instructions in the next table to set the fields in this screen.

Table 15-1 SMT: Port/Trunk Configuration

FIELD	DESCRIPTION
Port	This read-only field displays the port number (from 1 to 9 including the fiber/gigabit port) on the switch.

Table 15-1 SMT: Port/Trunk Configuration

FIELD	DESCRIPTION
Type	This read-only field displays the type of the port: **10/100TX** for Ethernet ports or **100FX** for the fiber port.
Enabled	Press [SPACE BAR] and [ENTER] to select **Yes** to activate the port.
Auto Negotiation	Press [SPACE BAR] and [ENTER] to select **Enabled** to activate the auto negotiation feature on the port.
Speed/Duplex Config	Press [SPACE BAR] and [ENTER] to select one **10 Half**, **10 Full**, **100 Half** or **100 Full** to set the speed and duplex mode of the port.
Flow Control	Press [SPACE BAR] and [ENTER] to select **On** to activate the flow control feature on the port.
Group	Press [SPACE BAR] and [ENTER] to select a trunk group this port belongs to. Trunk group choices are **Trunk1**, **Trunk2**, **Trunk3** and **Trunk4**.
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.	

The Type **field for port 9 varies depending on your switch model.**

15.2 Port Mirroring

The port mirroring feature allows you to monitor port traffic on the switch. Refer to the *Port Mirroring* chapter for more information.

Select **Port Mirroring Configuration** and press [ENTER] to display the screen as shown next.

```
          Dimension Switch ES-2008 : Port Mirroring Configuration
          =========================

     Port Mirroring State: Enable

      Analysis Port: 1


     Port          Type         Action
 ----------------------------------------
     1.            10/100TX      None
     2.            10/100TX      RX
     3.            10/100TX      TX
     Trk1.         10/100TX      Both
     Trk2.         10/100TX      None
     0.            10/100TX      None
     0.            10/100TX      None
     0.            10/100TX      None
     9.            100FX         None

 actions->    <Quit>      <Edit>     <Save>
                  Edit the mirroring configuration.
  Tab=Next Item  BackSpace=Previous Item  Space=Toggle  Esc=Action menu
```

Figure 15-2 SMT: Port Monitoring Configuration

The Type **field for port 9 varies depending on your switch model.**

Follow the instructions in the table next to configure the fields in this screen.

Table 15-2 SMT: Port Monitoring Configuration

FIELD	DESCRIPTION
Port Mirror State	Press [SPACE BAR] and [ENTER] to select **YES** to activate the port mirroring feature and set the related fields below.
Analysis Port	Press [SPACE BAR] and [ENTER] to select a port number as the mirror port.
Port	This read-only field displays the trunk group number or port numbers for ports not in a trunk group.
	Note: This field is **0** to indicate that a port is in a trunk group.
Type	This read-only field displays either **10/100 TX** for Ethernet ports or **100FX** for the fiber port on the switch.

Table 15-2 SMT: Port Monitoring Configuration

FIELD	DESCRIPTION
Action	Press [SPACE BAR] and [ENTER] to select direction of data traffic on the port to monitor.
	Select **RX** to monitor only the incoming traffic on the port.
	Select **TX** to monitor only the outgoing traffic on the port.
	Select **Both** to monitor both the incoming and outgoing traffic on the port.
	If this field is **None**, no traffic on the port is monitored.
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.	

15.3 VLAN

Use the **VLAN Configuration** screen to configure VLANs.

In the main menu, press [TAB] to select **Switch Configuration**, **VLAN Configuration** and press [ENTER] to display the screen as shown in the figure below.

```
        Dimension Switch ES-2008 : VLAN Configuration
        ========================


                 Configure VLAN Type

                 Create VLAN Group

                 Edit/Delete VLAN Group

                 Previous Menu


              Configure the VLAN PVID and Ingress Rule.
Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 15-3 SMT: VLAN Configuration

Refer to the *VLAN* chapter for more information.

15.3.1 Setting VLAN Mode

In the **VLAN Configuration** screen, select **Configure VLAN Type** and press [ENTER] to display the screen as shown next.

Select **Disabled**, **802.1Q**, **802.1QwithGVRP** or **Port-Based** in the **VLAN Mode** field.

```
                 Intelligent Switch : VLAN Support Configuraton
                 ===================

        VLAN Mode :Disabled



 actions->   <Quit>      <Edit>     <Save>    <Previous Page>    <Next Page>
                        Select the Action menu.
  Tab=Next Item  BackSpace=Previous Item  Space=Toggle  Ctrl+A=Action menu
```

Figure 15-4 SMT: VLAN Support Configuration: Setting VLAN Mode

The following sections describe how to configure various VLAN modes.

15.3.2 Tag-Based VLAN Configuration

Step 1.   In the **Configure VLAN Type** screen select either **802.1Q** or **802.1Q with GVRP** in the **VLAN Mode** field.

```
        Dimension Switch ES-2008 : Configure VLAN Type
        ========================

     VLAN Mode :802.1Q

                         Ingress          Acceptable
     Port      VLAN ID   Filter           Frame Type
     -----------------------------------------------------------
     1.        1         Disable          All
     2.        1         Disable          All
     3.        1         Disable          All
     Trk1.     1         Disable          All
     Trk2.     1         Disable          All
     0.        1         Disable          All
     0.        1         Disable          All
     0.        1         Disable          All
     9.        1         Disable          All


 actions->     <Quit>        <Edit>       <Save>
                     Select the Action menu.
  Tab=Next Item  BackSpace=Previous Item  Space=Toggle  Esc=Action menu
```

Figure 15-5 SMT: VLAN Support Configuration: 802.1Q

The following table describes the fields in this screen.

Table 15-3 SMT: VLAN Support Configuration: 802.1Q

FIELD	DESCRIPTION
VLAN Mode	Press [SPACE BAR] and [ENTER] to select either **802.1Q** or **802.1QwithGVRP**. The following fields display on the screen.

Table 15-3 SMT: VLAN Support Configuration: 802.1Q

FIELD	DESCRIPTION
Port	This read-only field displays the port number or the trunk group on the switch.
	Note: This field is **0** to indicate that a port is in a trunk group.
VLAN ID	Enter the VLAN ID number that will be assigned to untagged traffic on a given port. For example, if the default VLAN ID of port 10 is 100, all untagged packets on port 10 will belong to VLAN 100.
	The default setting for all ports is **1**.
	This feature is useful to accommodate devices that you want to participate in the VLAN but that don't support tagging. Only one untagged VLAN is allowed per port.
Ingress Filtering	Select **Enable** from the drop-down list box to forward frames belonging to a specific VLAN if the port belongs to that VLAN.
	Select **Disable** to forward all frames, regardless of the port's VLAN setting.
Acceptable Frame Type	Select **All** from the drop-down list box to accept all untagged frames.
	Select **Tag Only** to drop all untagged frames.
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.	

Step 2. After saving the settings, press any key to display the screen shown next.

```
        Dimension Switch ES-2008 : Create A VLAN Group
        ========================

        VLAN Name: [                  ] VLAN ID: [     ](1~4094)

        Port          Member
        -----------------------
        1.            No
        2.            No
        3.            No
        Trk1.         No
        Trk2.         No
        0.            No
        0.            No
        0.            No
        9.            No


    actions->    <Quit>      <Edit>     <Save>
                        Select the Action menu.
    Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 15-6 SMT: Add a VLAN Group

Follow the instructions in the table below to configure this screen.

Table 15-4 SMT: Add a VLAN Group

FIELD	DESCRIPTION
VLAN Name	Enter a descriptive name for the VLAN group for identification purposes.
VLAN ID	Enter a number between 1 and 4049 as the identification number for the VLAN group.
Port	This read-only field displays the trunk group number or port numbers for ports not belonging to a trunk group.
	Note: This field is **0** to indicate that a port is in a trunk group.
Member	Ports are assigned membership in a VLAN by associating a VLAN ID with the ports
	Press [SPACE BAR] to select **Tagged**, **UnTagged** or **No**.
	Select **Tagged** to tag all outgoing frames on this port.
	Select **Untagged** not to tag all outgoing frames on this port.
	Select **No** to prevent a port from joining a VLAN group
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.	

15.3.3 Port-Based VLAN Configuration

Step 1. In the **Configure VLAN Type** screen and select **Port-Based** in the **VLAN Mode** field.

Step 2. Press any key to display the screen as shown in *Figure 15-6*. Follow the instruction in *Table 15-3* to set the fields in the **Create a VLAN Group** screen.

15.3.4 Creating a New VLAN Group

You can add a new port-based or tag-based VLAN group.

Follow the steps below to create a new tag-based VLAN group.

Step 1. In the **Configure VLAN Type** screen, select **Create a VLAN Group** and press [ENTER] to display the **Create a VLAN Group** screen as shown in *Figure 15-6*.

Step 2. Select **Add a VLAN Group**. Refer to *Table 15-3* to set the fields.

15.3.5 Changing VLAN Group Settings

Follow the steps below to change VLAN group settings or delete a VLAN group.

