DIGITAL MultiSwitch 300 Manager

User's Guide

Part Number: AA-R4D9A-TE

February 1997

This guide explains how to use the DIGITAL MultiSwitch 300 Manager tools to control the DIGITAL MultiSwitch 300 family of network switches.

Revision/Update Information: This is a new document.

Contents

Preface

1 Introduction to MultiSwitch 300 Manager

2 Getting Started

3 Adding and Deleting Devices

4 MultiSwitch 300 System Management

5 MultiSwitch 300 Port Management

Tables

Preface

Overview

Purpose of This Document

This guide describes the DIGITAL MultiSwitch 300 Manager and discusses how a system manager uses it to configure and monitor the MultiSwitch 300 family of network switches.

Intended Audience

This guide is intended for use by personnel who configure and monitor the DIGITAL MultiSwitch 300 family of network switches.

Organization

This manual is organized as follows:

	Chapter	Description
1	Introduction to MultiSwitch 300 Manager	Provides an overview of the MultiSwitch 300 Manager software.
2	Getting Started	Describes software installation, logging on, passwords, and how to use the device and information windows.
3	Adding and Deleting Devices	Describes adding, modifying, and deleting devices, and how to use the Device Identify windows.
4	MultiSwitch 300 System Management	Discusses MultiSwitch 300 system management by detailing system information acquisition. Also describes how to manage filters, gather and interpret statistics, and use control tools.
5	MultiSwitch 300 Port Management	Discusses how to manage the ports on the MultiSwitch 300 by using available information windows, port statistics, and port performance information.
A	MultiSwitch 300 Port Image LEDs	Describes the meaning of the LEDs on the MultiSwitch ports.

Conventions

Overview

This guide uses the following conventions:

Convention	Description
Special Type	This special type in examples indicates system output.
Boldface	Boldface type in examples indicates user input.
<Return>	Indicates that you should press the Return key.

Correspondence

Documentation Comments

If you have comments or suggestions about this document, send them to the Network Products Engineering.

Attn.:	Documentation Project Manager
FAX:	(508) 486-6093
E-MAIL:	doc_feedback@lkg.mts.dec.com

Online Services

To locate product specific information, refer to the following online services:

BBS To read the Bulletin Board System, set your modem to 8 bits, no parity, 1 stop bit and dial 508-486-5777 (U.S.).

WWW The Digital Equipment Corporation Network Products Business Home Page on the World Wide Web is located at the following addresses:

North America:	http://www.networks.digital.com
Europe:	http://www.networks.europe.digital.com
Australia:	http://www.digital.com.au/networks

How to Order Additional Documentation

To order additional documentation, use the following information:

To Order:	Contact:
By Telephone	USA (except Alaska, New Hampshire, and Hawaii):
	1-800-DIGITAL (1-800-344-4825)
	Alaska, New Hampshire, and Hawaii: 1-603-884-6660
	Canada: 1-800-267-6215
Electronically (USA only)	Dial 1-800-DEC-DEMO (For assistance, call 1-800-DIGITAL)
By Mail (USA and Puerto Rico)	DIGITAL EQUIPMENT CORPORATION P.O. Box CS2008 Nashua, New Hampshire 03061 (Place prepaid orders from Puerto Rico with the local Digital subsidiary: 809-754-7575)
By Mail (Canada)	DIGITAL EQUIPMENT of CANADA LTD. 940 Belfast Road Ottawa, Ontario, Canada K1G 4C2 Attn.: A&SG Business Manager
Internationally	DIGITAL EQUIPMENT CORPORATION Attn.: A&SG Business Manager c/o local Digital subsidiary or approved distributor
Internally	U.S. Software Supply Business (SSB) DIGITAL EQUIPMENT CORPORATION 8 Cotton Road Nashua, New Hampshire 03063

Chapter 1

Introduction to MultiSwitch 300 Manager

The DIGITAL MultiSwitch 300 Manager is an SNMP-based network management system. It is a full-featured system providing a powerful set of tools to manage and control the entire DIGITAL family of MultiSwitch 300 Ethernet and Fast Ethernet products. It is specifically designed to allow affordable and optimal control of networks containing DIGITAL products.

The MultiSwitch 300 Manager assists you in quickly configuring the switch. It detects network problems, provides device and port control, and offers real-time graphical and statistical displays. Capabilities also include virtual LAN and custom filtering capabilities.

Designed for multiplatform network management, the MultiSwitch 300 Manager operates on all major network management platforms including the following:

- Standalone Windows 95 or Windows NT Client using any standard Winsock-compatible TCP/IP stack. In this configuration the MultiSwitch 300 Manager provides its own mapping, alarm color-handling, and polling capabilities.

Features include:

- Full SNMP-based management of all DIGITAL Ethernet and Fast Ethernet switches and hubs

- Ability to monitor *any* SNMP-compliant device

- Powerful, user-friendly GUI

- In-band and/or out-of-band configuration via SLIP RS232

- Multiple devices can be monitored and controlled simultaneously

The MultiSwitch 300 Manager is designed with the network manager in mind. By using built-in tools for monitoring up-to-the minute information and statistics, and reconfiguring the system as network requirements grow and evolve, you can maintain a network that operates at peak performance—maximum throughput, network stability, and minimal downtime.

Chapter 2

Getting Started

This chapter describes the procedures you need to follow to get started installing software, logging in, and using passwords.

It also explains the function and basic elements of the DIGITAL MultiSwitch 300 Manager windows, including terms you will encounter throughout this guide. Graphic support—an extremely flexible and versatile set of tools for viewing statistical information—is explained in detail. Also explained is how alarms work.

About the MultiSwitch 300 Manager Software Package

The MultiSwitch 300 Manager software package consists of the program disks and documentation. The package includes the following components:

- The MultiSwitch 300 Manager standalone version for Microsoft Windows 95 or NT

- The *DIGITAL MultiSwitch 300 Manager User's Guide*

Installing and Running the MultiSwitch 300 Manager

The MultiSwitch 300 Manager runs on Windows 95 and Windows NT Client. Following are brief instructions for installing a standalone version of the MultiSwitch 300 Manager running under Windows 95.

To install the MultiSwitch 300 Manager

1) Place the MultiSwitch 300 Manager disk in drive A or drive B.

2) From the Windows 95 Start menu, select Run.

3) Enter A:SETUP or B:SETUP in the Run dialog box.

4) Select OK and answer the questions when you are prompted.

To run the MultiSwitch 300 Manager

1) Choose the MultiSwitch 300 Manager group window.

2) Choose the MultiSwitch 300 Manager icon.

Logging In

When you start the MultiSwitch 300 Manager, you can log in as user or supervisor.

As a user, you can view network configuration and device status, but you cannot make any changes in the network. As a supervisor, you can view network configuration and device status, and change configurations and parameters of network devices.

NOTE

If you are operating multiple managers in a network, it is recommended that only one manager have supervisor privileges to avoid conflicts between network changes made from multiple supervisor consoles. However, there is no automatic limitation for this configuration.

Login modes are selected in the Login window when you load the application.

To Log In as a Supervisor

The following directions describe how to log in the first time you enter the MultiSwitch 300 Manager. After this initial login procedure, you can set up passwords for USER or SUPERVISOR modes, or set up the Password window to bypass the Login window. At this point, the Login window (Figure 2-1) should already be on the screen.

1) In the Login window, choose SUPERVISOR to enter the system in SUPERVISOR mode.

Figure 2-1: Login Window

2) Choose OK. If you choose Cancel, the MultiSwitch 300 Manager software is not loaded.

The MultiSwitch 300 Manager allows the network manager to switch between SUPERVISOR and USER modes while the program is running.

3) To change between SUPERVISOR and USER modes, select Login from the Options menu in the main menu bar, change modes, then choose OK. If you choose Cancel, the Login window closes and no changes are made.

You can bypass the startup Login window and start the MultiSwitch 300 Manager without operator intervention, in either USER or SUPERVISOR mode by setting up the Password window as described in the Using Passwords section in this chapter.

To Log In as a User

The following directions describe how to log in the first time you enter the MultiSwitch 300 Manager as USER. After this initial login procedure, you can set up a new password for USER mode, or set up the Password window to bypass the Login window. At this point, the Login window (Figure 2-1) should already be on the screen. Choose USER to enter the system in USER mode.

1) Type the default password in the Enter Password field. (Default is USER.)

2) Choose OK. If you choose Cancel, the MultiSwitch 300 Manager software is not loaded.

You can bypass the startup Login window and start the MultiSwitch 300 Manager without operator intervention, in either USER or SUPERVISOR mode by setting up the Password window as described in the Using Passwords section in this chapter.

Using Passwords

In its default configuration, the MultiSwitch 300 Manager requires a password to log in. You can also set up the Password window to start the program without a password.

To change password settings as a user or supervisor

1) From the Options menu on the main window menu bar, choose Password.

The Password dialog box (Figure 2-2) appears.

Figure 2-2: Password Dialog Box

2) Enter your correct old password in the Old password field.

NOTE

If you are logging in as a supervisor for the first time, press the <Tab> key in the Old Password field. If you are logging in as a user, enter the default password (default is USER).

---

3) Enter your new password in the New password field.

4) Enter your new password in the Verify password field for confirmation.

5) To bypass the Login window at startup, uncheck the Password required check box.

6) Choose OK to accept the changes and exit the Password window. Choose Cancel to close the window without performing any changes.

About the Main Window

The MultiSwitch 300 Manager main window (Figure 2-3) is the major gateway to all monitoring and control functions of devices on your network. The main window contains the map—the graphical representation of your network. Each device that has been correctly added to the map appears as an icon with its device name. Double-clicking an icon displays the device main window, which presents a graphical depiction of the device's front panel. (See About the Device Main Window in this chapter.) Choosing an icon makes that device the current device.

Additional commands are available through cascading menus of the menu bar, or by using the shortcut icons under the menu bar.

Figure 2-3: Main Window

The generic device type allows you to manage any SNMP-compliant device (see Chapter 3 for more information). This device has a green alarm state (see the About Alarms section later in this chapter).
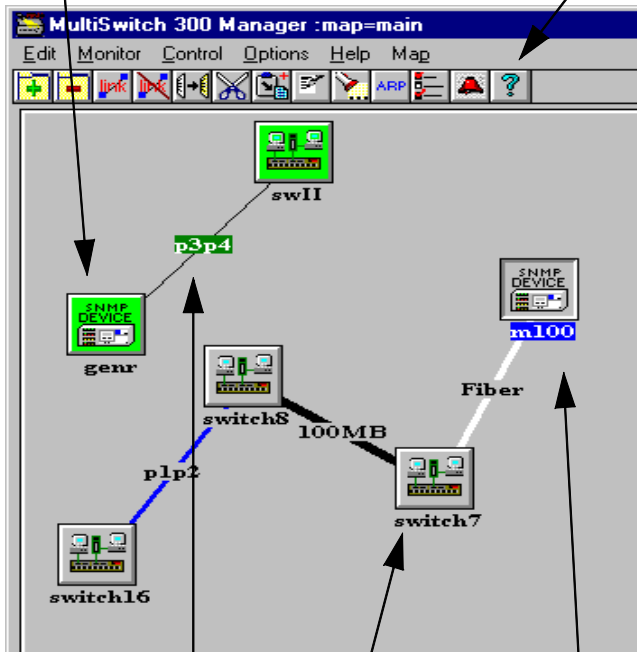
Note the 13 shortcut icons under the menu bar. From left to right they are:

1. Add a device.
2. Delete the current device.
3. Add a link.
4. Delete the current link.
5. Copy the selected item.
6. Cut (remove) the selected device from the map.
7. Paste the previously cut device.
8. Jump to the Describe window for the selected item. You can also copy and paste to that window.
9. Jump to the SNMP Device Identify window for the selected device.
10. Jump to the ARP table for the selected device.
11. Jump to the Alias Manager window for the selected device.
12. Jump to the Alarm Messages window for the selected device.
13 Jump to the MultiSwitch 300 Manager Help file.

The current link (p3p4) is highlighted. See Chapter 3 for more information about links.

The current device (m100) is highlighted and titled.

This device is colored grey, which means that the MultiSwitch 300 Manager has no information about it (it is currently being polled). Devices are grey just after MultiSwitch 300 Manager is loaded or just after you have added them to the map. After the device has been polled, a color state is assigned to it.

About the Device Main Window

Each device on the network has a main window (Figure 2-4) that displays the front panel of the selected device. Double click on a device icon on the map to display the Device Main Window. From this panel, you can quickly monitor the device's operations in real time. LEDs on the port image buttons indicate activity, collisions, and flow control for each port on the device. Table 2-1describes the function of the images in the device main window.

In addition to monitoring information, the device main window provides you with access to sets of control windows that contain additional statistics about port performance, communication links, and the system in general. These subwindows also allow you to control and change parameters of the device.

In this guide, the front panel of the MultiSwitch 300 is used as an example.