Step 1. In the **VLAN Configuration** main menu, select **Edit/Delete VLAN Group** and press [ENTER] to display the screen as shown next.

```
          Dimension Switch ES-2008 : Edit/Delete VLAN Group
          ========================

        Group Name       VLAN ID        Group Name      VLAN ID
        ----------------------        ----------------------
        default             1
        test                2




  actions->  <Edit>  <Delete>  <Save>  <Previous Page>  <Next Page>  <Quit>
                      Select VLAN Group to be modified.
 Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```
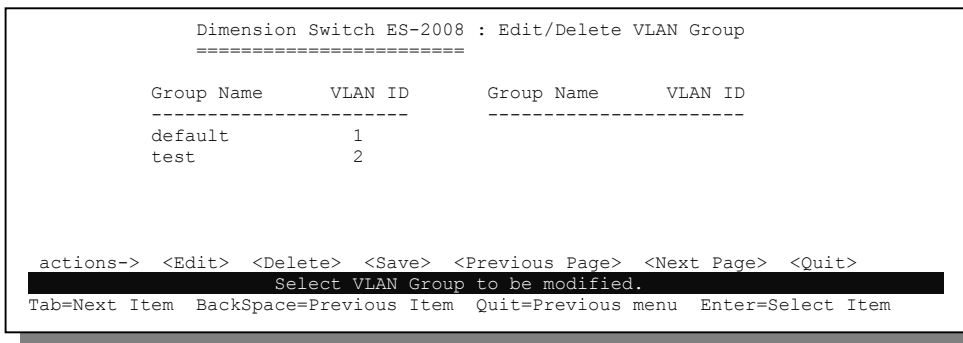
Figure 15-7 SMT: Edit/Delete a VLAN Group

Step 2. Press [TAB] to select **<Edit>** in the actions menu and press [ENTER].

Step 3. Follow the steps in *Section 15.3.2* (for tag-based VLAN) or *Section 15.3.3* (for port-based VLAN) to make changes.

15.3.6 Deleting a VLAN Group

Use the **Edit/Delete a VLAN Group** screen to delete an existing VLAN.

Follow the steps below to delete a VLAN group.

Step 1. In the **VLAN Configuration** main menu, select **Edit/Delete a VLAN Group** and press [ENTER] to display the screen as shown in *Figure 15-7*.

Step 2. Press [TAB] to select **<Delete>** in the actions menu and press [ENTER].

Step 3. Select an entry and press [ENTER] to delete the VLAN group.

Step 4. Press [ESC] and select **<Save>** in the actions menu to save the settings back to the switch.

15.4 Priority Configuration

Priority is a value between 0 and 7 assigned to each frame with 7 being the highest priority. Frames assigned a higher priority are transmitted before frames with a lower priority. Each priority number is mapped either the **Low** or **High** traffic class (or queue), and frames are transmitted based on what queue they are in. Frames in the **High** queue are transmitted out a port first.

In the **Switch Configuration** screen select **Priority Configuration** and press [ENTER] to display the screen as shown next.

```
              Dimension Switch ES-2008 : Priority Configuration
              =========================

                      Level 0 : Low
                      Level 1 : Low
                      Level 2 : Low
                      Level 3 : Low
                      Level 4 : High
                      Level 5 : High
                      Level 6 : High
                      Level 7 : High

                   High/Low Queue Service Ratio H:L :[H->L]


  actions->          <Edit>            <Save>            <Quit>
                        Select the action menu.
 Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 15-8 SMT: Priority Configuration

The following table describes the fields in this screen.

Table 15-5 SMT: Priority Configuration

FIELD	DESCRIPTION
Level 0..7	Press [SPACE BAR] and [ENTER] to select **High** to set high priority for level.
High/Low Queue Service Ratio H:L	Press [SPACE BAR] and [ENTER] to select the type of queue service. Refer to the *Advanced Switch Configuration* chapter for descriptions of each option.
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.	

15.5 MAC Address Configuration

Use the menus in the **MAC Address Configuration** screen to set static MAC addresses and configure MAC address filter.

In the **Switch Configuration** screen, select **MAC Address Configuration** to display the screen as shown.

```
         Dimension Switch ES-2008 : MAC Address Configuration
         =========================

                        Static MAC Address

                        Filtering MAC Address

                        Previous Menu


                       Configure the MAC address.
Tab=Next Item      BackSpace=Previous Item      Enter=Select Item
```

Figure 15-9 SMT: MAC Address Configuration

15.5.1 Static MAC Address

Follow the steps below to add a static MAC address.

Step 1.   In the **MAC Address Configuration** screen select **Static MAC Address** and press [ENTER] to display the MAC address table.

```
          Dimension Switch ES-2008 : Static MAC Address
          =========================

  MAC Address   Port          MAC Address   Port
  ------------------          ------------------




 actions->      <Add>     <Edit>     <Delete>     <Save>     <Quit>
                    Add/Edit/Delete static MAC addresses.
 Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 15-10 SMT: Static MAC Address

Step 2.   Press [TAB] to select **<Add>** and press [ENTER] to display screen as shown next.

```
          Dimension Switch ES-2008 : Add Static MAC Address
          ========================



                   MAC Address :

                   Port No.    :



 actions->        <Edit>           <Save>           <Quit>
                        Select the action menu.
 Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 15-11 SMT: Add Static MAC Address

Step 3.   Select **<Edit>** and press [ENTER] to move the cursor to the configuration
              fields.

Step 4.   Enter a MAC address in the **MAC Address** field.

Step 5.   Press [TAB] and enter a port number in the **Port Num** field.

Step 6.   Save the settings.

Editing a Static MAC Address

To change a static MAC address entry in the table, press [TAB] to select **<Edit>** and press
[ENTER]. Enter a new MAC address or change the port number and save the changes.

Deleting a Static MAC Address

To remove a static MAC address entry from the table, press [TAB] to select **<Delete>** and
press [ENTER]. Select the entry you want to remove and press [ENTER] and save the
changes.

15.5.2 MAC Address Filtering

Follow the steps below to set up MAC address filtering.

Step 1.   In the **MAC Address Configuration** screen, select **Filtering MAC Address**
              and press [ENTER] to display the screen as shown.

```
                  Dimension Switch ES-2008 : Filtering MAC Address
                  =========================

   MAC Address   VLAN ID                   MAC Address   VLAN ID
   ------------------------------          ------------------------------




 actions->       <Add>      <Edit>      <Delete>     <Save>      <Quit>
                        Add/Edit/Delete filter MAC addresse .
 Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 15-12 SMT: MAC Address Filtering

Step 2.   Press [TAB] to select **<Add>** and press [ENTER].

```
                  Dimension Switch ES-2008 : Add Filter MAC Address
                  =========================


                       MAC Address :

                       VLAN ID     :




 actions->        <Edit>             <Save>            <Quit>
                        Select the action menu.
 Connection to host lost.=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 15-13 SMT: Edit MAC Address Filtering

Follow the instruction in the table next to set the fields in this screen.

Table 15-6 Edit MAC Address Filtering SMT Field Descriptions

FIELD	DESCRIPTION
MAC Address	Enter the MAC address of the Ethernet device you wish to block in hexadecimal notation.
VLAN ID	If VLAN is enabled, enter the number of the VLAN group to which this port belongs in the **VLAN ID** field.
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.	

Editing MAC Address Filter

To change a MAC address filter entry in the table, press [TAB] to select **<Edit>** and press [ENTER]. Enter a new MAC address or change the port number and save the changes.

Deleting MAC Address Filter

To remove a MAC address filter entry from the table, press [TAB] to select **<Delete>** and press [ENTER]. Select the entry you want to remove and press [ENTER] and save the changes.

15.6 Miscellaneous Configuration

This section shows you configuration menus in **Misc Configuration** menu.

```
            Dimension Switch ES-2008 : Misc Configuration
            ========================


                        Port Security

                        Aging Time Setting

                        Broadcast Storm Filtering

                        Bridge Transmit Delay Bound

                        Previous Menu



                    Configure the port security.
    Tab=Next Item     BackSpace=Previous Item     Enter=Select Item
```

Figure 15-14 SMT: Misc Configuration

15.6.1 Port Security

Refer to the section on *Port Security* for background information.

Select **Port Security** and press [ENTER] to display the screen as shown next.

```
               Dimension Switch ES-2008 : Port Security
               ========================


      Port              Enable Security
                    (disable for MAC Learning)
               -------------------------------
      1.                 Disable
      2.                 Disable
      3.                 Disable
      4.                 Disable
      Trk1.              Disable
      Trk2.              Disable
      0.                 Disable
      0.                 Disable
      9.                 Disable



  actions->       <Edit>            <Save>            <Quit>
                       Select the Action menu.
 Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```
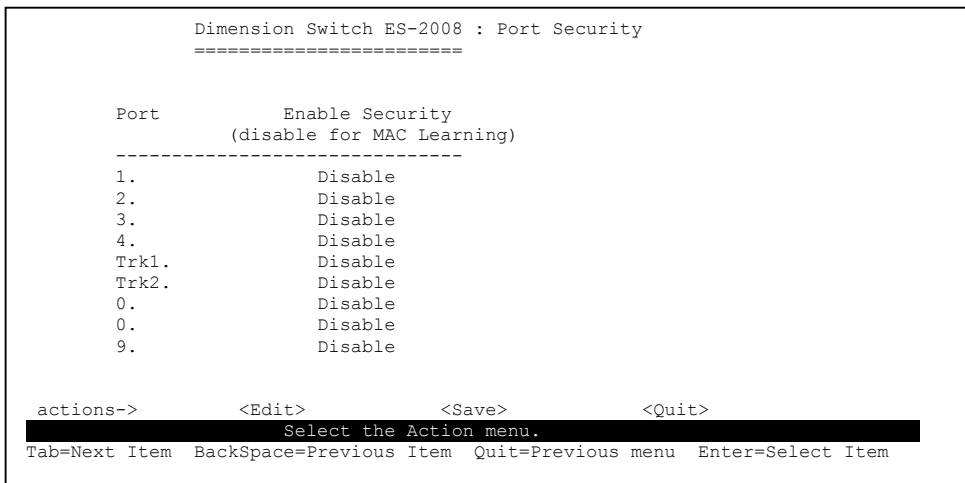
Figure 15-15 SMT: Port Security

The following table describes the fields in this screen.

Table 15-7 SMT: Port Security

FIELD	DESCRIPTION
Port	This read-only field displays the port number or the trunk group on the switch
	Note: This field is **0** to indicate that a port is in a trunk group.
Enable Security	Press [SPACE BAR] and [ENTER] to select **Enable** to prevent the port from learning new MAC addresses.
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.	

15.6.2 MAC Address Time Out

To specify the time out period for inactive MAC addresses, select **Aging Time Setting** to display the screen as shown next.

Enter a time interval between 300 and 765 (in seconds) in the **MAC Age Interval (sec)** field. If you enter 0, the MAC addresses will never timeout.