Figure 2-4: Device Main Window
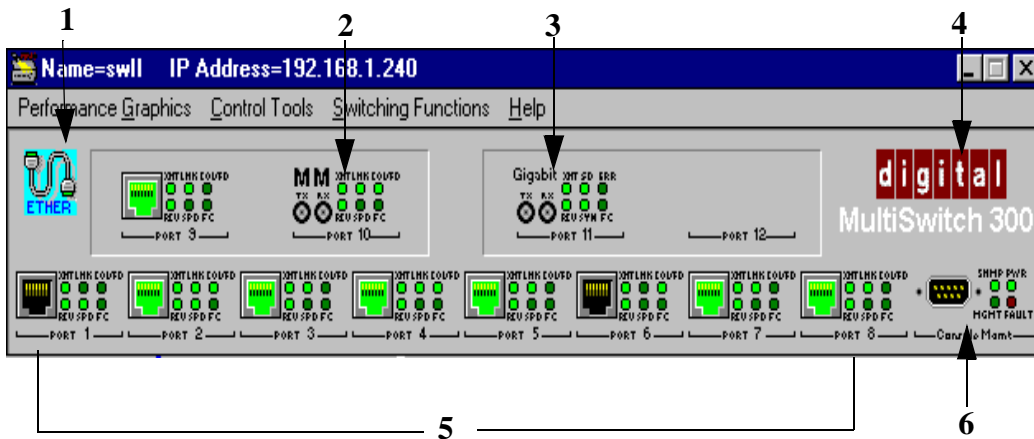
Table 2-1: Device Main Window Functions

Item[*]	Description	Function
1	Ethernet communication	Indicates whether there is communication with the device. Red - no current communication Blue - current communication
2	High-speed port image (port 1)	Multi-mode fiber optics port, displays Port Information window.
3	High-speed port image (port 2)	Single-mode fiber optics port, displays Port Information window.
4	Device model	Displays System Information window.
5	Port image (ports 3–7)	Displays Port Information window for ports 3–7.
6	Administrative/SLIP interface	You use the RS232 interface to connect to a terminal for initial setup of SNMP agent software or for nongraphical, command-line style control and management of the switch. You can also configure the RS232 interface as a direct SLIP connection to the network management system (NMS) for standard out-of-band management.

[*]You can access further information for items 2–5 by choosing the image.

You may also click on the RS232 interface icon on the switch image to open a Telnet session to the device, if you have a Telnet program installed on your system.

About Control Windows

Control windows allow the network manager to perform remote control operations on devices and to change device parameters. Although control windows come in a variety of layouts and perform different functions, most have a common set of features as can be seen in the following Port Configuration window (Figure 2-5). Table 2-2 describes the buttons in the Port Configuration window.

Figure 2-5: Control Window Example
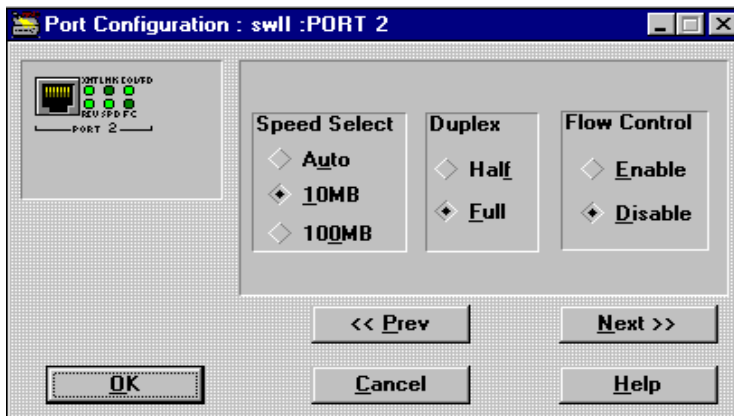
Table 2-2: Port Configuration Window Control Buttons

Button	Description
Prev	Displays the Port Configuration window for the previous port.
Next	Displays the Port Configuration window for the next port.
OK	Sends changes, if any, to the device and closes the window. If there is a problem with accepting changes, an error message displays or the window does not close.
Cancel	Closes the window without sending changes to the device.
Help	Provides a description of items specific to the active window.

Using Keyboard Shortcuts

When you see a button or menu command with a letter underlined, you can use a keyboard shortcut instead of the mouse to select the item. Press the <Alt> key and the letter key that matches the underlined letter in the command.

Using Graphic Support

With the MultiSwitch 300 Manager, you can graphically view counter data about a device's ports as a speedometer or as a line graph. These alternate views of numbers make it easy to analyze and compare statistics at a glance. Tiling allows you to line up several graphic windows neatly on the screen.

Statistics in any window that contains the graphics image (Figure 2-6) can be viewed as a graphic. Choose Ports or Cnts and the information displays in a window with graphics support. Figure 2-7 is an example of a window with graphics support. Whenever you encounter a window with graphic support elements, counter data can be viewed as a speedometer or line graph.

Figure 2-6: Graphics Image
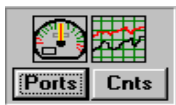
Figure 2-7: Graphic Support Elements in a Window
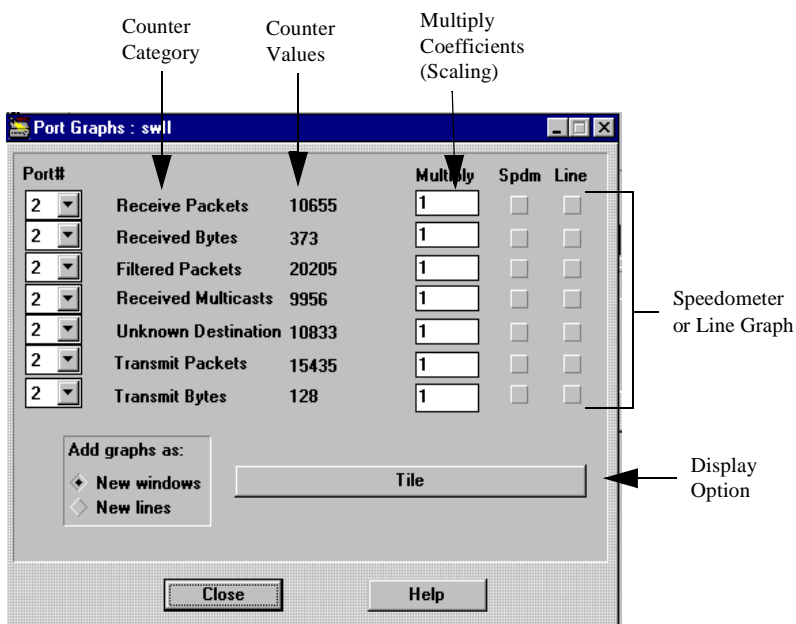
Speedometers

This type of display (Figure 2-8) shows the instantaneous value of a selected counter in a speedometer-like window. The window contains a moving indicator, the counter category, and the current value. This view is most helpful during situations such as excessive collisions, where you need to adjust system parameters to improve traffic flow.

Figure 2-8: Speedometer

Table 2-3 lists the Speedometer window button and its function.

Table 2-3: Speedometer Window Button

Button	Description
Options	Displays the Speedometer Options dialog box (Figure 2-9). These options allow you to reconfigure the speedometer. The band between the Critical value and the Max value changes to red on the speedometer.

Figure 2-9: Speedometer Options Dialog Box
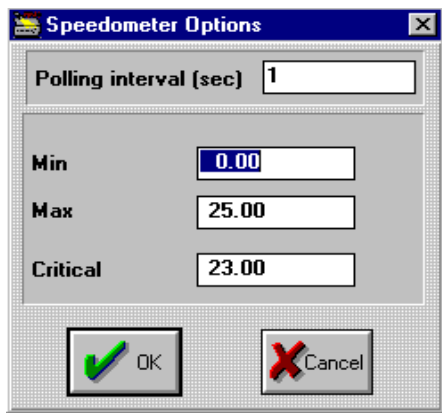
To view a counter as a speedometer

You can view this information from a Ports Graphs window or a Counters Graphs window as illustrated by the following two identical speedometers. Note the window titles indicating whether the graph was obtained on a *per-port* or *per-counter* basis.

• Choose the Spdm button next to a counter.

  A speedometer for the selected counter displays (Figure 2-10).

Figure 2-10: Per Port and Per Counter Speedometers
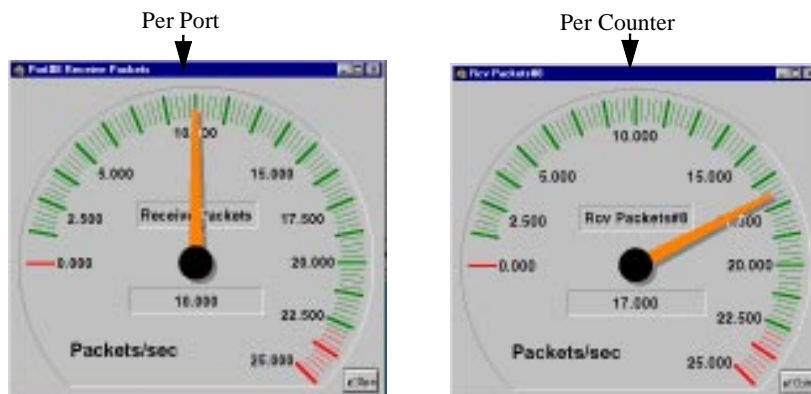
Line Graphs

The line graph feature provides a wide variety of options for monitoring and comparing data. In its simplest form, *one* graph for each counter is displayed in separate windows showing current activity. When you open a line graph window, the selected counter's activity is dynamically recorded in one polling interval increments on the graph.

Line graphs are especially useful for highlighting trends.

Figure 2-11 illustrates the filtered packets activity for port 8.

Figure 2-11: Line Graph
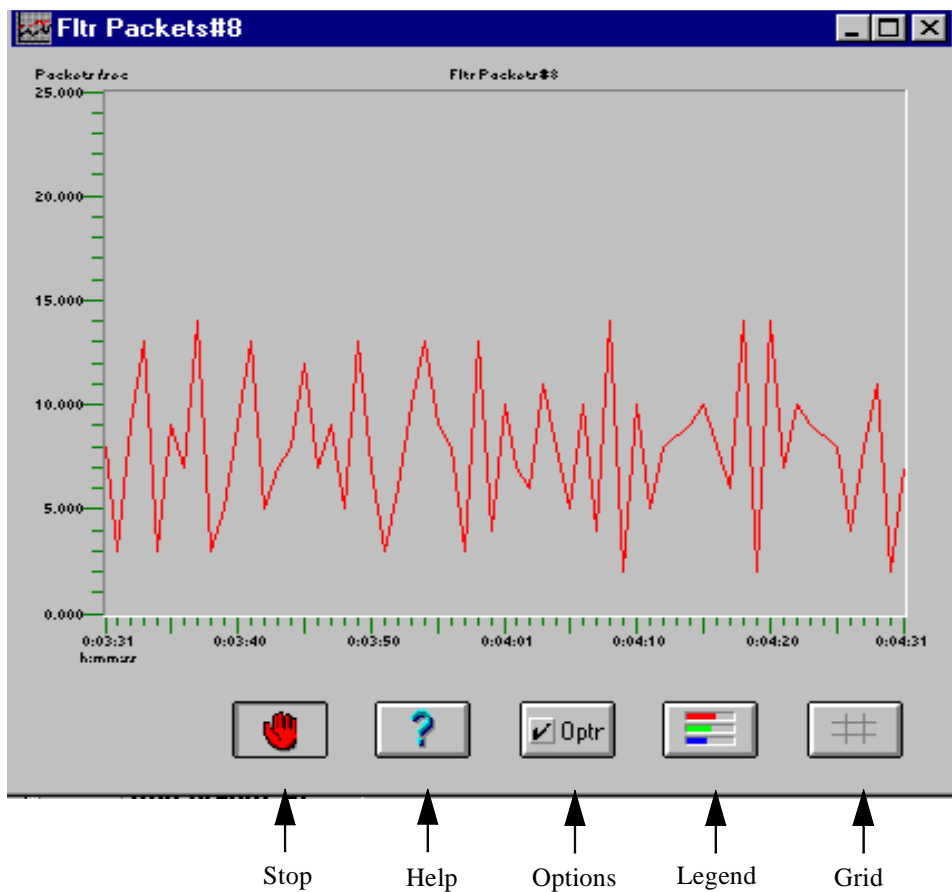
Buttons located below the graph allow you to obtain further information and provide options for additional window configuration. Table 2-4 describes the buttons.

Table 2-4: Line Graph Buttons

Button	Description
Stop	Halts recording of statistics on a graph. To resume drawing, choose the button again.
Help	Provides a brief description of graphics support features.
Options	Displays the Graph Options dialog box (Figure 2-12). These options allow you to reconfigure the main GRP window.
Legend	Displays a subwindow that displays the current statistics: category, time elapsed, and value. Category names and port numbers are color coded corresponding to lines on the graph.
Grid	Adds a grid to the graph. To delete the grid, click on the button again.

Figure 2-12: Graph Options Dialog Box
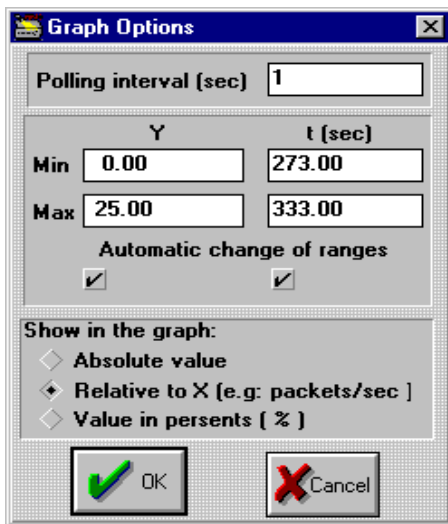
Table 2-5: Graph Options Dialog Box Buttons

Field or Button	Description
Polling Interval	Sets the value for the GRP main window and its parent.
Min Y	Sets the minimum value for the Y axis.
Max Y	Sets the maximum value for the Y axis.
Min t	Sets the minimum value for the X(t) axis.
Max t	Sets the maximum value for the X(t) axis.
Absolute value	Displays an absolute number of packets in the graph.
Relative to X	Displays a number of packets relative to the X axis (time).
Value in percent	Displays the number of packets relative to a range from 0% to 100%.

NOTE

For graphs where the X axis indicates time, always check the X check box. Sometimes it is better to turn off the Y check box, especially when graphs have peaks.

To view a counter as a single line graph

You can view this information from a Ports Graphs window or a Counters Graphs window as illustrated by the two identical graphs in step 3. Note window titles indicating whether the graph was obtained on a *per-port* or *per-counter* basis.

1) Click the Line check box for the counter you wish to view.

   A line graph for the counter displays.

2) To view a counter in another window, choose New windows in the Add Graphs As section.

3) Decide on a counter you wish to view, then click the Line check box for that counter.

   A line graph for the counter displays in a new window (Figure 2-13).

Figure 2-13: Per Port and Per Counter Line Graphs

Per Port   Per Counter
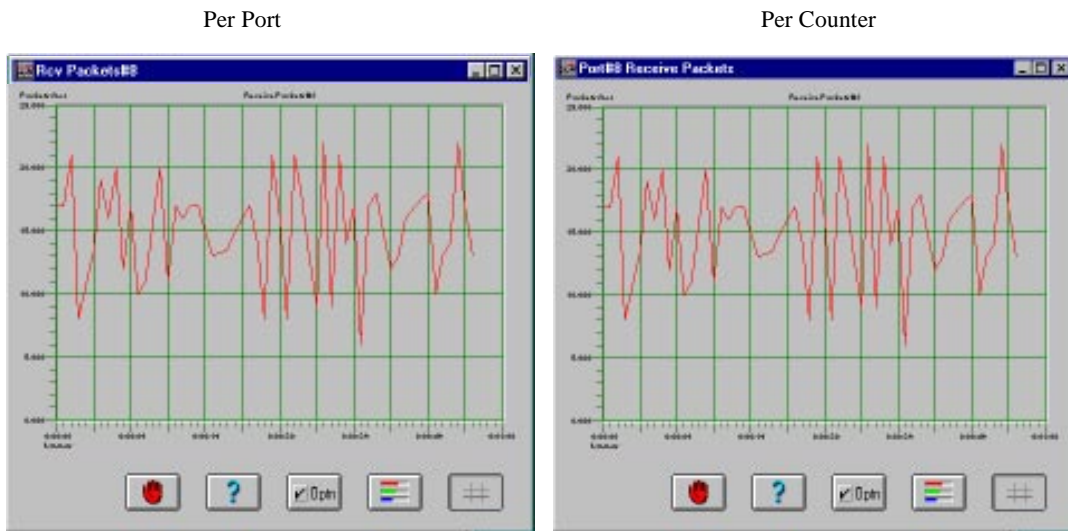
NOTE

Grids have been added to these graphs.

Complex Line Graphs

For more sophisticated analysis and comparison, multiple line graphs—up to 16 linear graphs—can be included in a single window. You can view statistics in many configurations:

- Same counter for different ports

- Different counters for a single port

- Different counters for different ports

Figure 2-14 illustrates the number of packets received (Receive Packets) for ports 1 and 2. On screen, each line displays as a different color.

Figure 2-14: Multiple Line Graphs
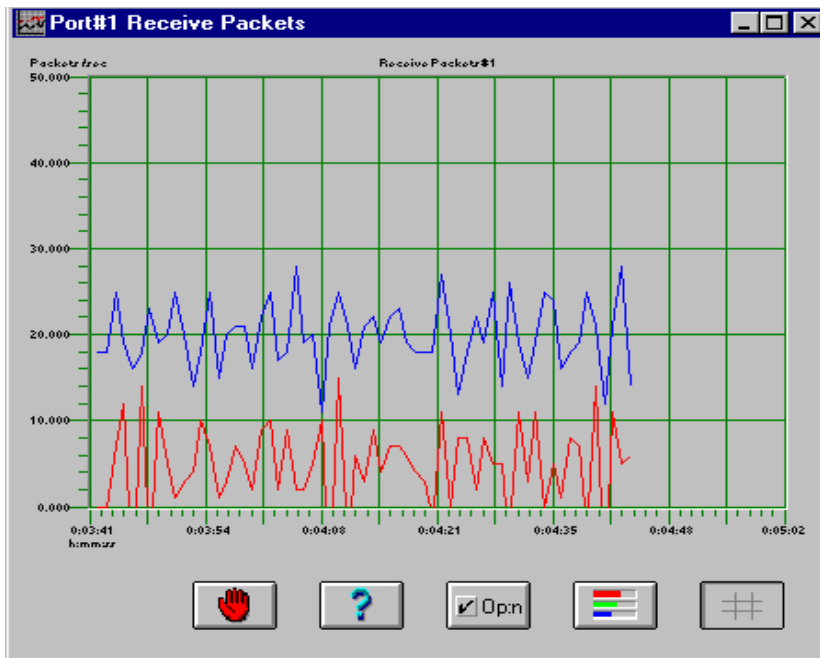
Scaling Graph Lines (Multiply Coefficients)

For some statistic-to-graph conversions, you will need to use the multiply coefficients function to properly scale graph lines, especially when you use two counter categories, where values might have large differences.

By entering a multiply coefficient for a counter, its current graph value is multiplied by the coefficient. This allows you to view several counters that have different dimensions in one graph window, for example, Received Bytes and Transmitted Packets.

To view the counter values of different ports for the same counter category as a line graph

You must be in a Counters Graphs window to view this type of graph. This example displays line graphs for Receive Packets on ports 1 and 2.

1) Click on the New lines check box in the Add Graphic As section.

2) Click on the Lines check box across from a counter you wish to view.

A line graph for the counter displays (Figure 2-15).

3) Click on the Lines check box for another counter you wish to add to the graph.

Another line is added to the graph.

Figure 2-15: Single Line Graph Display for Multiple Ports
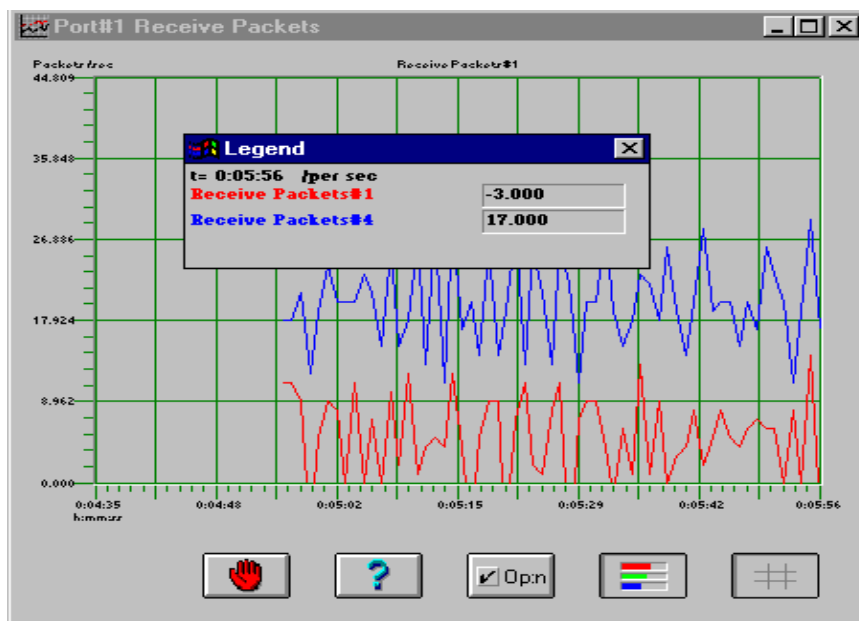
4) Repeat step 3 to add other lines to the graph.

NOTE

You will find it useful to open the Legend subwindow when you are viewing multiple lines in a graph. Each counter category is color coded to match the lines in the graph.

To view multiple lines on a graph (different ports/different counter categories or same port/different counter categories)

You must be in a Counters Graphs window to view this type of graph. This example displays line graphs for Receive Packets on ports 1 and 2.

1) Click on the New lines check box in the Add Graphic As section.

2) Click on the Line check box for the counter you wish to view.

A line graph for the counter displays (Figure 2-16).

Figure 2-16: Multiple Lines on a Graph
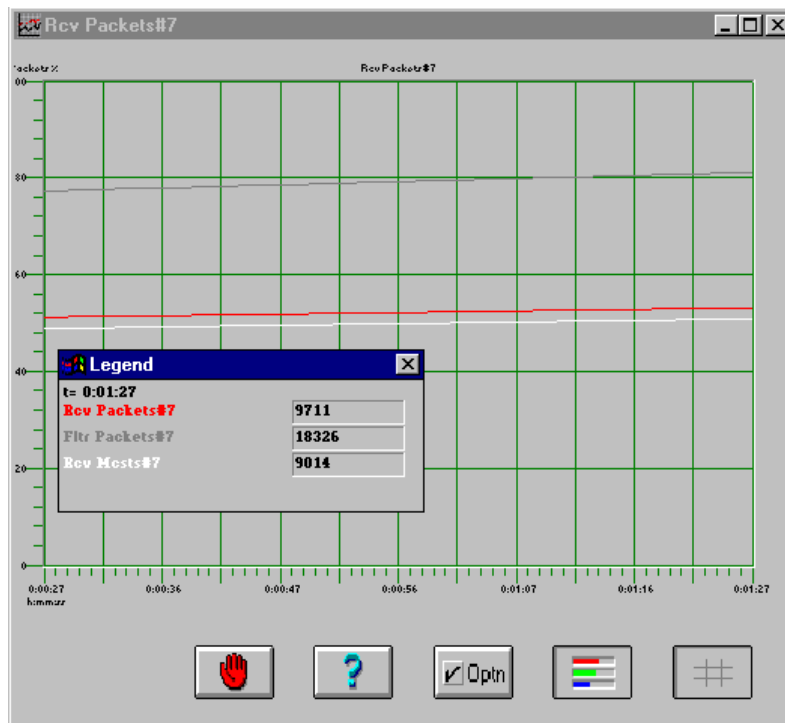
3) Click on the Line check box for another counter you wish to add to the graph.

Another line is added to the graph.

4) Repeat step 3 to add other lines to the graph.

NOTE

You will find it useful to open the Legend subwindow when you are viewing multiple lines in a graph. Each counter category is color coded to match the lines in the graph.

Tiling Graphic Windows

Choose Tile, and graphic windows will automatically and neatly position themselves on the screen (Figure 2-17).

Figure 2-17: Tiling Graphic Support Windows
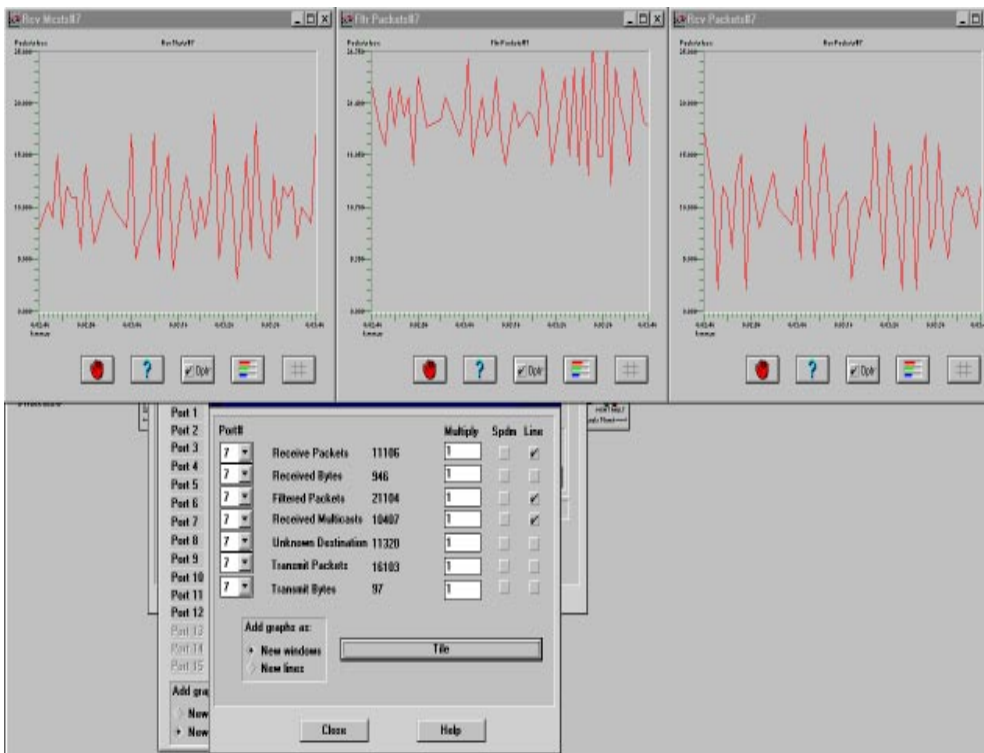
About Alarms

Alarms are activated by status changes in network devices. When the MultiSwitch 300 Manager detects a change in a device, it generates an alarm. A beep is sounded and the alarm message is recorded in the Alarm Log, indicating the date and time, the switch in which it occurred, the severity, and a short description of the reason for the alarm.

An alarm is also reflected in the device icon—the icon color changes according to the severity of the alarm. Alarms have five severity levels: critical, warning, normal, informational, and unknown, each represented by a different color. Table 2-6 lists the alarm severities and their associated colors.

Table 2-6: Alarm Severities and Their Colors

Alarm Severity	Color
Informational	Purple
Normal	Green or transparent
Warning	Yellow
Critical	Red
Unknown	Grey

Alarm Notifications

In addition to a sound notifying you of an alarm condition, the color of a device icon corresponds to the latest alarm with the highest severity. When an event received cancels any previously received alarm, the alarm is removed and the color of the icon is updated to reflect the new status of the device.

To view the alarm messages

- Choose Alarm Log from the Monitor menu from the main window menu.

  The Alarm Messages window appears (Figure 2-18).

NOTE

Only one application can receive SNMP traps at a time. If another application starts up first and seizes the trap port, then MultiSwitch 300 Manager will not be able to report alarms.