```
                Dimension Switch ES-2008 : Aging Time Setting
                ========================



           MAC Age Interval (sec) [300  ] : 300   (0,300~765)




 actions->        <Edit>              <Save>            <Quit>
                        Select the action menu.
 Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 15-16 SMT: Aging Time Setting

15.6.3 Broadcast Storm Filter Mode

In the **Broadcast Strom Filter Mode** filed, press [SPACE BAR] and [ENTER] to select **Yes** to activate broadcast storm filter.

```
                Dimension Switch ES-2008 : Broadcast Storm Filtering
                ========================



                   Broadcast Storm Filter Mode :NO



 actions->        <Edit>              <Save>            <Quit>
                        Select the action menu.
 Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 15-17 SMT: Broadcast Storm Filter Mode

15.6.4 Setting Max Bridge Transmit Delay Bound

```
          Dimension Switch ES-2008 : Bridge Transmit Delay Bound
          ========================


                Bridge Transmit Delay Bound :OFF

                Enable Delay Bound :Disable

                Max Delay Time :0



 actions->        <Edit>           <Save>           <Quit>
                        Select the action menu.
Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 15-18 SMT: Max Bridge Transmit Delay Bound

Follow the instructions in this table to configure this screen.

Table 15-8 SMT: Max Bridge Transmit Delay Bound

FIELD	DESCRIPTIONS
Bridge Transmit Delay Bound	Press [SPACE BAR] and [ENTER] to select one of **1 sec**, **2 sec** and **4 sec** to set the packets queuing time in the switch. Packets queued beyond the time period will be dropped. Select **off** to disable this feature. Default is **1 sec**.
Enable Delay Bound	Press [SPACE BAR] and [ENTER] to select **Enable** and specify a time in the **MAC Delay Time ms** (in milliseconds) to limit the time a low priority packet is allowed to queue in the switch.
Max Delay Time	Specify a time interval a low priority packet is allowed to queue in the switch.
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.	

Chapter 16
Protocol Related Configuration

This chapter shows you how to configure STP, SNMP, GVRP and LACP.

16.1 Introduction

In the main menu, press [TAB] to select **Protocol Related Configuration** and press [ENTER]. The following screen displays.

```
        Dimension Switch ES-2008 : Protocol Related Configuration
        ========================


                          STP Configuration

                          SNMP Configuration

                          GVRP Configuration

                          LACP Configuration

                          Previous Menu


                  Configure the Spanning Tree Protocol.
 Tab=Next Item      BackSpace=Previous Item      Enter=Select Item
```

Figure 16-1 SMT: Protocol Related Configuration

16.2 STP Configuration

To access the STP menus, select **STP Configuration** in the **Protocol Related Configuration** screen. Refer to the *STP* chapter for more background information.

```
Dimension Switch ES-2008 : STP Configuration
========================

            Enable/Disable STP Function

            STP Parameters Setup

            STP Per Port Setting

            Previous Menu


        Enable or disable the Spanning Tree P otocol.
Tab=Next Item    BackSpace=Previous Item    Enter=Select Item
```

Figure 16-2 SMT: STP Configuration

16.2.1 Enable STP

To enable STP, select **Enable/Disable STP Function** in the **STP Configuration** screen and press [ENTER] to display the screen as shown next.

Press [SPACE BAR] and [ENTER] to select **Enable** in the **STP** field and save the settings.

```
Dimension Switch ES-2008 : Enable/Disable STP Function
========================



            STP :Enabled


actions->        <Edit>            <Save>            <Quit>
                Select the action menu.
Tab=Next Item  BackSpace=Previous Item  Space=Toggle  Esc=Action menu
```

Figure 16-3 SMT: Enable STP

16.2.2 Configure System Parameters

Use the **STP Parameters Setup** screen to configure the system parameters for STP. Refer to the *Configuring Spanning Tree Parameters* section for field descriptions.

```
              Dimension Switch ES-2008 : STP Parameters Setup
              ========================


      Root Bridge Information          Configure Spanning Tree Parameters
      -----------------------          ----------------------------------
      Priority     : 32768             Priority (1-65535)  : 32768
      Mac Address  : 00001C01016C
      Root Path Cost: 0                Max Age (6-40)      : 20
      Root Port    : Root
      Max Age      : 20                Hello Time (1-10)   : 2
      Hello Time   : 2
      Forward Delay : 15               Forward Delay Time (4-30): 15



     actions->        <Edit>            <Save>            <Quit>
                            Select the action menu.
    Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 16-4 SMT: STP Parameters Setup

16.2.3 Configuring STP Parameters Per Port

Use the **STP Per Port Setting** screen to set up STP parameters for each port on the switch.

```
              Dimension Switch ES-2008 : STP Per Port Setting
              ========================


     Port           State          Path Cost          Priority
     -----------------------------------------------------------
     1.             Disabled       10                 128
     2.             Forwarding     10                 128
     3.             Disabled       10                 128
     4.             Disabled       10                 128
     5.             Disabled       10                 128
     6.             Disabled       10                 128
     7.             Disabled       10                 128
     8.             Disabled       10                 128
     9.             Disabled       10                 128



     actions->        <Edit>            <Save>            <Quit>
                            Select the Action menu.
    Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 16-5 SMT: STP Per Port Setting

The following table describes the fields in this screen.

Table 16-1 SMT: STP Per Port Setting

FIELD	DESCRIPTION
Port	This read-only field displays the port number on the switch.
State	This read-only field displays the state of the port. The state can be **Forward**, **Disable**, **Blocking**, **Learning** and **Listening**.
Path Cost	Enter a number between 1 and 65535 in the **Path Cost** field. The smaller the number the lower the path cost is for the port.
Priority	Enter a number between 0 and 255 in the **Priority** field. The smaller the number, the higher the priority.
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.	

16.3 SNMP Configuration

Refer to the *SNMP* chapter for more information on SNMP.

To configure SNMP, use the menus in the **SNMP Configuration** screen as shown next.

```
              Intelligent Switch : SNMP Configuration
              ===================



                     System Options

                     Community Strings

                     Trap Managers

                     Previous Menu


                 Configure the system information.
 Tab=Next Item     BackSpace=Previous Item     Enter=Select Item
```

Figure 16-6 SMT: SNMP Configuration

16.3.1 System Options

Use the **System Options** screen to set up system parameters for SNMP.

```
                Intelligent Switch : System Options
                  ===================



        System Name :

        System Contact :

        System Location :


 actions->         <Edit>            <Save>            <Quit>
                          Select the action menu.
Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 16-7 SMT: SNMP System Options

Refer to the *Configuring SNMP* section for field descriptions.

16.3.2 Community Strings

```
                Intelligent Switch : Community Strings
                  ===================

 Community Name           Write Access
 ----------------------------------------
 public                   Read only




 actions->      <Add>      <Edit>      <Delete>      <Save>      <Quit>
                     Add/Edit/Delete community strings.
Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 16-8SMT: SNMP Community Strings

Refer to the *Configuring SNMP* section for field descriptions.

16.3.3 Trap Manager

Follow the steps below to add trap management stations.

Step 1.   Select **Trap Managers** in the **SNMP Configuration** screen and press
   [ENTER] to display the screen as shown next.

```
                    Intelligent Switch : Trap Managers
                    ===================

   IP                           Community Name
  ----------------------------------------


  actions->      <Add>       <Edit>       <Delete>      <Save>       <Quit>
                        Add/Edit/Delete trap managers.
 Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 16-9 SMT: SNMP Trap Manager

Step 2.   Select **<Add>** and press [ENTER] to display the **Add SNMP Trap Manager** screen as shown.

```
                    Intelligent Switch : Add SNMP Trap Manager
                    ===================




                     IP :

                     Community Name :



  actions->      <Edit>             <Save>            <Quit>
                        Select the action menu.
 Tab=Next Item  BackSpace=Previous Item  CTRL+A=Action menu  Enter=Select Item
```

Figure 16-10 SMT: Add SNMP Trap Manager

Step 3.   Enter the IP address of the trap management station in the **IP** field in dotted decimal notation.

Step 4.   Enter a community string (or password) in the **Community Name** field of the trap management station.

Step 5.   Save the changes.

16.4 GVRP Configuration

Refer to the *VLAN* chapter for more information on GVRP.

```
            Intelligent Switch : GVRP Configuration
            ===================




              GVRP : Enabled



actions->          <Edit>            <Save>            <Quit>
                        Select the action menu.
 Tab=Next Item  BackSpace=Previous Item  Space=Toggle  Esc=Action menu
```

Figure 16-11 SMT: GVRP Configuration

To enable dynamic VLAN, press [SPACE BAR] and [ENTER] to select **Enabled** in the **GVRP** field.

16.5 LACP Configuration

Refer to the *Port Trunking* chapter for more information on LACP (Link Aggregate Control Protocol).

```
           Dimension Switch ES-2008 : LACP Configuration
           ========================


                         LACP Group Setting

                         Port State Activity

                         LACP Group Status

                         Previous Menu



                   Configure LACP group setting.
 Tab=Next Item     BackSpace=Previous Item     Enter=Select Item
```

Figure 16-12 SMT: LACP Configuration

16.5.1 LACP Group Setting

Select **LACP Group Setting** in the **LACP Configuration** screen and press [ENTER] to display the screen shown next.

```
                Dimension Switch ES-2008 : LACP Group Setting
                =========================


                     Group      LACP       Work Port No.
                     ----------------------------------------
                      Trk1.      Enabled         2
                      Trk2.      Disabled        2




 actions->           <Edit>             <Save>              <Quit>
                          Select the action menu.
 Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 16-13 SMT: LACP Group Setting

Before you configure LACP, you must set the trunk groups first.
Refer to the chapter on *Port Trunking***.**

The following table describes the fields in this screen.

Table 16-2 SMT: LACP Group Setting

FIELD	DESCRIPTION
Group	This read-only field displays the trunk group number.
LACP	Press [SPACE BAR] and [ENTER] to select **Enable** to activate dynamic trunking on this trunk group.
Work Port No.	Enter the number of ports in the trunk group.
	If dynamic trunking is *not* activated on the trunk group then the number must be the same as the number of ports in the trunk group.
	If dynamic trunking is activated, you may enter a number bigger than the number of ports in a trunk group.
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.	