Figure 2-18: Alarm Messages Window

Date and Time   Device Name   Alarm Severity   Reason for Alarm
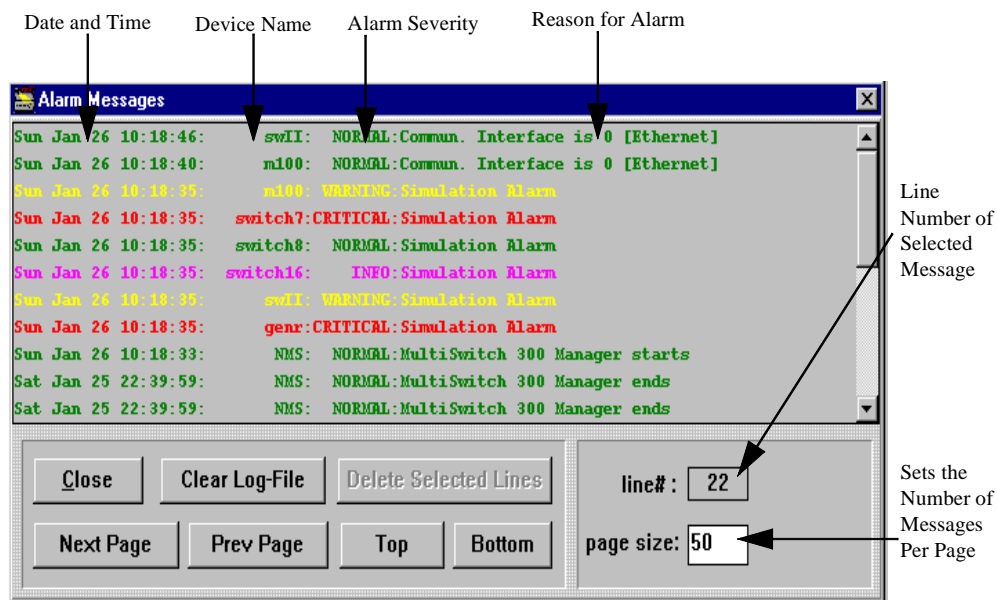
Alarms Configuration Window

You can change the severity level of any situation that calls for an alarm. You can also choose to record or not record an alarm in the Alarm Log.

To configure alarms

1) From the Options menu on the main window menu bar, choose Alarms Configuration.

    The Alarms Configuration window displays (Figure 2-19).

2) Choose Generic. Generic makes a global change to all devices.

3) Select an alarm description, then make changes in the log and severity level sections.

4) Choose OK.

Figure 2-19: Alarms Configuration Window
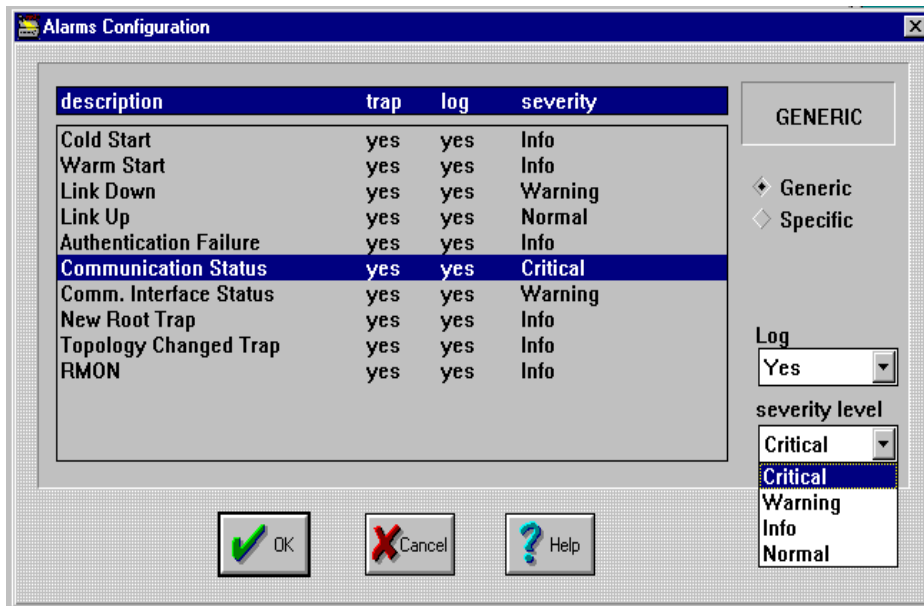
You may assign different severity levels for device state (see the description column in Figure 2-19). A description is added to the Alarms Log if Log=Yes for that description.

NOTE

Alarm severities are not updated on alarms received prior to an alarm configuration. Only alarms received after the configuration will adhere to the new settings.

Chapter 3

Adding and Deleting Devices

Before you can manage a device, you must first define the device, provide parameters to establish communication, and select an interface.

This chapter describes how to add, modify, and delete a device on a standalone Windows platform. Only the SUPERVISOR may add and delete devices and modify their attributes.

Adding a Device

After a device is physically installed on the network, the MultiSwitch 300 Manager requires specific parameters to establish communication. You must supply a name and address, specify communication type, enter polling durations, and define SNMP community names.

To add a new device

1) Select Add from the Edit menu.

The Devices Types window appears (Figure 3-1).

Figure 3-1: Devices Type Window
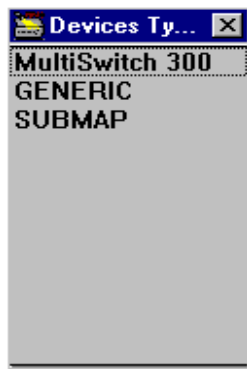
2) Select a desired device type.

A Describe window for the device appears (Figure 3-2).

Figure 3-2: Describe Window for Device Options
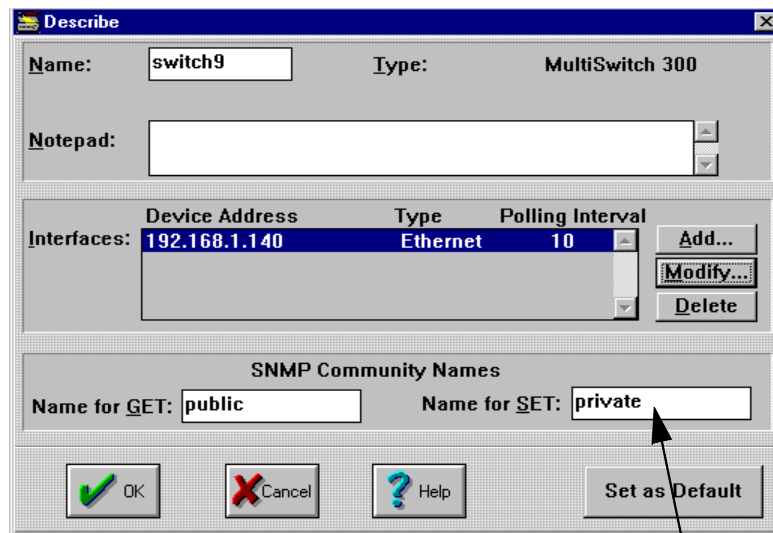
Uses the current entry in the Interfaces list as the default. When you
add other devices of this type, the default parameters are automatically
entered in the Define Interfaces dialog box. This shortcut lets you en-
ter a new device with just a few keystrokes.

3) In the Name field, type a name for the device.

4) In the SNMP Community Names section, type a Name for GET and a Name for
SET. (The default values are "public" for Get operations and "private" for Set
operations.)

5) Use the Notepad field to note details about the device—additional location
information or other comments such as support contact.

The Interfaces list defines all interfaces available to the device for communication
with the network. You enter interface specifications in the Define Interface dialog
box.

6) To define a new interface, choose Add in the Describe window. You may also
modify the existing interface. To do this, select it and click on Modify or double-
click on the interface line.

The Define Interface dialog box appears (Figure 3-3).

Figure 3-3: Define Interface Dialog Box
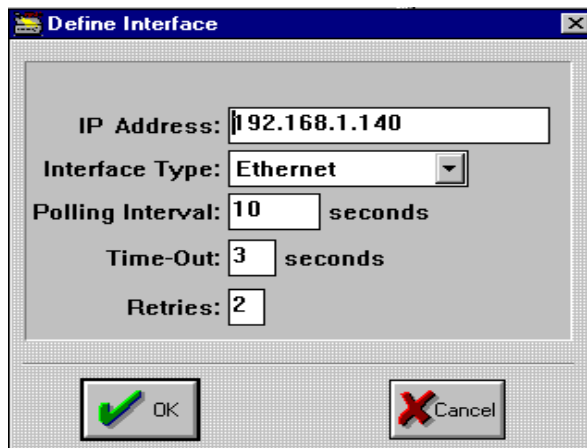
7) In the IP Address field, enter the IP address for the interface of the device.

8) Select an interface from the Interface Type list:

    •   Ethernet — when this interface is connected to the Ethernet LAN.

    •   SLIP — when the interface is connected to the serial line.

9) Enter values for Polling Interval, Time-Out, and Retries.

CAUTION

Set the Polling Interval time with care. Setting it to a high value may cause a slow response to network errors, while setting it to a low value may flood the network with large quantities of management traffic. It is recommended that you use the default value of 10 seconds.

---

10) Choose OK to add the interface to the Interfaces list.

The Describe window displays with the newly defined interface inserted above the highlighted line. The first interface on the list receives the highest priority for establishing communication. If communication cannot be established through that interface, the next interface is tried.

11) Choose OK.

The icon representing the new device now appears in the main window. If communication has been successfully established, the device icon is transparent with its name in blue. If communication has not been established, the device icon is red.

After a device has been successfully defined, it is polled at every poll interval to establish communication. The device's configuration is automatically learned after initial connection is established.

Modifying Device Settings

After a device has been added, you can change setup parameters or delete an interface through the Describe window.

To modify device settings

1) Make any adjustments needed in the available fields (the Name field cannot be changed).

2) To change an interface definition, select it and click on Modify or double-click on the definition. Make any required interface changes in the Define Interface window.

3) Choose OK.

To delete an interface

1) Select the interface you want to delete, then choose the Delete button.

2) Choose OK.

Submaps

The MultiSwitch 300 Manager allows you to add a Submap type to the main map of your network, easing visualization of your network (Figure 3-4). Any device type may be added in a submap, including other submaps. To jump to a submap, double-click on its icon. The submap from which it was called is automatically added, enabling you to navigate quickly between different maps. You may also jump between different submaps by adding a submap and giving it the name of the map you wish to jump to. You may also use the Open Map window (stand-alone version only), described on the next page.

Figure 3-4: Main Map with a Submap

The main map with a submap (MIS) added to it. You may assign links to a submap (100).

Double-click on a submap to jump to it. The window on the right is the MIS submap. The main is the Manager's top level map icon. Each submap besides the main map has the map above it added to it automatically.
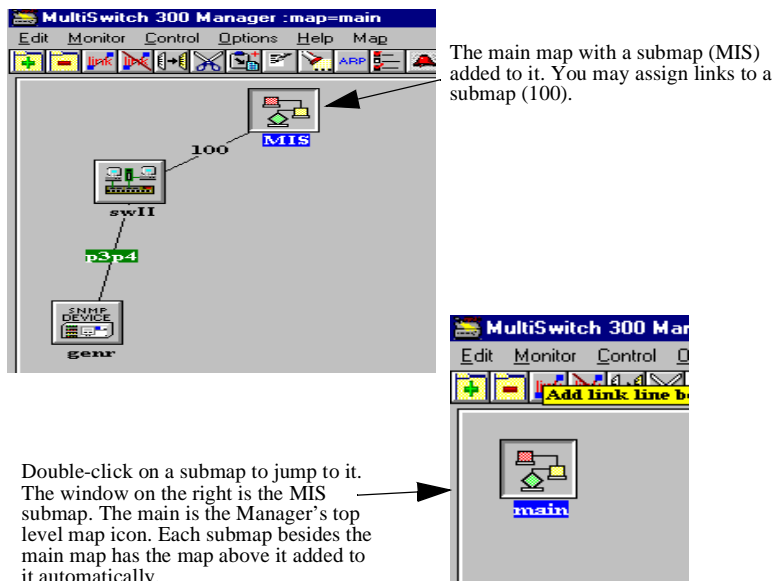
When you jump to a submap, its name is displayed in the title bar (for example, "map=main" in the window on the left).

To add a submap

Choose Add from the Edit menu on the main window menu bar, then select Submap
to add this device type. You may also click on the Add shortcut button under the main
menu. The Describe window appears (Figure 3-5).

Figure 3-5: Describe Window
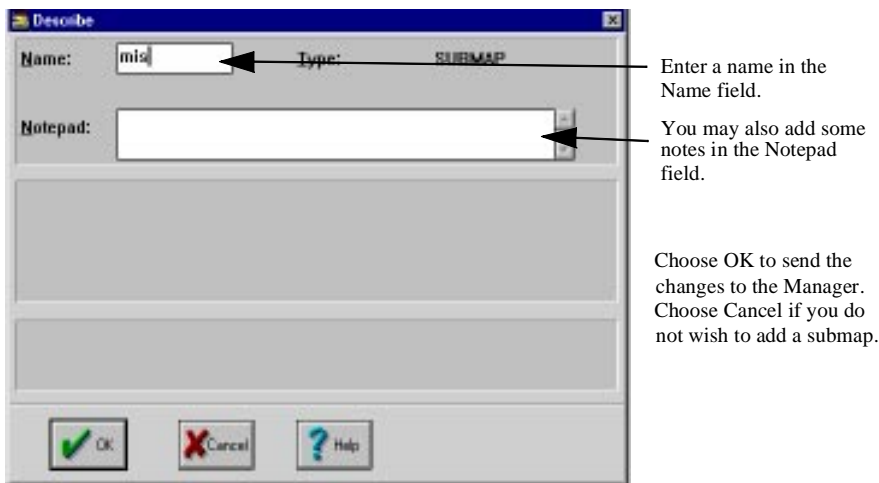
Several operations can make working with submaps easier: cut, paste, and drag &
drop. You can cut or copy a device from one map, then paste it into another. Its
attributes will be the same. You can also drag a device icon over a submap. The
MultiSwitch 300 Manager will ask you whether you wish to move it to that submap
(Figure 3-6).