16.5.2 Port State Activity

Select **Port State Activity** in the **LACP Configuration** screen and press [ENTER] to display the screen as shown.

```
            Dimension Switch ES-2008 : Port State Activity
            ========================


                  Port        State Activity
                  --------------------------
                  1           Passive
                  2           Passive
                  3           Passive
                  4           Passive
                  7           Active
                  8           Active


 actions->        <Edit>          <Save>          <Quit>
                     Select the action menu.
 Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 16-14 SMT: LACP State Activity

The following table describes the fields in this screen.

Table 16-3 SMT: LACP State Activity

FIELD	DESCRIPTION
Port	This read-only field displays *only* the port number in a dynamic trunk group. For example, in *Figure 16-14*, port 5 and 6 (not shown) are not in a dynamic trunk group.
State Activity	Press [SPACE BAR] to select either **Passive** or **Active** and press [ENTER]. Select **Active** to have the port automatically send LACP packets to another trunk port on the other side of the link to negotiate a trunk link configuration. Select **Passive** to have the port respond to LACP packets but cannot negotiate a trunk link configuration with another trunk port on the other end of the link. This is the default setting for all ports.
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.	

16.5.3 LACP Group Status

The **LACP Group Status** screen displays the ports in a static trunk group.

```
                Intelligent Switch : LACP Group Status
                ===================


                       Static Trunking Group


             Group Key : 2

             Port_No   : 5 6



  actions->      <Quit>     <Previous Page>     <Next Page>
                        Select the action menu.
  Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 16-15 SMT: LACP Group Status

The following table describes the fields in this screen.

Table 16-4 SMT: LACP Group Status

FIELD	DESCRIPTION
Group Key	This read-only field displays the static trunk group number.
Port	This read-only field displays the port number in the static trunk group.
Press [ESC] to move the cursor back to the actions menu. Press [TAB] to select **<Save>** and press [ENTER] to save the settings back to the switch.	

Chapter 17
Status and Counters

This chapter describes how to view port status and statistics and general switch information.

17.1 Status and Counters

In the SMT main screen, select **Status and Counters** and press [ENTER]. A screen displays as shown.

```
           Dimension Switch ES-2008 : Status and Counters
           =========================


                           Port Status

                           Port Counters

                           System Information

                           Main Menu


            Displays current status of all the switc  ports.
 Tab=Next Item     BackSpace=Previous Item     Enter=Select Item
```

Figure 17-1 SMT: Status and Counters

17.1.1 Port Status

In the **Status and Counters** screen, select **Port Status** and press [ENTER] to display the **Port Status** screen.

```
              Dimension Switch ES-2008 : Port Status
              ========================

   Port       Type         Enabled      Status      Mode      FlowCtrl
   ----       --------      -------      ------      ---------    --------
   1.         10/100TX      No           Down        100 Full     On
   2.         10/100TX      No           Down        100 Full     On
   3.         10/100TX      Yes          Up          100 Half     On
   4.         10/100TX      No           Down        100 Full     On
   5.         10/100TX      No           Down        100 Full     On
   6.         10/100TX      No           Down        100 Full     On
   7.         10/100TX      No           Down        100 Full     On
   8.         10/100TX      No           Down        100 Full     On
   9.         100FX         No           Down        100 Full     On

  actions->       <Quit>
                         Select the action menu.
  Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 17-2 SMT: Port Status

Refer to the *Port Control* chapter for field descriptions.

17.1.2 Port Statistics

In the **Status and Counters** screen, select **Port Counters** and press [ENTER] to display the **Port Counters** screen.

```
              Dimension Switch ES-2008 : Port Counters
              ========================

   Port  TxGoodPkt  TxBadPkt  RxGoodPkt  RxBadPkt  TxAbort   Collision
   ---------------------------------------------------------------------------
   1.    0          0         0          0         0         0
   2.    0          0         0          0         0         0
   3.    3388925    0         3632292    379465    0         15457
   4.    0          0         0          0         0         0
   5.    0          0         0          0         0         0
   6.    0          0         0          0         0         0
   7.    0          0         0          0         0         0
   8.    0          0         0          0         0         0
   9.    0          0         0          0         0         0

  actions->       <Refresh>        <Clear>        <Quit>
                         Configure the action menu.
  Tab=Next Item  BackSpace=Previous Item  Quit=Previous menu  Enter=Select Item
```

Figure 17-3 SMT: Port Counters

Refer to the *Port Control* chapter for field descriptions.

17.1.3 General Switch Information

In the **Statistics and Counter** screen select **Switch Information** and press [ENTER] to display the **Switch Information** screen.

```
            Dimension Switch ES-2008 : System Information
            =========================


System Description : Dimension Switch ES-2008

MAC Address        : 00001C01016C

Firmware Version   : v1.02

Hardware Version   : A3.00

Kernel Version     : v1.06



                   Display the switch system.
   Esc=Previous menu
```

Figure 17-4 SMT: Switch Information

Refer to the *General Switch Information* section for field descriptions.

Chapter 18
Firmware and Configuration File Maintenance

This chapter shows you how to upgrade the firmware and configuration file and create configuration backup files.

18.1 Filename Convention

The firmware or the configuration files do not have any filename conventions. There is not specific file extension or filenames that you need to follow. Therefore, you can specify any names or file extensions for the firmware and the configuration files.

However, it is recommended to use the ".bin" file extension for the firmware file and ".rom" for the configuration file to manage the files.

> **The filename must be less than 15 ASCII characters if you use the web configurator.**

Visit www.zyxel.com to download the latest version of firmware for your switch.

18.2 Firmware Upgrade

This section shows you how to perform firmware upgrades. .

> **Download the correct firmware for your switch model from www.zyxel.com**
>
> **Upgrading wrong firmware version will render the fiber/gigabit port useless for switch models with a fiber/gigabit port.**

> **WARNING!**
> **DO NOT INTERRUPT THE FILE TRANSFER PROCESS AS THIS MAY PERMANENTLY DAMAGE YOUR SWITCH.**

To upload firmware to your switch via the web configurator, you need to run tftp server on your computer. In the event of your network being down, uploading files is only possible with a direct connection to your switch via the console port.

18.2.1 Firmware Upgrade Via Console Port

Connect your computer to the console port on the switch.

Step 1. Run a terminal emulation program (Hyper Terminal in Windows screen shots are used in this *User's Guide*) and configure its communication parameters. Refer to the section on *Accessing the SMT Using the Console Port*.

Step 2. Reboot the switch. The following screen displays.

```
$$$ Switch LOADER Checksum O.K !!!
$$$ Press X key to  start Xmodem receiver: Key = 78
$$$ Download IMAGE through console(1K Xmodem;baudrate=57600bps)
$$$ Start Xmodem Receiver:
```

Figure 18-1 SMT: Startup Message

Step 3. At the "$$$ Press X key to start Xmodem receiver:" message, press "x".

Step 4. You *must* change your terminal emulation program console port baud rate setting to 57600bps.

Step 5. Click **Transfer**, then **Send File** to display the following screen.

Figure 18-2 1K Xmodem Firmware Upload Example

```
$$$ Switch LOADER Checksum O.K !!!
$$$ Press X key to  start Xmodem receiver: Key = 78
$$$ Download IMAGE through console(1K Xmodem;baudrate=57600bps)
$$$ Start Xmodem Receiver: CCCCCCCCC
$$$ Download IMAGE .... O.K !!!
$$$ Update firmware . . . . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . .
$$$ Update Firmware . . . . OK!!!
$$$ Note: console baudrate of new image is 9600bps..
$$$ Reboot . . . .
```
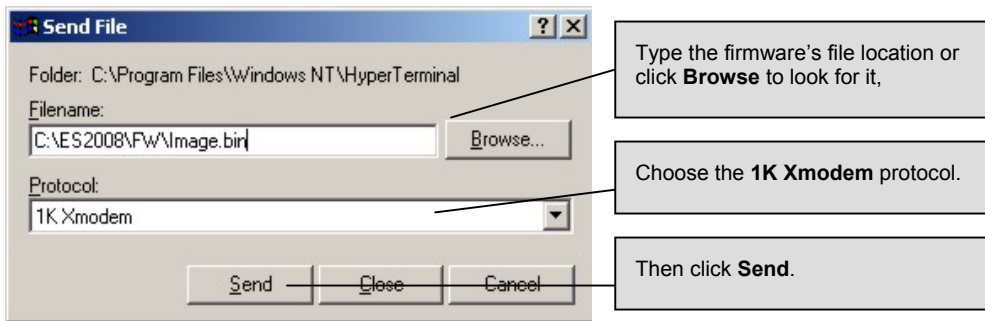
Figure 18-3 SMT: Firmware Upload Process

Step 6. After the firmware upload process has completed, the switch will automatically restart. You *must* change the console port rate back to 9600bps.

Step 7. Check the **System Information** screen to confirm that you have uploaded the correct firmware version.

18.2.2 Firmware Upgrade Using the Web Configurator

Follow the steps below to upgrade firmware via the web configurator.

Step 1. Follow the steps in the *Accessing the Web Configurator* section to log in to the web configurator.

Step 2. Run a TFTP server program on the computer and specify the location of the firmware file and the communication mode.

Step 3. Click **TFTP Update Firmware** to display the screen as shown next.

Firmware Download

| TFTP Server IP Address | |
| Firmware File Name | |

Apply   Help

Figure 18-4 Web Configurator: Firmware Upgrade

Step 4. Enter the IP address of the TFTP server, where the new firmware file resides, in the **TFTP Server IP Address** field.

Step 5. Specify the name of the firmware file in the **Firmware File Name** field. The firmware filename must not be more than 15 ASCII characters and must be exactly the same as the firmware file on the computer.

Step 6. Click **Apply**. The switch will download the new firmware file from the TFTP server. The following screen displays when the firmware is retrieved successfully from the TFTP server.

Figure 18-5 Web Configurator: Successful Firmware Retrieval

Step 7. Click **Update Firmware** to save the firmware file to the switch.

Step 8. Click **Reboot** to restart the switch.

Step 9. Check the **Firmware Version** field in **Switch Setting:Basic** screen to confirm that you have uploaded the correct firmware version.

18.3 Configuration File Maintenance

You can only use the web configurator to perform configuration file backup and restore.

> **WARNING!**
> **DO NOT INTERRUPT THE FILE TRANSFER PROCESS AS THIS**
> **MAY PERMANENTLY DAMAGE YOUR SWITCH.**

18.3.1 Backup Configuration

Backup is highly recommended once your switch is functioning properly.

Step 1. Run a TFTP server program on a computer and specify the location for saving the configuration file and set the communication mode.

Step 2. Click **Configuration Backup** and click on the **TFTP Backup Configuration** tab to display the screen as shown next.
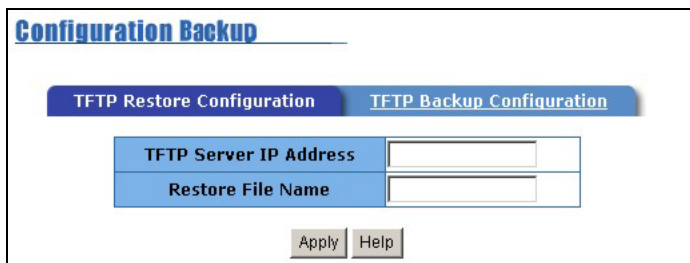
Figure 18-6 Backup Configuration

Step 3. Enter the IP address of the TFTP server, where the backup configuration file will be stored, in the **TFTP Server IP Address** field.

Step 4. Specify the name of the configuration in the **Backup File Name** field.

Step 5. Click **Apply**. The switch saves the system configuration file to the TFTP server. The following screen displays when the backup process is successful.

Backup configuration is completed, go to main.

Figure 18-7 Web Configurator: Backup Configuration File Successful

Step 6. Click on the message to go back to the main screen.

18.3.2 Restore Configuration

This section shows you how to restore a previously saved configuration.

> **WARNING!**
> **DO NOT INTERRUPT THE FILE TRANSFER PROCESS AS THIS MAY PERMANENTLY DAMAGE YOUR SWITCH.**

> **This function erases the current configuration before restoring a previous back up configuration; please do not attempt to restore unless you have a backup configuration file stored on disk.**

Step 1. Run a TFTP server program on the computer and specify the location of a previously saved configuration file and set the communication mode.

Step 2. Click **Configuration Backup** and then the **TFTP Configuration Restore** tab to display the screen as shown next.

Figure 18-8 Web Configurator: Restore Configuration

Step 3. Enter the IP address of the TFTP server, where a configuration file resides, in the **TFTP Server IP Address** field.

Step 4. Specify the name of the configuration file in the **Retore File Name** field.

Step 5. Click **Apply**. The switch will download the configuration file from the TFTP server.

Step 6. Restart the switch. Make sure you enter the correct IP address to access the web configurator. The following message displays when the configuration file is retrieved successfully from the TFTP server.

Restore configuration is completed, please reboot system.

reboot

Figure 18-9 Web Configurator: Successful Configuration File Retrieval

Step 7. Click **reboot** to restart the switch.

Part V:

Additional Information

Part V consists of troubleshooting, product specifications, appendices and an index.

Chapter 19
Troubleshooting

19.1 Using LEDs to Diagnose Problems

The LEDs are useful aides for finding possible problem causes.

19.1.1 Power LED

The **PWR** LED on the front panel does not light up.

Table 19-1 Troubleshooting Power LED

STEPS	CORRECTIVE ACTION
1	Check the connections from your switch to the power source. Make sure you are using the supplied power cord and proper power supply. Refer to the product specifications.
2	Make sure the power source is turned on and that the switch is receiving sufficient power.
3	If these steps fail to correct the problem, contact your local distributor for assistance.

19.1.2 The LK/ACT LED

The **LK/ACT** LED does not light up when a device is connected.

Table 19-2 Troubleshooting LK/ACT LED

STEPS	CORRECTIVE ACTION
1	Verify that the attached device(s) is turned on and properly connected to the switch.
2	Make sure the network adapters are working on the attached devices.
3	Verify that 10/100/1000 M Ethernet cable length does not exceed 100 meters. For more information on network cables, see the section on network cable types.

19.1.3 The 100 LED

The **100** LED does not show the speed of my Ethernet device.

Table 19-3 Troubleshooting 100 LED

STEPS	CORRECTIVE ACTION
1	Check the connection between the switch and your Ethernet device(s).
2	Check that the port is enabled.
3	Make sure you're using the correct table type and that the distance between the switch and the device does not exceed 100 meters.

19.1.4 The FD/COL LED

Use this LED to check the duplex mode of the attached Ethernet device.

Table 19-4 Troubleshooting FD/COL LED

STEPS	CORRECTIVE ACTION
1	The Ethernet device is connected at full-duplex mode if the **FD/COL** LED is yellow.
2	The Ethernet device is connected at half-duplex mode when the **FD/COL** LED is off.
3	Make sure you have the correct speed and flow control enabled for each port. Refer to the *Port Control* chapter.
3	This LED blinks if packet collisions are occurring. Collisions are normal, but if the **FD/COL** LED blinks very frequently, you may need to segment your network.

19.2 Console Port

I cannot access the switch through the console port.

Table 19-5 Troubleshooting Console Port

STEPS	CORRECTIVE ACTION	
1	Check to see if the switch is connected to your computer using the RS-232 cable.	
2	Check to see if the communications program is configured correctly. Set the communication parameters as stated here.	Emulation: auto detect Baud Rate: 9600 bps No Parity, 8 data bits, 1 stop bit Flow Control: None

Table 19-5 Troubleshooting Console Port

STEPS	CORRECTIVE ACTION
3	Make sure you entered the correct username and password. The default username is "admin" and the default password is "1234".
	If you have forgot your username or password, refer to *Section 19.5*.

19.3 Telnet

I cannot telnet into the switch.

Table 19-6 Troubleshooting Telnet

STEPS	CORRECTIVE ACTION
1	Make sure you are using the correct IP address of the switch. Check the IP address of the switch.
2	Ping the switch from your computer.
	If you cannot ping the switch, check the IP addresses of the switch and your computer. Make sure that both IP addresses are in the same subnet.
3	Make sure you entered the correct username and password. The default username is "admin" and the default password is "1234".
	If you have forgot your username or password, refer to *Section 19.5*.