Figure 3-6: The Drop Submap Confirmation Window
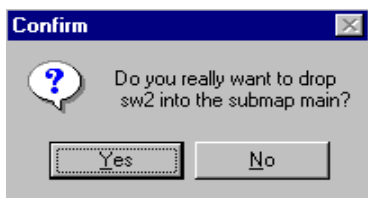
To open a map window

Enter the Open Map window (Figure 3-7) by selecting Open Map from the Map menu on the main window menu bar. If you add a submap through this window (New Map), it will not have an icon. You may use the Add command from the Edit menu on the main window menu bar to add a submap with an icon. You may jump to any map with the Open Map button or by double-clicking its name. You may delete any map by highlighting it and clicking the Delete Map button.

Figure 3-7: Open Map Window

If you have more than ten submaps, a slider bar appears in the Maps list box.

Deleting Devices

You can remove a device from the system in situations that require device repair or replacement, or physical reconfiguration of the system.

To delete a device

* Select the device's icon in the MultiSwitch 300 Manager main window, then choose Delete from the Edit menu.

Links

To help you visualize your network configuration, you may add links between devices on the main map. Links are added manually. To add a link, select Add Link from the Edit menu shown in the left side of Figure 3-8. The current link is highlighted (p3p4 in Figure 3-8). To rename an existing link, double-click on it. Both of these actions will take you to the Describe Link window (Figure 3-8, right). To delete the selected link, select Delete Link from the Edit menu. You can also use one of the 13 buttons in the map window to add and delete links.

Figure 3-8: Adding and Describing a Link
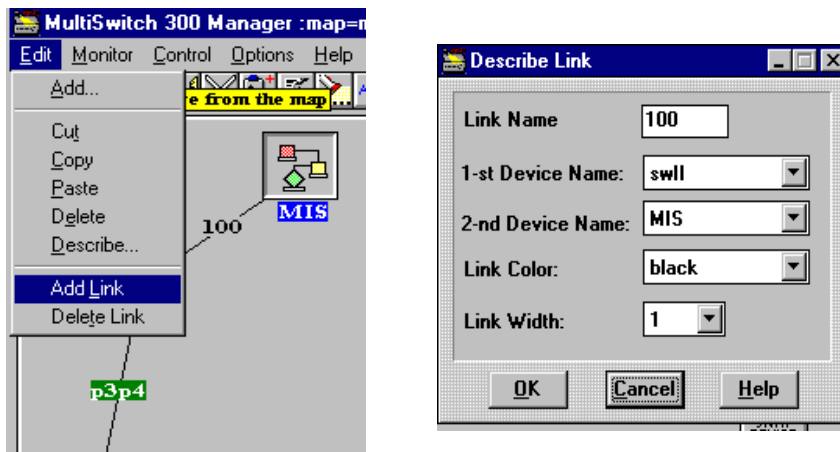
You may modify an existing link. Do not give links identical names if they are attached to the same device. Do not use spaces when naming a link. Link names use only six characters.

General Device Information: Device Identify Window

The Device Identify window (Figure 3-9) provides you with a quick look at basic information about a device—items such as product type, up time, device location, and contact.

Figure 3-9: Device Identify Window
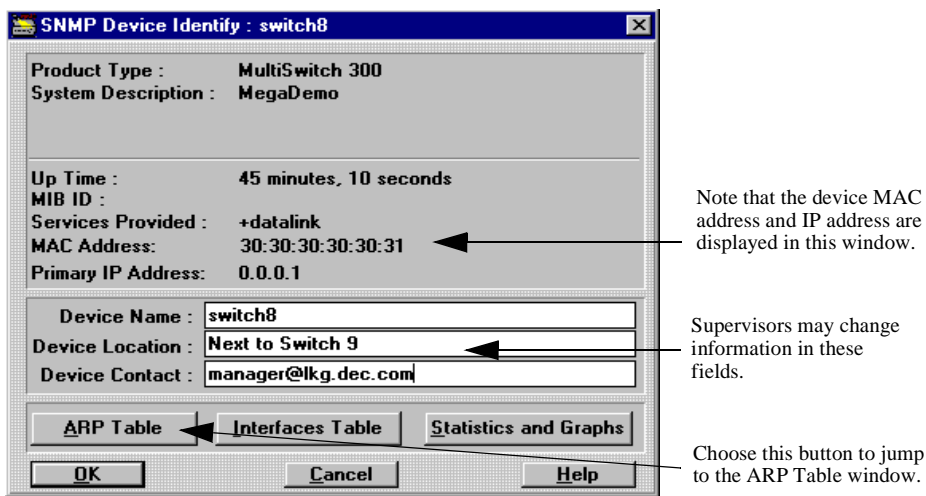
To modify general device information

1) Choose Identify from the Monitor menu on the main window menu bar.

The Device Identify window (Figure 3-9) appears.

2) Enter changes, then choose OK.

Autodiscovery

The Autodiscovery window (Figure 3-10) allows you to easily add network devices without knowing their IP addresses. The MultiSwitch 300 Manager will poll each IP address and add devices with SNMP agents.

To start the Autodiscovery process, click on Autodiscovery from the Map menu on the main window menu bar and choose the Start Discovery button after entering the desired options.

Figure 3-10: Autodiscovery Window
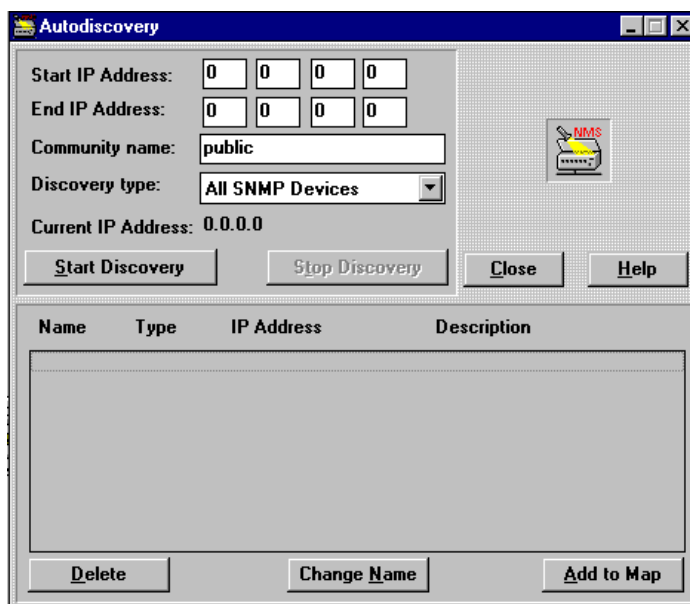
You may choose to Autodiscover either DIGITAL devices, or all SNMP devices. Table 3-1 describes the buttons and fields in the Autodiscovery window.

Table 3-1: Fields and Buttons of the Autodiscovery Window

Field or Button	Description
Start IP Address	The first IP address that the MultiSwitch 300 Manager will poll.
End IP Address	The last IP address that the MultiSwitch 300 Manager will poll.
Community Name	Enter the community name if known; otherwise, use the default value.
Discovery Type	You may choose which type of device to search for: either DIGITAL devices, or any with an SNMP agent. The MultiSwitch 300 Manager will add an unknown device as a "Generic SNMP Device."

General Device Information: Device Identify Window

Field or Button	Description
Current IP Address	Displays the IP address currently being polled.
Start/Stop Discovery	Click on Start Discovery to begin the discovery process; click on Stop Discovery to halt the discovery process.

The Start and End IP addresses may be modified; the MultiSwitch 300 Manager will poll each IP address sequentially and update the Current IP Address field. Once a device with an SNMP agent has been found, a Describe Discovered Device window will open. This window is functionally identical to the Describe window shown in Figure 3-2.

Clicking Add or Modify will take you to the Define Interface window (see Figure 3-3), where you may adjust the polling interval, time-out value, and retry value. The MultiSwitch 300 Manager will autodetect the IP address and the Interface type; adjust them only if you know that they are or should be different.

Generally, the only thing you have to do to add a device successfully is to name the discovered device and choose OK. The device will be added to the map, and the Autodiscovery process will continue. Choose Cancel if you do not want to add the discovered device. The Autodiscovery process will continue until you choose Stop Discovery in the Autodiscovery window, or when the End IP Address is reached.

Generic Devices

The Generic device type will allow you to manage any SNMP-compliant device. The Generic SNMP Device Identify window (Figure 3-11) will open when you double-click on an icon of a generic device. This window is similar to the Device Identify window (Figure 3-1), but in addition lists the device's MAC address and primary IP address. The MultiSwitch 300 Manager will add the generic device to the map; you may view its general information by double-clicking on its icon or by selecting Identify from the Monitor menu on the main window menu bar. Generic devices may send standard traps and alarms to the MultiSwitch 300 Manager (that is, when there is no communication between the device and the MultiSwitch 300 Manager).

Figure 3-11: SNMP Device Identify Window
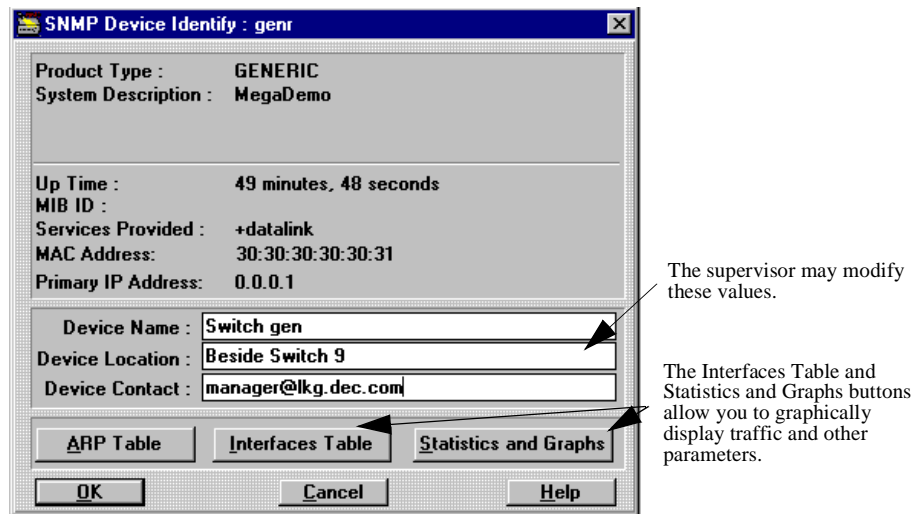
Table 3-2 describes the buttons in the SNMP Device Identify window.

Table 3-2: Buttons on the SNMP Device Identify Window

Button	Description
ARP Table	Choose this button to jump to the ARP Table window.
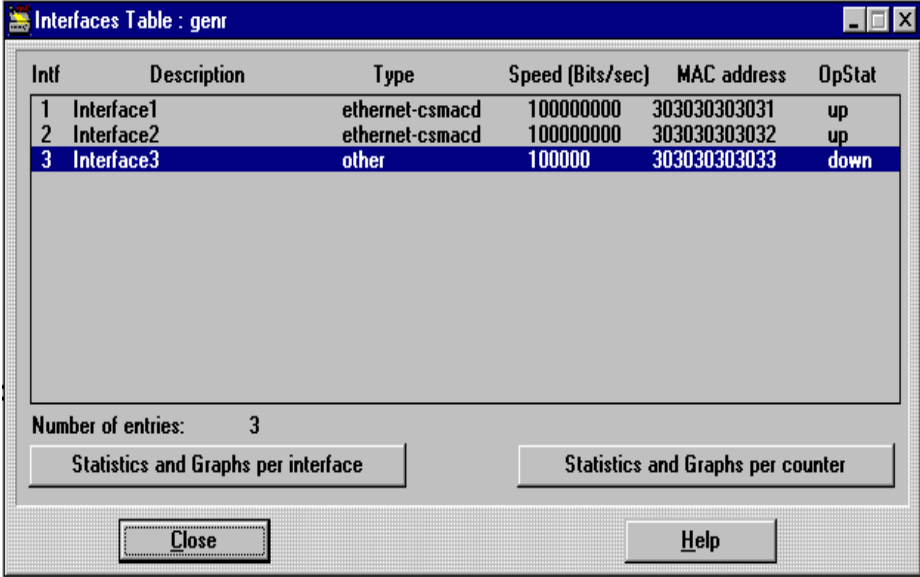
Button	Description
Interfaces Table	Choose this button to jump to the Interfaces Table window (described later in this section).
Statistics and Graphs	Choose this button to jump to the graphics windows for this device. Please refer to Using Graphic Support in Chapter 2 for more information about graphs.

Interfaces Table Window

The Interfaces Table window (Figure 3-12) presents information about device interfaces. It is based on the information from the ifTab (RFC 1213, MIB-II). Any SNMP-compliant device must support the parameters listed in the Interfaces Table.

Figure 3-12: Interfaces Table Window

Table 3-3 describes the fields in the Interfaces Table window (for every interface).

Table 3-3: Fields in the Interfaces Table Window

Field	Description
Intf	The interface number.
Description	A textual string containing information about the interface. This string should include the name of the manufacturer, the product name, and the version of the hardware interface.
Type	The type of interface, distinguished according to the physical/link protocol(s) immediately below the network layer in the protocol stack.
Speed	An estimate of the interface's current bandwidth in bits per second. For interfaces that do not vary in bandwidth or for those where no accurate estimation can be made, this object should contain the nominal bandwidth.
MAC address	The interface's address at the protocol layer immediately below the network layer in the protocol stack. For interfaces that do not have such an address (for example, a serial line), this object should contain an octet string of zero length. If the address does not have an alias, then the raw address will be displayed. Otherwise, the current aliased name will be displayed. You may add or edit aliases through the ARP Add/Edit window, Alias Manager window, or any other window (such as the Switching Database window) with an embedded alias window.
OpStat	The current operational state of the interface (up, down, or testing). The testing state indicates that no operational packets can be passed.

Double-click on the desired interface line or choose the Statistics and Graphs per Interface button to open the Interfaces Statistics (per interface) window (Figure 3-13).

Click on the Statistics and Graphs per Interface button to open Interfaces Statistics (per counter). Please refer to Using Graphic Support in Chapter 2 for more information about MultiSwitch 300 Manager graphs.

Figure 3-13: Interface Statistics and Interfaces Graphs Windows
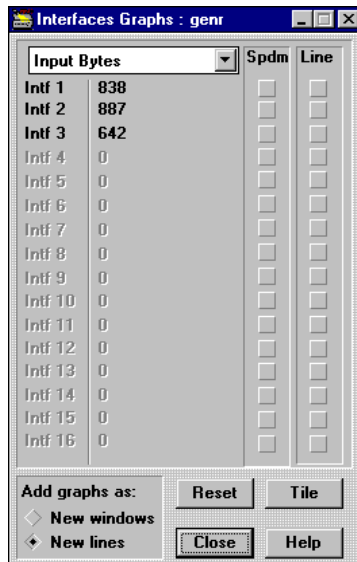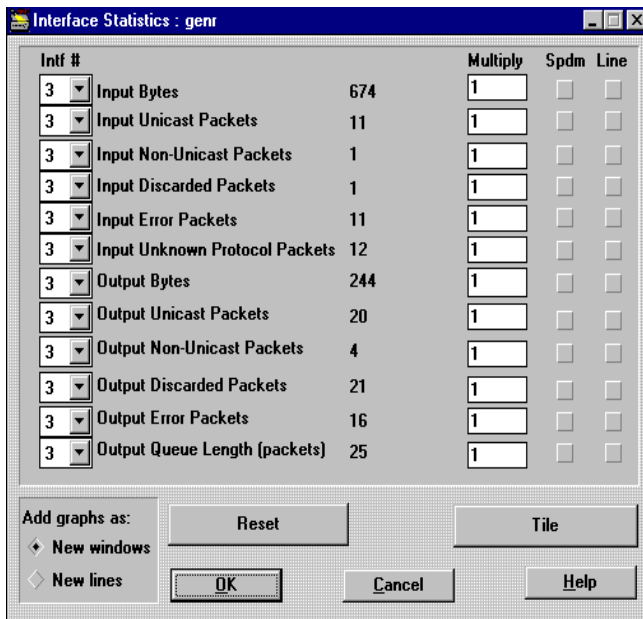
Alias Manager

The MultiSwitch 300 Manager allows you to assign aliases to MAC addresses, easing identification of network devices and stations. Each network device (for example, a workstation, switch, hub, printer) has its own unique 12-digit hexadecimal MAC address. The first six digits denote the device vendor. You may assign an alias to any complete MAC address or the 6-digit vendor code. The Alias Manager (Figure 3-14) includes the 6-digit vendor codes for most vendors. Once an Alias is defined, it will be active in any alias window in the MultiSwitch 300 Manager.

Once an alias has been defined, you may type the either the alias or the MAC address and MultiSwitch 300 Manager will supply the missing field. If you add just part of a MAC address, MultiSwitch 300 Manager will append the remaining digits. If there is no alias entry, just the MAC address will be displayed.

Figure 3-14: Alias Manager Window
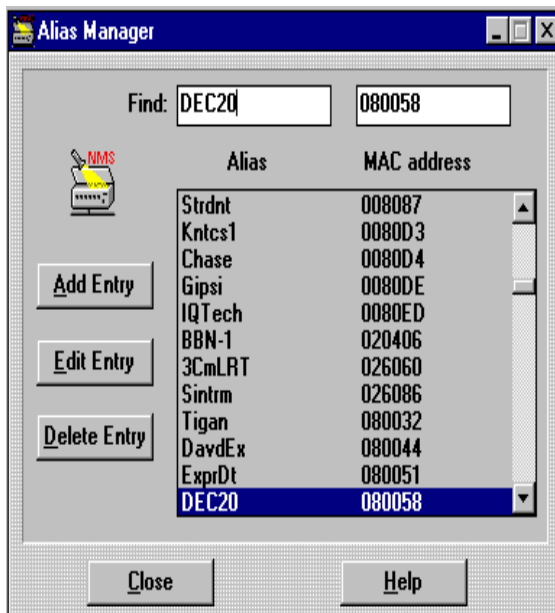
Note that "DEC20" has been typed in the Find field, highlighting the hexaecimal digits assigned to DEC20. You may double-click on an entry to jump to the Edit Alias Entry window (below). You may delete an entry by highlighting it and clicking on the Delete Entry button.
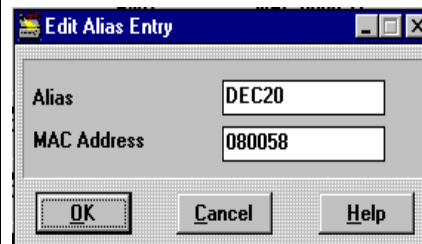
Chapter 4

MultiSwitch 300 System Management

This chapter describes the system management of the DIGITAL MultiSwitch 300 family of devices. System management describes the tools available for monitoring and configuring the MultiSwitch 300 system parameters.

System Management

The MultiSwitch 300 Manager contains a versatile set of tools that assists you in managing the performance, configuration, security, and accounting of a MultiSwitch 300 switch. A series of multipurpose hierarchical windows enable, you to monitor and control individual devices, as well as the general system configuration of the network.

Designed for active management, the MultiSwitch 300 Manager allows you to obtain up-to-the-minute configuration information and statistics, and load new configuration information. By analyzing performance and interactively reconfiguring the system, you can maintain a network that operates at optimum performance—with maximum throughput, network stability, and minimal downtime.

This section describes the following control and monitoring tools:

- General system information

- Switch configuration

- Traffic flow—topology, flow patterns, volume, and bottlenecks

- Statistics for troubleshooting, detecting faults, pinpointing subnormal performance, and managing costs

- Switching network interfaces

- Network configuration using Security virtual LANs and virtual broadcast domains

- Testing transmission and network analysis interfacing

- Resetting software, hardware, and factory defaults

- Adding, changing, or deleting manager hosts

- Bridge Spanning Tree parameters and enable/disable controls

System Information

The System Information window (Figure 4-1) provides three important functions:

- Lists general information about a device.

- Displays Port Information Graphics windows, allowing you to view statistics as a speedometer or line graph.

- Functions as the gateway to monitoring and controlling the individual device.

Figure 4-1: System Information Window
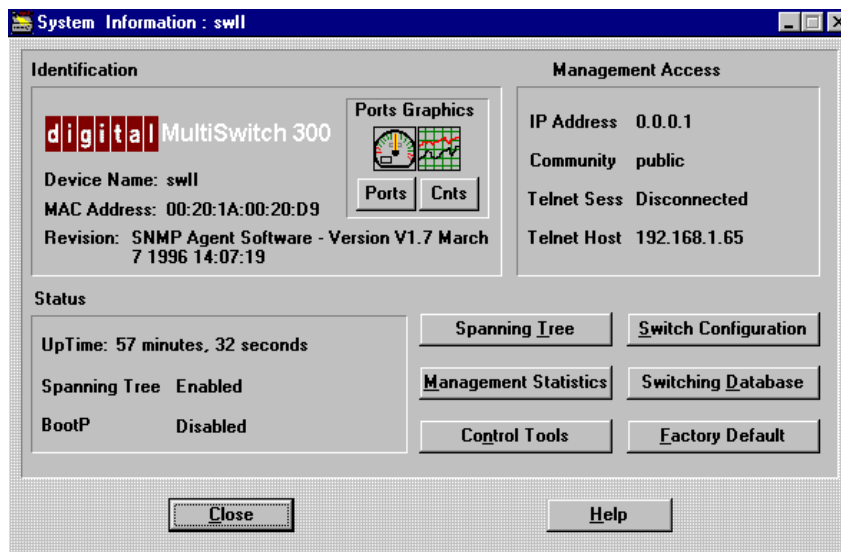
General System Information

You can take a quick look at the current status of the system and the devices on the network in the System Information (Figure 4-1) window. To display the System Information window, double-click on a switch in the main window map, then click on the logo that identifies the device.

Table 4-1 describes the fields displayed in the System Information window.

Table 4-1: System Information Window Fields

Field	Description
Device Name	Name assigned to the device through the Describe window.
MAC Address	Physical address of the device.
Revision	Revision and version number of the SNMP agent software.
IP Address	IP address of the device.
Community	Community name for SNMP Get requests. You can change this parameter from the Switch Configuration window.
Telnet Sess	Connected/Disconnected to the administrative Telnet interface.
Telnet Host	Administrative Telnet IP address if Telnet Session is connected.
UpTime	Time elapsed since last reset cycle.
Spanning Tree	Enabled/Disabled. You can change this parameter from the Bridge Spanning Tree Parameters window.
BootP	Disabled/Enabled. This parameter may be changed from the Switch Configuration window.

Viewing Port Statistics

You can view port information by choosing Ports or Cnts from the Ports Graphics section of the System Information window. For detailed information on these options, see Using Graphic Support in Chapter 2.

Other System Control Windows

From the System Information window, you can open other windows that contain additional information about the network and use tools for managing and reconfiguring the system. Table 4-2 describes the function of each button.

Table 4-2: System Information Window Buttons

Button	Description
Switch Configuration	Displays the Switch Configuration window.
Switching Database	Displays the Switching Database window.
Factory Default	Restores the defaults from the MultiSwitch 300 Manager NVRAM database after a reset.
Spanning Tree	Displays the Bridge Spanning Tree Parameters window.
Management Statistics	Displays the Management Statistics window.
Control Tools	Displays the Control Tools window.

Switch Configuration

The Switch Configuration window (Figure 4-2) contains basic switch configuration parameters that you can modify for your particular network requirements. To display the Switch Configuration window, click on the Switch Configuration button in the Switch Configuration window.

Table 4-3 describes the fields in the Switch Configuration window.

Figure 4-2: Switch Configuration Window
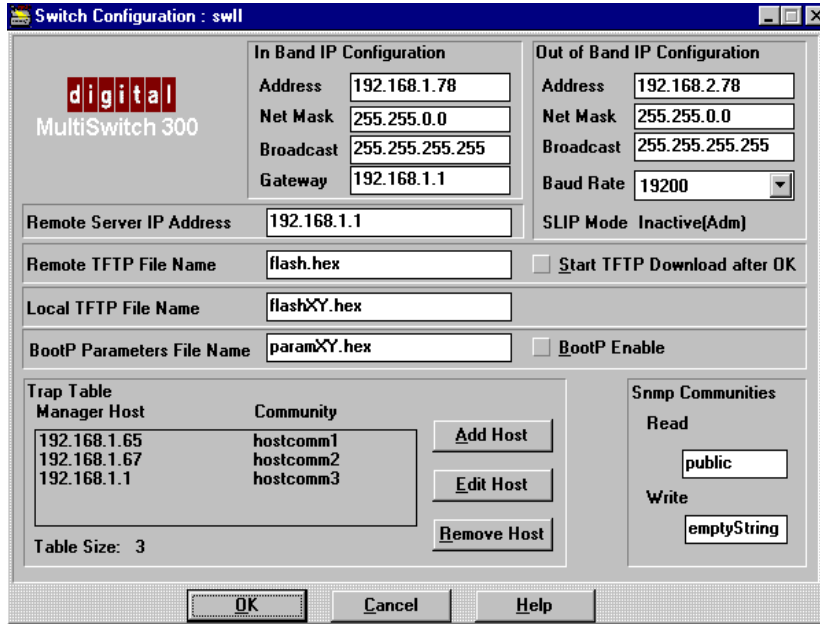
Table 4-3: Switch Configuration Window Fields

Field	Description
In Band IP Configuration	Displays the current information for in-band Ethernet switch connections. You can view and change the following items:
	IP Address Net Mask Broadcast IP Address Gateway IP Address
Out of Band IP Configuration	Displays the current information for SLIP (out-of-band) switch connections. You can view and change the following items:
	Net Mask Broadcast IP Address Baud Rate (9600/19200/38400)—in SLIP mode SLIP Mode (Active/Inactive)

Field	Description
SNMP Communities	Displays the current SNMP security parameters for the switch. Default Community names are "public" and "private" for read and write, respectively. You can change the following items: Read Write
Software Download Parameters	Displays the parameters for downloading new agent software. You can change the following items: Remote Server IP Adress Remote TFTP File Name Local TFTP File Name BootP Parameters File Name
Trap Table	Displays the manager hosts for the switch. After the manager's host IP address is in the table, the switch can send standard SNMP traps to it.

Adding, Editing, and Removing Manager's Hosts

As your network requirements change, you may find it necessary to add new manager's hosts, remove them completely, or modify existing host parameters.

To add or edit a host

1) Select a host from the list (if editing) in the Switch Configuration window.

2) Click on Add Host or Edit Host (or double-click on the item if editing).

The Add Host or Edit Host dialog box appears.

3) Enter the appropriate values in the fields.

4) Click on OK.

To remove a host

1) Select a host from the list.

2) Click on the Remove Host button.