4	If these steps fail to correct the problem, contact the distributor.

19.4 Web Configurator

I cannot access the web configurator.

Table 19-7 Troubleshooting Web Configurator

STEPS	CORRECTIVE ACTION
1	Make sure you are using the correct IP address of the switch. Check the IP address of the switch.
2	Make sure you entered the correct username and password. The default username is "admin" and the default password is "1234".
	If you have forgot your username or password, refer to *Section 19.5*.
3	Ping the switch from your computer.
	If you cannot ping the switch, check the IP addresses of the switch and your computer. Make sure that both IP addresses are in the same subnet.

The web configurator does not display properly.

Table 19-8 Troubleshooting Internet Browser Display

STEPS	CORRECTIVE ACTION
1	Make sure you are using Internet Explorer 5.0 and later versions.
2	Delete the temporary web files and log in again.. In Internet Explorer, click **Tools**, **Internet Options** and then click the **Delete Files ...** button. When a **Delete Files** window displays, select **Delete all offline content** and click **OK**. (Steps may vary depending on the version of your Internet browser.)

19.5 Login Username and Password

I forgot my login username and/or password.

Table 19-9 Troubleshooting Login Username and Password

STEPS	CORRECTIVE ACTION
	You need to set the switch back to factory default settings. This will erase all custom configurations.
1	Use a terminal emulation program to connect your computer to the console port on the switch. Refer to the *Accessing the SMT Using the Console Port* section.
2	At the login screen, type "superuser" in the **User Name** field and "zyxel" in the **Password** field. When you see a "INET>" prompt, you are logged in with safe mode on.
4	At the "INET>" prompt, type "flashdf" and press [ENTER]. A "Writing flash to default value ....please wait" message displays.
5	When the "INET>" prompt displays again, unplug the power cord to turn off the switch, then turn on the switch. The default switch IP address is **192.168.1.1**, default user name is "admin" and the default password is "1234".
6	It is highly recommended to change the default username and password. Make sure you store the username and password in a save place.

19.6 Improper Network Cabling and Topology

Improper network cabling or topology setup are common causes of poor network performance or even network failure.

Table 19-10 Troubleshooting Improper Network Cabling and Topology

DESCRIPTION	PROBLEMS AND CORRECTIVE ACTION
Faulty cables	Using faulty network cables may affect data rates and have an impact on your network performance. Replace with new standard network cables.
Non-standard network cables	Non-standard cables may increase the number of network collisions and cause other network problems that affect your network performance; refer to *Chapter 2*.
Cabling Length	If you use longer cables than are needed, transmission quality may be affected. The network cables should not be longer than the limit of 100 meters.
Too many hubs between the computers in the network	Too many hubs (or repeaters) between the connected computers in the network may increase the number of network collision or other network problems. Remove unnecessary hubs from the network.
A loop in the data path	A data path loop forms when there is more than one path or route between two networked computers. This results in broadcast storms that will severely affect your network performance. Make sure there are no loops in your network topology.

Appendix A
Setting up Your Computer's IP Address

All computers must have a 10M or 100M Ethernet adapter card and TCP/IP installed.

Windows 95/98/Me/NT/2000/XP, Macintosh OS 7 and later operating systems and all versions of UNIX/LINUX include the software components you need to install and use TCP/IP on your computer. Windows 3.1 requires the purchase of a third-party TCP/IP application package.

TCP/IP should already be installed on computers using Windows NT/2000/XP, Macintosh OS 7 and later operating systems.

After the appropriate TCP/IP components are installed, configure the TCP/IP settings in order to "communicate" with your network.

If you manually assign IP information instead of using dynamic assignment, make sure that your computers have IP addresses that place them in the same subnet as the Prestige's LAN port.

Windows 95/98/Me

Click **Start**, **Settings**, **Control Panel** and double-click the **Network** icon to open the **Network** window.
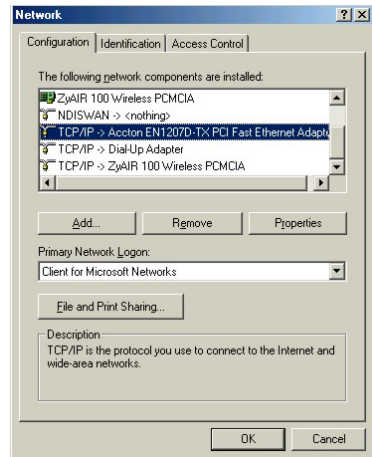
Installing Components

The **Network** window **Configuration** tab displays a list of installed components. You need a network adapter, the TCP/IP protocol and Client for Microsoft Networks.

If you need the adapter:

a.   In the **Network** window, click **Add**.

b.   Select **Adapter** and then click **Add**.

c.   Select the manufacturer and model of your network adapter and then click **OK**.

If you need TCP/IP:

a.   In the **Network** window, click **Add**.

b.   Select **Protocol** and then click **Add**.

c.   Select **Microsoft** from the list of **manufacturers**.

d.   Select **TCP/IP** from the list of network protocols and then click **OK**.

If you need Client for Microsoft Networks:

a.   Click **Add**.

b.   Select **Client** and then click **Add**.

c.   Select **Microsoft** from the list of manufacturers.

d.   Select **Client for Microsoft Networks** from the list of network clients and then click **OK**.

e.   Restart your computer so the changes you made take effect.

Configuring

In the **Network** window **Configuration** tab, select your network adapter's TCP/IP entry and click **Properties**.

1.   Click the **IP Address** tab.

-If your IP address is dynamic, select **Obtain an IP address automatically**.

-If you have a static IP address, select **Specify an IP address** and type your information into the **IP Address** and **Subnet Mask** fields.
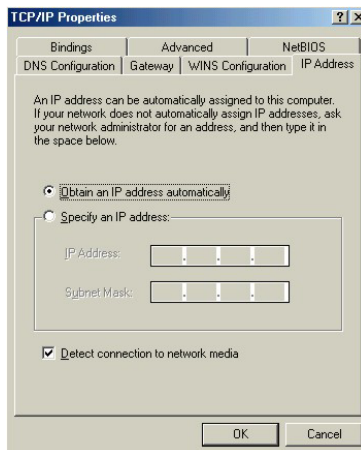
2. Click the **DNS** Configuration tab.

    -If you do not know your DNS information, select **Disable DNS**.

    -If you know your DNS information, select **Enable DNS** and type the information in the fields below (you may not need to fill them all in).
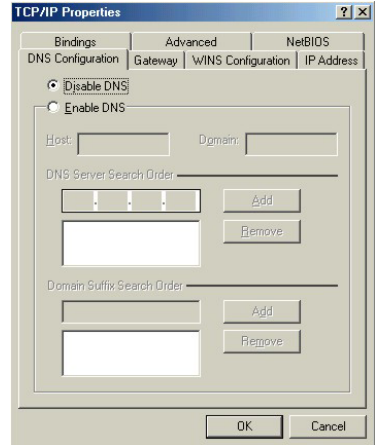
3. Click the **Gateway** tab.

    -If you do not know your gateway's IP address, remove previously installed gateways.

    -If you have a gateway IP address, type it in the **New gateway field** and click **Add**.

4. Click **OK** to save and close the **TCP/IP Properties** window.

5. Click **OK** to close the **Network** window. Insert the Windows CD if prompted.

6. Turn on your Prestige and restart your computer when prompted.

Verifying Settings

1. Click **Start** and then **Run**.

2. In the **Run** window, type "winipcfg" and then click **OK** to open the **IP Configuration** window.

3. Select your network adapter. You should see your computer's IP address, subnet mask and default gateway.

Windows 2000/NT/XP

1. For Windows XP, click **start**, **Control Panel**. In Windows 2000/NT, click **Start**, **Settings**, **Control Panel**.

2. For Windows XP, click **Network Connections**. For Windows 2000/NT, click **Network and Dial-up Connections**.
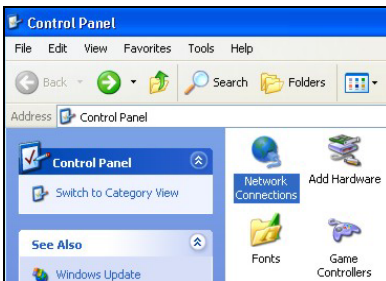
3. Right-click **Local Area Connection** and then click **Properties**.
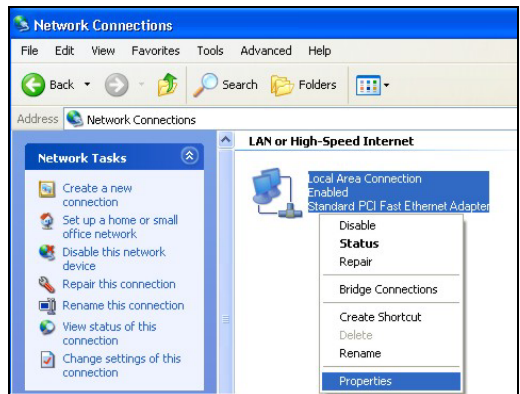
4. Select **Internet Protocol (TCP/IP)** (under the **General** tab in Win XP) and click **Properties**.
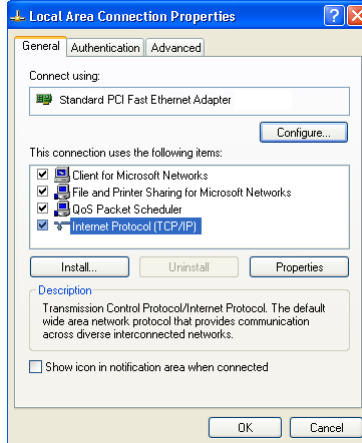
5. The **Internet Protocol TCP/IP Properties** window opens (the **General tab** in Windows XP).

   -If you have a dynamic IP address click **Obtain an IP address automatically**.

   -If you have a static IP address click **Use the following IP Address** and fill in the **IP address**, **Subnet mask**, and **Default gateway** fields.

   Click **Advanced**.
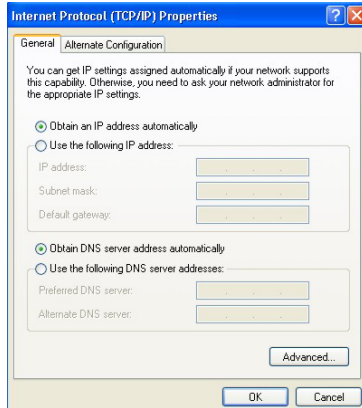
6
.
-If you do not know your gateway's IP address, remove any previously installed gateways in the **IP Settin**gs tab and click **OK**.

Do one or more of the following if you want to configure additional IP addresses:

-In the **IP Settings** tab, in IP addresses, click **Add**.

-In **TCP/IP Address**, type an IP address in **IP address** and a subnet mask in **Subnet mask**, and then click **Add**.

-Repeat the above two steps for each IP address you want to add.

-Configure additional default gateways in the **IP Settings** tab by clicking **Add** in **Default gateways**.

-In **TCP/IP Gateway Address**, type the IP address of the default gateway in **Gateway**. To manually configure a default metric (the number of transmission hops), clear the **Automatic metric** check box and type a metric in **Metric**.

-Click **Add**.

-Repeat the previous three steps for each default gateway you want to add.

-Click **OK** when finished.
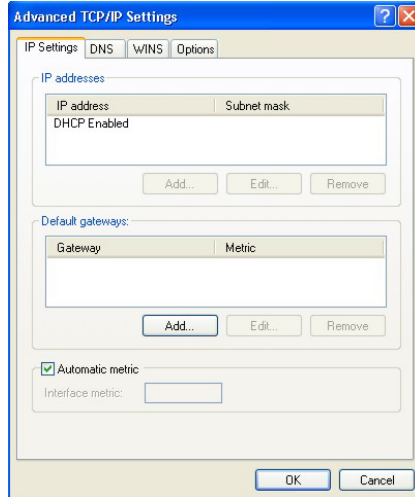
7. In the **Internet Protocol TCP/IP Properties** window (the **General tab** in Windows XP):

    -Click **Obtain DNS server address automatically** if you do not know your DNS server IP address(es).

    -If you know your DNS server IP address(es), click **Use the following DNS server addresses**, and type them in the **Preferred DNS server** and **Alternate DNS server** fields.

    If you have previously configured DNS servers, click **Advanced** and then the **DNS** tab to order them.
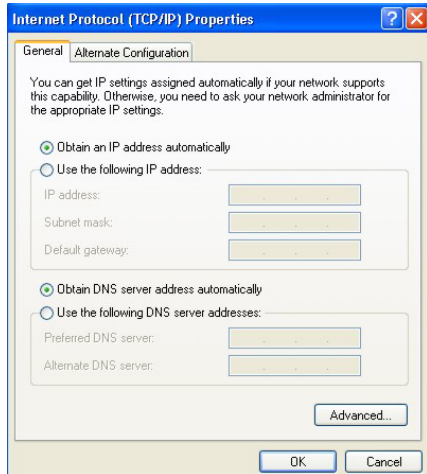
8. Click **OK** to close the **Internet Protocol (TCP/IP) Properties** window.

9. Click **OK** to close the **Local Area Connection Properties** window.

10. Turn on your Prestige and restart your computer (if prompted).

Verifying Settings

1. Click **Start**, **All Programs**, **Accessories** and then **Command Prompt**.

2. In the **Command Prompt** window, type "ipconfig" and then press [ENTER]. You can also open **Network Connections**, right-click a network connection, click **Status** and then click the **Support** tab.

Macintosh OS 8/9

1. Click the **Apple** menu, **Control Panel** and double-click **TCP/IP** to open the **TCP/IP Control Panel**.
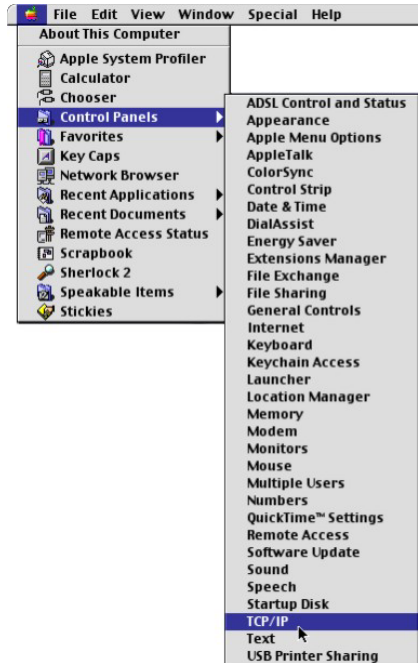
2. Select **Ethernet built-in** from the **Connect via** list.
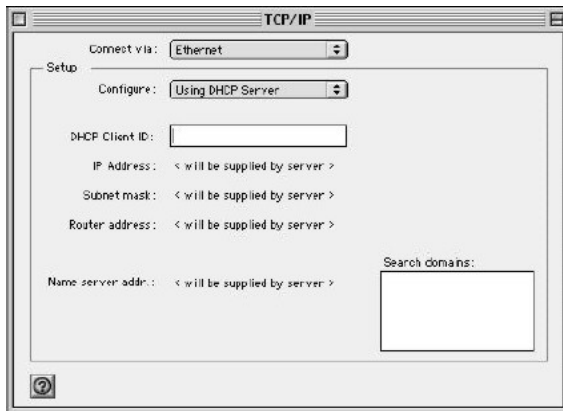
3. For dynamically assigned settings, select **Using DHCP Server** from the **Configure:** list.

4. For statically assigned settings, do the following:

    -From the **Configure** box, select **Manually**.

-Type your IP address in the **IP Address** box.

-Type your subnet mask in the **Subnet mask** box.

-Type the IP address of your Prestige in the **Router address** box.

5.   Close the **TCP/IP Control Panel**.

6.   Click **Save** if prompted, to save changes to your configuration.

7.   Turn on your Prestige and restart your computer (if prompted).

Verifying Settings

Check your TCP/IP properties in the **TCP/IP Control Panel** window.

Macintosh OS X

1.   Click the **Apple** menu, and click **System Preferences** to open the **System Preferences** window.
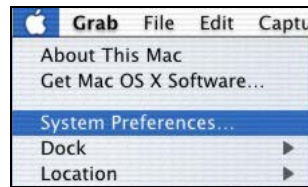
2.   Click **Network** in the icon bar.

      - Select **Automatic** from the **Location** list.

      - Select **Built-in Ethernet** from the **Show** list.

      - Click the **TCP/IP** tab.
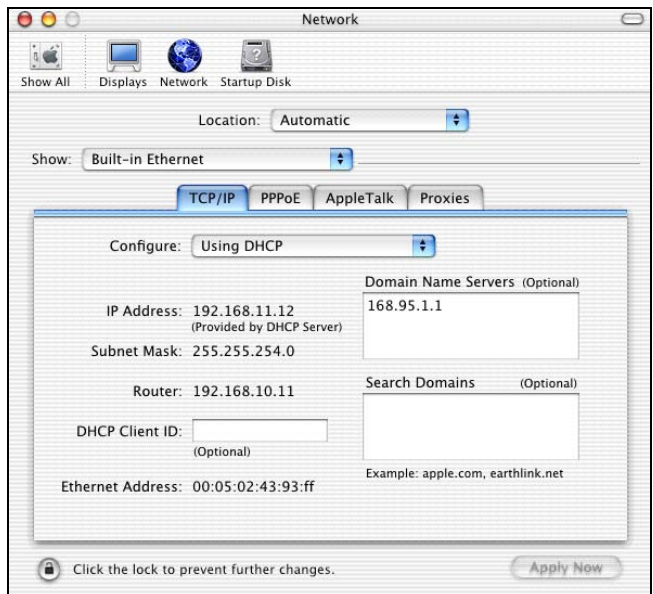
3.   For dynamically assigned settings, select **Using DHCP** from the **Configure** list.

4. For statically assigned settings, do the following:

    -From the **Configure** box, select **Manually**.

    -Type your IP address in the **IP Address** box.

    -Type your subnet mask in the **Subnet mask** box.

    -Type the IP address of your Prestige in the **Router address** box.

5. Click **Apply Now** and close the window.

6. Turn on your Prestige and restart your computer (if prompted).

Verifying Settings

Check your TCP/IP properties in the **Network** window.

Appendix B
IP Subnetting

IP Addressing

Routers "route" based on the network number. The router that delivers the data packet to the correct destination host uses the host ID.

IP Classes

An IP address is made up of four octets (eight bits), written in dotted decimal notation, for example, 192.168.1.1. IP addresses are categorized into different classes. The class of an address depends on the value of its first octet.

➢ Class "A" addresses have a 0 in the left most bit. In a class "A" address the first octet is the network number and the remaining three octets make up the host ID.

➢ Class "B" addresses have a 1 in the left most bit and a 0 in the next left most bit. In a class "B" address the first two octets make up the network number and the two remaining octets make up the host ID.

➢ Class "C" addresses begin (starting from the left) with 1 1 0. In a class "C" address the first three octets make up the network number and the last octet is the host ID.

➢ Class "D" addresses begin with 1 1 1 0. Class "D" addresses are used for multicasting. (There is also a class "E" address. It is reserved for future use.)

Chart 1 Classes of IP Addresses

IP ADDRESS:		OCTET 1	OCTET 2	OCTET 3	OCTET 4
Class A	0	Network number	Host ID	Host ID	Host ID
Class B	10	Network number	Network number	Host ID	Host ID
Class C	110	Network number	Network number	Network number	Host ID

Host IDs of all zeros or all ones are not allowed.

Therefore:

➢ A class "C" network (8 host bits) can have $2^8 - 2$ or 254 hosts.

➢ A class "B" address (16 host bits) can have $2^{16} - 2$ or 65534 hosts.

A class "A" address (24 host bits) can have $2^{24} - 2$ hosts (approximately 16 million hosts).

Since the first octet of a class "A" IP address must contain a "0", the first octet of a class "A" address can have a value of 0 to 127.

Similarly the first octet of a class "B" must begin with "10", therefore the first octet of a class "B" address has a valid range of 128 to 191. The first octet of a class "C" address begins with "110", and therefore has a range of 192 to 223.

Chart 2 Allowed IP Address Range By Class

CLASS	ALLOWED RANGE OF FIRST OCTET (BINARY)	ALLOWED RANGE OF FIRST OCTET (DECIMAL)
Class A	**0**0000000 to **0**1111111	0 to 127
Class B	**10**000000 to **10**111111	128 to 191
Class C	**110**00000 to **110**11111	192 to 223
Class D	**1110**0000 to **1110**1111	224 to 239

Subnet Masks

A subnet mask is used to determine which bits are part of the network number, and which bits are part of the host ID (using a logical AND operation). A subnet mask has 32 bits; each bit of the mask corresponds to a bit of the IP address. If a bit in the subnet mask is a "1" then the corresponding bit in the IP address is part of the network number. If a bit in the subnet mask is "0" then the corresponding bit in the IP address is part of the host ID.

Subnet masks are expressed in dotted decimal notation just as IP addresses are. The "natural" masks for class A, B and C IP addresses are as follows.

Chart 3 "Natural" Masks

CLASS	NATURAL MASK
A	255.0.0.0
B	255.255.0.0
C	255.255.255.0

Subnetting

With subnetting, the class arrangement of an IP address is ignored. For example, a class C address no longer has to have 24 bits of network number and 8 bits of host ID. With subnetting, some of the host ID bits are converted into network number bits. By convention, subnet masks always consist of a continuous sequence of ones beginning from the left most bit of the mask, followed by a continuous sequence of zeros, for a total number of 32 bits.

Since the mask is always a continuous number of ones beginning from the left, followed by a continuous number of zeros for the remainder of the 32 bit mask, you can simply specify the number of ones instead of writing the value of each octet. This is usually specified by writing a "/" followed by the number of bits in the mask after the address.

For example, 192.1.1.0 /25 is equivalent to saying 192.1.1.0 with mask 255.255.255.128.

The following table shows all possible subnet masks for a class "C" address using both notations.

Chart 4 Alternative Subnet Mask Notation

SUBNET MASK IP ADDRESS	SUBNET MASK "1" BITS	LAST OCTET BIT VALUE
255.255.255.0	/24	0000 0000
255.255.255.128	/25	1000 0000
255.255.255.192	/26	1100 0000
255.255.255.224	/27	1110 0000
255.255.255.240	/28	1111 0000
255.255.255.248	/29	1111 1000
255.255.255.252	/30	1111 1100

The first mask shown is the class "C" natural mask. Normally if no mask is specified it is understood that the natural mask is being used.

Example: Two Subnets

As an example, you have a class "C" address 192.168.1.0 with subnet mask of 255.255.255.0.

	NETWORK NUMBER	HOST ID
IP Address	192.168.1.	0
IP Address (Binary)	11000000.10101000.00000001.	00000000
Subnet Mask	255.255.255.	0
Subnet Mask (Binary)	11111111.11111111.11111111.	00000000