A confirmation dialog box appears.

3) Click OK to remove the host from the list or click Cancel to end the procedure without deleting the selected host.

System Information

Switching Database (Learn Table)

The Switching Database window (Figure 4-3) maintains all information about the contents of a device's learn table, a complete record of all Ethernet (MAC) addresses. This window also provides access to address filtering tools and network connectivity.

Figure 4-3: Learn Table
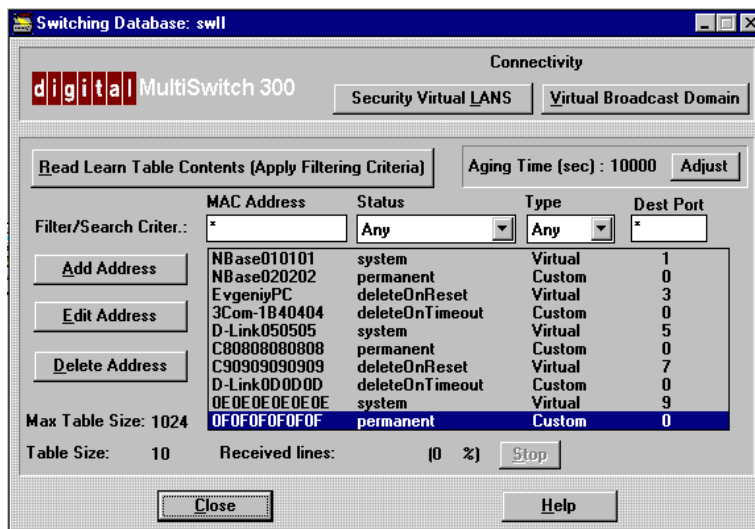
Each switch maintains a learn table, a lookup table of MAC addresses relative to destination ports, that tells the device where to send frames. The table is automatically updated. When a frame arrives, its destination address is looked up in the table and either filtered completely or forwarded to the appropriate port(s). If a frame's destination address is unknown, it is typically broadcast to all other ports.

The learn table is kept current by checking the source addresses of all received frames and updating the table accordingly. Therefore, the learn table remembers which station (or device) resides on which port. When necessary, the table can be directly manipulated by the network supervisor. A learn table entry consists of four items: MAC address, status, type, and destination port. Table 4-4 describes the entries in a learn table.

Table 4-4: Learn Table Entries

.

Item	Description
MAC Address	The MAC Address corresponds to the Ethernet (physical) address for the entry. If the address does not have an alias, the raw address is listed. If the address has an alias, the alias is displayed. You can add, edit, or delete addresses and aliases through the Add Address, Edit Address, and Delete Address buttons.
Status	Status provides two functions: it indicates the current status of an address and also determines what happens to an address after a reset cycle, or completion of an aging interval (timeout).
	You can set Status to one of the following options:
	System — Indicates a system entry such as a system address, the broadcast address, or the Spanning Tree group address.
	Permanent — Indicates that the selected entry is currently in use and will remain so after the next reset of the device. This value is legal only for custom filter types of entries. Setting a virtual filter entry to permanent results in Delete On Reset status.
	Delete On Reset — Indicates that the selected entry is currently in use and will remain so until the next reset of the switch.
	Delete On Timeout — Indicates that the selected entry is currently in use and will remain so, until it is aged out.
Type	Type indicates the type of filter used to modify an address for forwarding frames received by the device. See the section Installing and Using Custom Filters in this chapter for more details on filters.

Item	Description
	You can set the filter type to one of the following options:
	Virtual Filter — Indicates that this entry has a virtual filter associated with it. This is the default value for learned entries.
	Custom Filter — Indicates that this entry has a custom filter manually installed through the MultiSwitch 300 Manager.
Dest Port	The port that a frame containing an entry MAC address would be forwarded to if it is not overwritten by the SVLAN mechanism. This number is relevant only for virtual filter entries. For custom filter entries, this number is zero. In actuality, this is the port that the device with this particular MAC address is physically connected to.

Viewing Selected Learn Table Entries According to Specified Criteria

In the Switching Database window, you view learn table entries by specifying criteria for each category. For example, if you want to view the entire database of addresses, the Filter/Search Criter field would read as follows:

Mac Add	*
Status	Any
Type	Any
Dest Port	*

By changing criteria in the fields, the database is quickly filtered, allowing you to find the precise information for any category or combination of categories.

To view learn table entries that apply to specified criteria

1) In the Filter/Search Criter fields, enter the criteria values.

NOTE

In the MAC Address field, you may enter part of the address or alias followed by
an asterisk (*).

---

2) Click on Read Learn Table Contents (Apply Filtering Criteria).

Addresses display corresponding to the selected filtering criteria.

Adding, Editing, and Deleting a Learn Table Entry

You add a learn table entry through the Add Address window. You modify a learn
table entry through the Edit Address window. You delete a learn table entry with the
Delete Address button.

To add a learn table entry

1) Click on Add Address in the Switching Database window (Figure 4-3).

The Add Address window appears (Figure 4-4).

Figure 4-4: Add Address Window
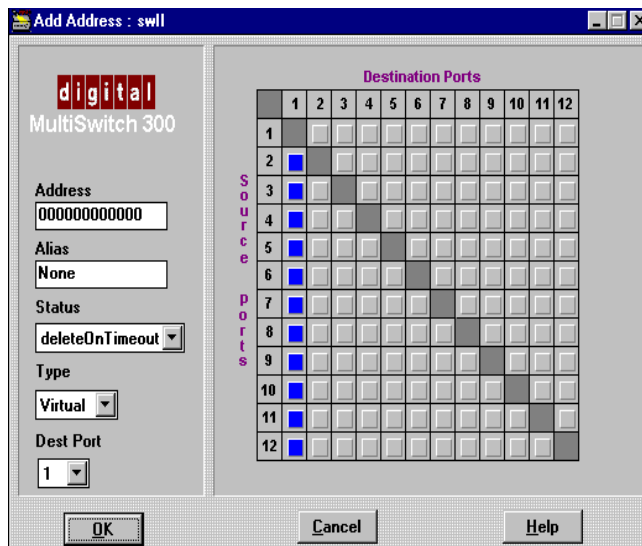
2) Enter an address and/or alias.

3) Set the options for Status, Type, and Dest Port.

4) Click on OK.

To edit a learn table entry

1) Select an address from the learn table in the Switching Database window and double-click on it to open the Edit Address window.

The Edit Address window appears (Figure 4-5).

Figure 4-5: Edit Address Window
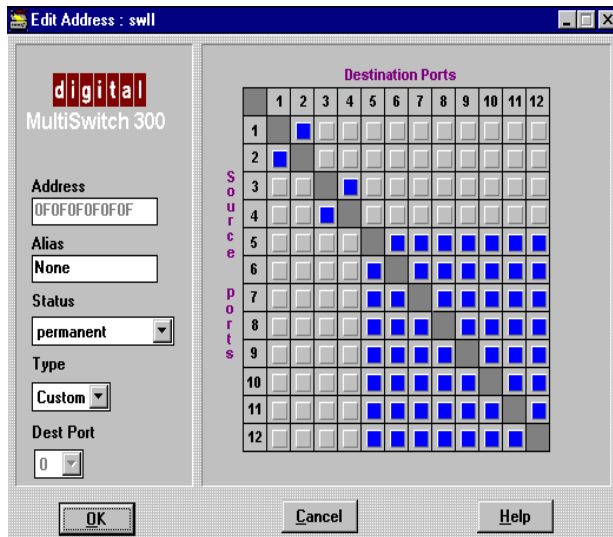
2) Edit an address and/or alias.

3) Set the options for Status, Type, and Dest Port.

4) Click on OK.

To delete an address from the learn table

1) Select the address you want to delete.

2) Click on Delete Address.

The Confirm dialog box appears.

3) Click on OK.

After confirmation, the address is deleted.

Aging Time

Aging is the length of time an address remains in the database without being refreshed. Because the learn table is kept current by checking the source addresses of all received frames, active addresses are constantly updated or refreshed. Old or inactive entries in the learn table are flushed by an aging mechanism that prevents the table from becoming full and helps assure that there is always room for new addresses.

The Aging Time field in the Switching Database window displays the current aging time of the device in seconds. Addresses that are not permanent will be deleted one aging time length after they are learned, unless they are updated with fresh information. Permanent and system addresses are not deleted by the aging process. Use the following procedure to change aging times.

To modify aging time

1) Click on Adjust in the Aging Time section of the Switching Database window (Figure 4-3).

The Adjust Aging Time window appears (Figure 4-6).

Figure 4-6: Adjust Aging Time Window
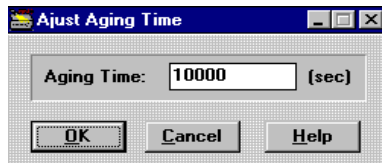
2) Enter a valid aging time (10–27525 seconds).

3) Click on OK.

If the aging time is valid, the aging time is updated to the new value. If the time is not valid, an error message displays.

Installing and Using Custom Filters

You may define a custom filter for every Ethernet address in the learn table. A filter is installed for a corresponding Ethernet address (alias). Custom filters are based on the source and destination ports.

Every port on the switch is connected to a segment. Every segment contains several stations (or devices). When you open the Switching Database window, you see all the stations that have been learned by the switch. Every table line presents a station. The station is represented by its MAC address or alias.

The last table line parameter is the destination port, labeled Dest Port. This is the port that the station is physically connected to.

By default, every station has a virtual filter. When a packet from any port (the source port) arrives at this station (the package has its MAC address inside), it will be forwarded. So, a virtual filter does not actually filter packets.

When you open the Edit Address Window for stations with a virtual filter, the connectivity matrix has a vertical line corresponding to the station's destination port. This means that the packet will always be forwarded, regardless of the source port.

You may want to filter the packet when it comes from certain ports. You do it by installing a custom filter.

To install a custom filter

1) Select an address from the learn table in the Switching Database window and click on Edit or double-click on the address.

The Edit Address window appears (Figure 4-7).

Or

Click on Add Address if you are installing a new address with a custom filter.

The Add Address window appears.

Figure 4-7: Edit Address Window
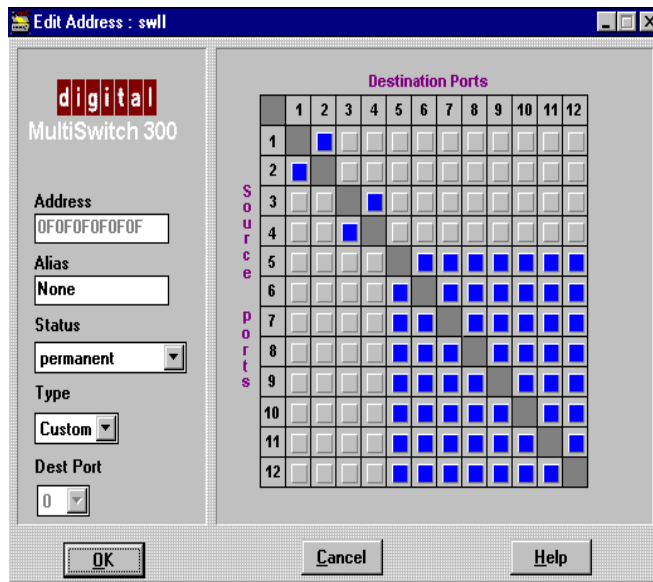
2) Click on Custom in the Type box. Dest Port is automatically set to 0.

3) Assume that you are going to set up a custom filter with the following configuration:

Packets from port. . . (Source Port)	Are forwarded to ports. . . (Destination Port)
2	6, 7
3	6
4	6
5	6, 7

NOTE

There cannot be any other forwarding for packets with the MAC address listed.

To set up the filter, click on boxes 2-6, 2-7, 3-6, 4-6, 5-6, and 5-7 in the matrix.

Make sure that no other boxes are checked (Figure 4-8).

Figure 4-8: Edit Address Window with Destination Ports
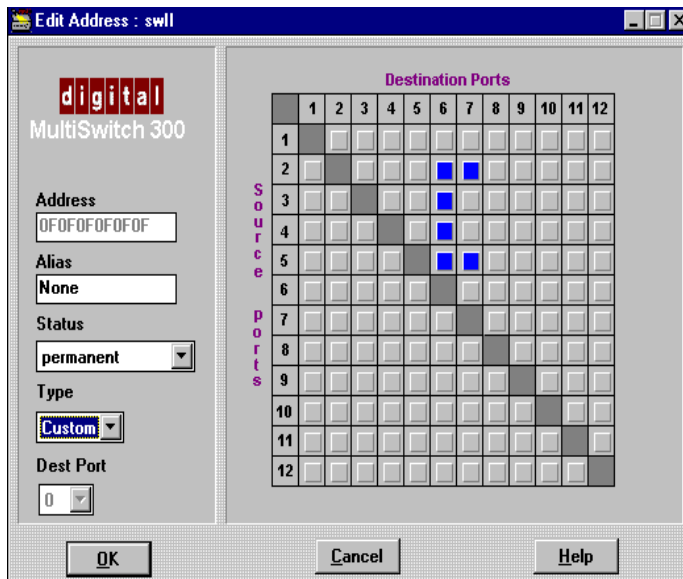
4) Click on OK. The changes are now sent to the device.

Virtual Networking

Virtual LANs allow you to create secure workgroups, erect firewalls against broadcast storms, use flow control to make better use of the existing network bandwidth, and reconfigure networks—all without changing cabling or adding equipment. Members of functional teams can work within secure groups; while a virtual LAN still permits access to global network resources, such as, print and email servers.

The MultiSwitch 300 family implements virtual LANs based on a port grouping policy. A port may be shared by several virtual LANs with access to all network resources or traffic multiplexing as defined by the ATM Forum LAN Emulation standards.