The first three octets of the address make up the network number (class "C"). You want to have two separate networks.

Divide the network 192.168.1.0 into two separate subnets by converting one of the host ID bits of the IP address to a network number bit. The "borrowed" host ID bit can be either "0" or "1" thus giving two subnets; 192.168.1.0 with mask 255.255.255.128 and 192.168.1.128 with mask 255.255.255.128.

> **In the following charts, shaded/bolded last octet bit values indicate host ID bits "borrowed" to form network ID bits. The number of "borrowed" host ID bits determines the number of subnets you can have. The remaining number of host ID bits (after**

"borrowing") determines the number of hosts you can have on each subnet.

Chart 5 Subnet 1

	NETWORK NUMBER	LAST OCTET BIT VALUE
IP Address	192.168.1.	0
IP Address (Binary)	11000000.10101000.00000001.	**0**0000000
Subnet Mask	255.255.255.	128
Subnet Mask (Binary)	11111111.11111111.11111111.	**1**0000000
Subnet Address: 192.168.1.0		Lowest Host ID: 192.168.1.1
Broadcast Address: 192.168.1.127		Highest Host ID: 192.168.1.126

Chart 6 Subnet 2

	NETWORK NUMBER	LAST OCTET BIT VALUE
IP Address	192.168.1.	128
IP Address (Binary)	11000000.10101000.00000001.	**1**0000000
Subnet Mask	255.255.255.	128
Subnet Mask (Binary)	11111111.11111111.11111111.	**1**0000000
Subnet Address: 192.168.1.128		Lowest Host ID: 192.168.1.129
Broadcast Address: 192.168.1.255		Highest Host ID: 192.168.1.254

The remaining 7 bits determine the number of hosts each subnet can have. Host IDs of all zeros represent the subnet itself and host IDs of all ones are the broadcast address for that subnet, so the actual number of hosts available on each subnet in the example above is $2^7 - 2$ or 126 hosts for each subnet.

192.168.1.0 with mask 255.255.255.128 is the subnet itself, and 192.168.1.127 with mask 255.255.255.128 is the directed broadcast address for the first subnet. Therefore, the lowest IP address that can be assigned to an actual host for the first subnet is 192.168.1.1 and the highest is 192.168.1.126. Similarly the host ID range for the second subnet is 192.168.1.129 to 192.168.1.254.

Example: Four Subnets

The above example illustrated using a 25-bit subnet mask to divide a class "C" address space into two subnets. Similarly to divide a class "C" address into four subnets, you need to "borrow" two host ID bits to give four possible combinations of 00, 01, 10 and 11. The

subnet mask is 26 bits (11111111.11111111.11111111.**11**000000) or 255.255.255.192. Each subnet contains 6 host ID bits, giving 2^6-2 or 62 hosts for each subnet (all 0's is the subnet itself, all 1's is the broadcast address on the subnet).

Chart 7 Subnet 1

	NETWORK NUMBER	LAST OCTET BIT VALUE
IP Address	192.168.1.	0
IP Address (Binary)	11000000.10101000.00000001.	**00**000000
Subnet Mask (Binary)	11111111.11111111.11111111.	**11**000000
Subnet Address: 192.168.1.0		Lowest Host ID: 192.168.1.1
Broadcast Address: 192.168.1.63		Highest Host ID: 192.168.1.62

Chart 8 Subnet 2

	NETWORK NUMBER	LAST OCTET BIT VALUE
IP Address	192.168.1.	64
IP Address (Binary)	11000000.10101000.00000001.	**01**000000
Subnet Mask (Binary)	11111111.11111111.11111111.	**11**000000
Subnet Address: 192.168.1.64		Lowest Host ID: 192.168.1.65
Broadcast Address: 192.168.1.127		Highest Host ID: 192.168.1.126

Chart 9 Subnet 3

	NETWORK NUMBER	LAST OCTET BIT VALUE
IP Address	192.168.1.	128
IP Address (Binary)	11000000.10101000.00000001.	**10**000000
Subnet Mask (Binary)	11111111.11111111.11111111.	**11**000000
Subnet Address: 192.168.1.128		Lowest Host ID: 192.168.1.129
Broadcast Address: 192.168.1.191		Highest Host ID: 192.168.1.190

Chart 10 Subnet 4

	NETWORK NUMBER	LAST OCTET BIT VALUE
IP Address	192.168.1.	192
IP Address (Binary)	11000000.10101000.00000001.	**11**000000
Subnet Mask (Binary)	11111111.11111111.11111111.	**11**000000
Subnet Address: 192.168.1.192		Lowest Host ID: 192.168.1.193
Broadcast Address: 192.168.1.255		Highest Host ID: 192.168.1.254

Example Eight Subnets

Similarly use a 27-bit mask to create 8 subnets (001, 010, 011, 100, 101, 110).

The following table shows class C IP address last octet values for each subnet.

Chart 11 Eight Subnets

SUBNET	SUBNET ADDRESS	FIRST ADDRESS	LAST ADDRESS	BROADCAST ADDRESS
1	0	1	30	31
2	32	33	62	63
3	64	65	94	95
4	96	97	126	127
5	128	129	158	159
6	160	161	190	191
7	192	193	222	223
8	224	223	254	255

The following table is a summary for class "C" subnet planning.

Chart 12 Class C Subnet Planning

NO. "BORROWED" HOST BITS	SUBNET MASK	NO. SUBNETS	NO. HOSTS PER SUBNET
1	255.255.255.128 (/25)	2	126
2	255.255.255.192 (/26)	4	62
3	255.255.255.224 (/27)	8	30

Chart 12 Class C Subnet Planning

NO. "BORROWED" HOST BITS	SUBNET MASK	NO. SUBNETS	NO. HOSTS PER SUBNET
4	255.255.255.240 (/28)	16	14
5	255.255.255.248 (/29)	32	6
6	255.255.255.252 (/30)	64	2
7	255.255.255.254 (/31)	128	1

Subnetting With Class A and Class B Networks.

For class "A" and class "B" addresses the subnet mask also determines which bits are part of the network number and which are part of the host ID.

A class "B" address has two host ID octets available for subnetting and a class "A" address has three host ID octets (see *Chart 1*) available for subnetting.

The following table is a summary for class "B" subnet planning.

Chart 13 Class B Subnet Planning

NO. "BORROWED" HOST BITS	SUBNET MASK	NO. SUBNETS	NO. HOSTS PER SUBNET
1	255.255.128.0 (/17)	2	32766
2	255.255.192.0 (/18)	4	16382
3	255.255.224.0 (/19)	8	8190
4	255.255.240.0 (/20)	16	4094
5	255.255.248.0 (/21)	32	2046
6	255.255.252.0 (/22)	64	1022
7	255.255.254.0 (/23)	128	510
8	255.255.255.0 (/24)	256	254
9	255.255.255.128 (/25)	512	126
10	255.255.255.192 (/26)	1024	62
11	255.255.255.224 (/27)	2048	30
12	255.255.255.240 (/28)	4096	14
13	255.255.255.248 (/29)	8192	6

Chart 13 Class B Subnet Planning

NO. "BORROWED" HOST BITS	SUBNET MASK	NO. SUBNETS	NO. HOSTS PER SUBNET
14	255.255.255.252 (/30)	16384	2
15	255.255.255.254 (/31)	32768	1

Appendix C
Product Specifications

General	
Standards	IEEE802.3 10BASE-T Ethernet (twisted-pair copper) IEEE802.3u 100BASE-TX Fast Ethernet (twisted-pair copper) ANSI/IEEE802.3 Auto-negotiation IEEE802.3x Flow Control IEEE802.1p Priority Queues IEEE802.1Q VLAN IEEE802.1d Spanning Tree
Interface	Eight 10/100BASE-T Ethernet port One SC connector for 100FX fiber (ES-2008-SC, ES-2008-SC30) One RJ-45 connector for 1000Base-T (ES-2008-GTP) One console port
Data Transfer Rate	Ethernet: 10Mbps(half duplex), 20Mbps (full duplex) Fast Ethernet: 100Mbps (half duplex), 200Mbps(full duplex)

Cabling	10BASE-T: UTP Cat.3, 4, 5 (100 m)
	100BASE-TX: UTP Cat.5 (100 m max.)
	1000Base-T: UTP Cat.5 (100m Max) (ES-2008-GTP)
	100BASE-FX: (ES-2008-SC, ES-2008-SC30)
	    50~62.5/125-micron multi-mode fiber-optics (ES-2008-SC)
	    8~10/125 micron single-mode fiber-optics (ES-2008-SC30)

Full/Half Duplex	Full/Half duplex for 10/100Mbps speeds
Media Interface Exchange	All ports MDI-II/MDI-X auto-sensing.

Performance and Management	
Backplane	Non-blocking full wire speed forwarding rate at 3.8Gbps
Packet Forwarding Rate	14880 PPS for 10BASE-T 148800 PPS for 100BASE-TX/FX

Performance and Management	
Switching Method	Store-and-forward
MAC Address Table	8000 entries per main switch
Data Buffer	256 Kbyte
VLAN	IEEE 802.1Q tag-based VLAN, 4095 Max Port-based VLAN
IEEE 802.1p Priority Queues	2 queues
Port Trunking	IEEE802.1ad port trunking, up to 4 groups, up to 8 ports for each group
Port Security	Static MAC address filtering
Multicasting	Support IGMP snooping
Broadcast Storm	Support broadcast storm control
Port Mirroring	All ports support port mirroring
Management	Local console Telnet Web-Based management SNMP
Management Security	Username/Password needed for Console, Telnet and Web management authentication
MIBs	RFC 1213(MIB-II) RFC 1493(Bridge MIB) RFC 1643
RMON	Support RMON 4 groups (1,2,3,9)
Console Port	DB-9 RS-232C

Physical and Environmental	
Weight	Main switch: 1.08Kg

Physical and Environmental	
LED	Main switch: power, 10/100Mbps, LK/ACT, FD/COL 100FX Fiber (ES-2008-SC and ES-2008-SC30): LK/ACT, FD/COL 1000Base-T (ES-2008-GTP): 1000M, LK/ACT, FD/COL
Dimensions	250(W) x 132(D) x 37(H) mm
Power Supply	100 - 240VAC 50/60Hz internal universal power supply
Power Consumption	17W max
Operating Temperature	0ºC~45ºC (32ºF to 113ºF)
Operational Humidity	10% to 90% (Non-condensing)
EMI	FCC Class A CE
Safety	UL, cUL

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