Two levels of security are implemented by the MultiSwitch 300 Manager:

- **Virtual broadcast domain** — Consists of segments attached to specified ports that are allowed to share broadcast-type traffic. Any other type of traffic passes freely between stations in different virtual broadcast domains.

- **Security virtual LAN** — Consists of a group of segments attached to the specified ports that are allowed to share the traffic. Traffic may not flow to a segment that is not attached to a port in the group.

The two implementations fill similar needs of an extended network, with the sole difference being in the type of traffic that is allowed to flow or is blocked. Traffic flow control ensures that traffic flows across only the segments in the group and the stations attached to them. Packets are switched only to the ports within a defined group. Traffic may not flow to a segment that is not attached to a port in the group.

NOTE

A custom filter will override this rule.

For security and access control, the switch checks that both the source port and the destination port are members of the same virtual LAN group.

Configuring Virtual Networks

Each MultiSwitch 300 device on the network maintains two virtual LAN tables—
SVLAN and VBD. SVLANs and VBDs have similar configuration table windows.
The table lists the LANs and the ports connected to that particular network group. An
SVLAN/VBD Management window (Figure 4-9) allows you to view and change the
table.

NOTES

MultiSwitch 300 virtual LANs do not interoperate with virtual LANs on other
model DIGITAL switches.

Descriptions and directions that follow apply to both SVLANs and VBDs.

Figure 4-9: Security Virtual LAN Management Window
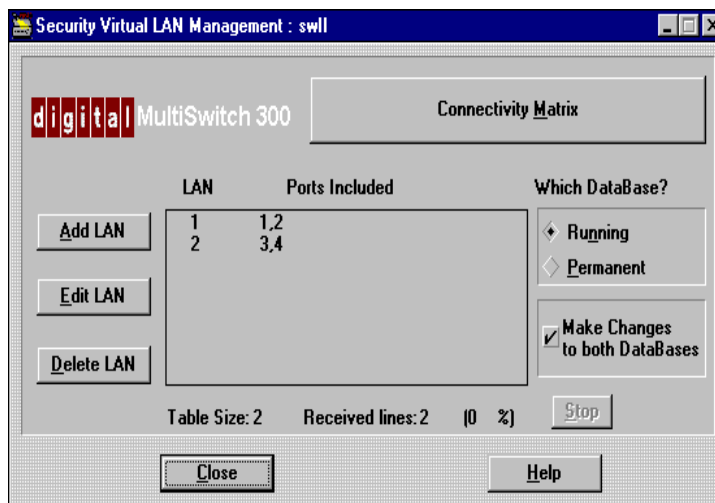
Each MultiSwitch 300 retains and updates two separate databases—a running database
and a permanent database. You determine which database to view or change by using
the following commands in the Which Database? section. Table 4-5 describes the
options in the Which Database? section of the window.

Table 4-5: Which Database? Options

Option	Description
Running	Displays the currently active database. Changes you make to this database immediately affect the operation of the switch, but changes are not saved for the next reboot.
Permanent	Displays the database stored in the initialization memory of the device. This database is loaded each time the switch reboots. Changes you make to this database do not affect the current operation, but will affect the next reboot.
Make Changes to Both Databases	Allows you to configure each database separately (uncheck the box) or configure both at the same time (check the box), if you want to see the change implemented immediately, and if you want it to be part of the permanent database.

Virtual Network Connectivity

An SVLAN/VBD connectivity matrix for each device provides you with an overall view of the logical connections of ports. The matrix depicts the information that can be changed through LAN reconfigurations and port mirroring operations. (See Port Mirroring in this chapter.)

The information in a matrix shows the connection from each source port to each destination port. If the pathway is allowed, the box is blue; otherwise, the box is light gray. Because frames cannot be bound for their originating port, the diagonals are grayed out.

Figure 4-10 shows the SVLAN Connectivity Matrix window. The connectivity matrix in Figure 4-10 corresponds to the information in Figure 4-9.

Figure 4-10: SVLAN Connectivity Matrix Window
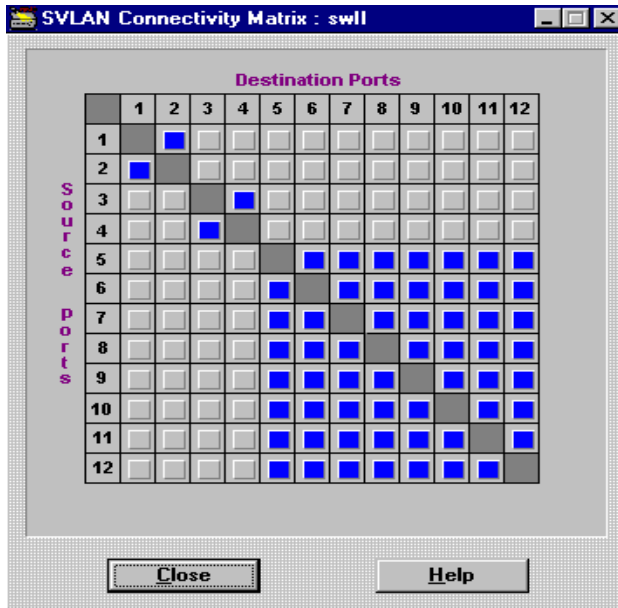
Adding and Editing Virtual Networks

When personnel, functions, and groups change, you can add new LANs or modify existing LANs. The following directions apply to SVLANs and VBDs.

To modify a LAN

1) In a LAN management window (Figure 4-11), choose a database in the Which Database? section. If you want to change both databases, check the Make Changes to Both Databases box.

Figure 4-11: Security Virtual LAN Management Window
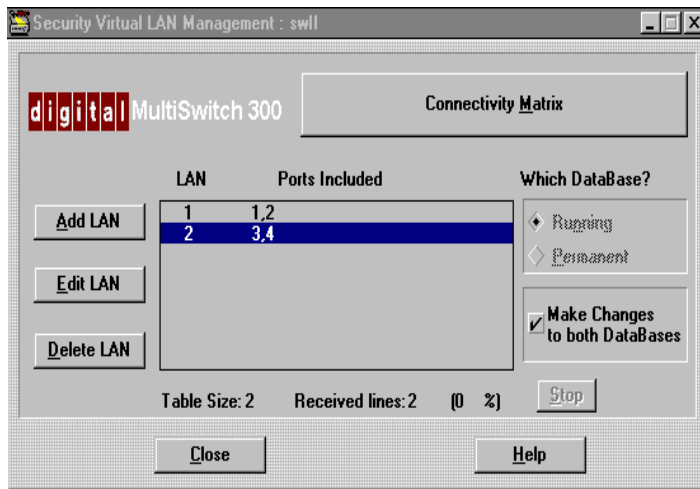
2) Select the LAN you wish to modify. Double-click a LAN in the list, or select a LAN and click on Edit LAN.

    The Edit LAN dialog box appears (Figure 4-12).

Figure 4-12: Edit LAN Dialog Box
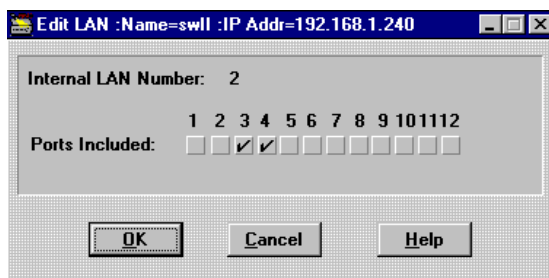
3) Make changes to the Ports Included boxes.

4) Click on OK.

To add a LAN

1) In a LAN management window, choose a database in the Which Database? section. If you want to change both databases, check the Make Changes to Both Databases box.

2) Click on Add LAN from a LAN management window.

The Add LAN dialog box appears (Figure 4-13). The Internal LAN Number section automatically displays the next sequential LAN number for the device.

Figure 4-13: Add LAN Dialog Box
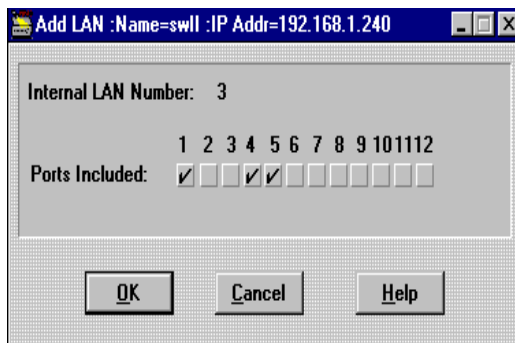
3) In the Ports Included section, check the ports you want included in the LAN.

4) Click on OK.

To delete a LAN

1) In a LAN management window, choose a database in the Which Database? section. If you want to change both databases, check the Make Changes to Both Databases box.

2) In a LAN management window, select the LAN you wish to delete.

3) Click on Delete LAN.

A Confirm dialog box appears.

4) Click on OK.

Factory Default

If, in the course of changing parameters and reconfigurations, you find network performance deteriorating, it is easy to return settings to their original factory default values. Resetting to defaults restores the original NVRAM database after a reset.

To reset factory defaults

1) Click on Factory Default in the System Information window.

A confirm dialog box appears.

Figure 4-14: Confirm Dialog Box for Restoring Defaults
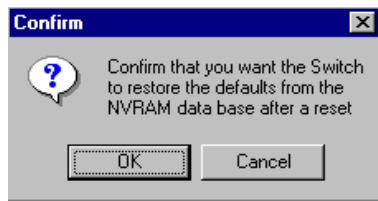
2) Click on OK to restore defaults.

3) To use these values immediately, choose Warm Reset or Cold Reset from the Control Tools menu in the device main window (see Figure 2-4).

Bridge Spanning Tree

The Bridge Spanning Tree Configuration window (Figure 4-15) contains information relevant to the Spanning Tree algorithm from the *dot 1 bridge* group. The Spanning Tree algorithm creates a single Spanning Tree from any combination of bridging elements. This tree topology compensates automatically for changes in any active path such as additions, removals, or failures of any bridge. It quickly reestablishes a stable active topology with a minimum of network disturbance and communication bandwidth. This is accomplished in a consistent and reproducible manner, which is transparent to ports receiving and transmitting data packets.

Figure 4-15: Bridge Spanning Tree Configurations Window
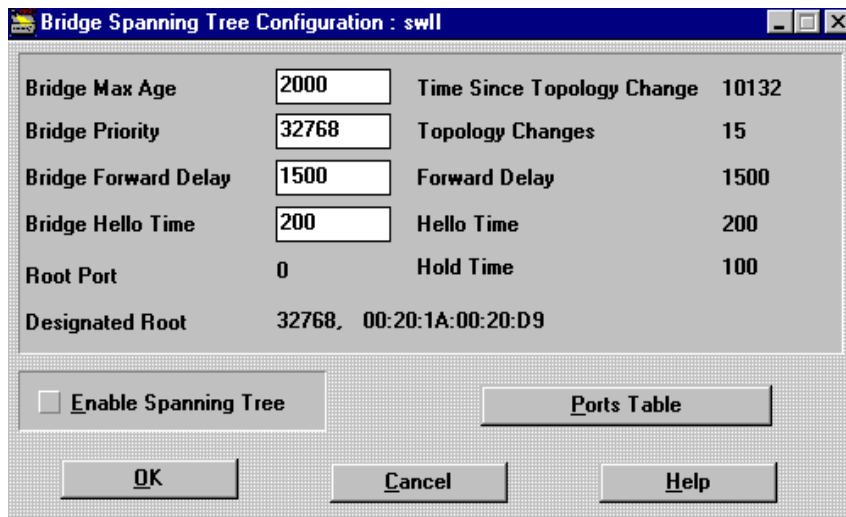
The Bridge Spanning Tree Configuration window presents the information described in Table 4-6. You can change the first four items. There are some relationships between the different parameters. Setting any of the following to a value that does not enforce these relationships will result in a different value default.

Table 4-6: Bridge Spanning Tree Configuration Window Parameters

Item	Description
Bridge Max Age	Aging time for all bridges when this bridge is acting as the root.
Bridge Priority (hexadecimal)	Writable portion of bridge ID.
Bridge Forward Delay	Length of time a port should wait before changing state when this bridge is the root.
Bridge Hello Time	Hello Time used by all bridges when this bridge is acting as the root.
Root Port	Port with the lowest cost path to the root bridge.
Destination Root	Bridge ID of designated root (in MAC address format).
Time Since Topology	Number of seconds since last configuration change.
Topology Changes	Number of configuration changes.
Forward Delay	Length of time a port should wait to change state.
Hello Time	Length of time between configuration requests when this bridge is changing root state.
Hold Time	Length of time between configuration requests by this bridge.

NOTE

All times are in hundredths of a second unless noted, and all values are in decimal unless otherwise stated.

To enable or disable Spanning Tree

1) Access the Bridge Spanning Tree Configuration window by selecting Spanning Tree from the System Information window.

2) In the Bridge Spanning Tree Configuration window, check or uncheck the Enable Spanning Tree check box.

Bridge Spanning Tree

3) Click on OK.

The System Information window appears.

4) Click on Close in the System Information window.

5) Reset the switch in the device main window (Figure 2-4) by choosing Warm Reset or Cold Reset from the Control Tools menu.

NOTES

After you enable the Spanning Tree algorithm, the switch is closed to all traffic for approximately 45 seconds to 1 minute, as it sets the port configurations. The MultiSwitch 300 Manager will then come back on line.

When Spanning Tree is disabled, you cannot change the other values. You must follow the above steps to enable Spanning Tree before editing the writable variables.

Management Statistics

The Management Statistics window (Figure 4-16) contains information about traffic to and from the system management agent. The information is divided into general information and specific per-port information. Values in both categories are dynamically updated. You access the Management Statistics window by choosing Management Statistics from the System Information window.

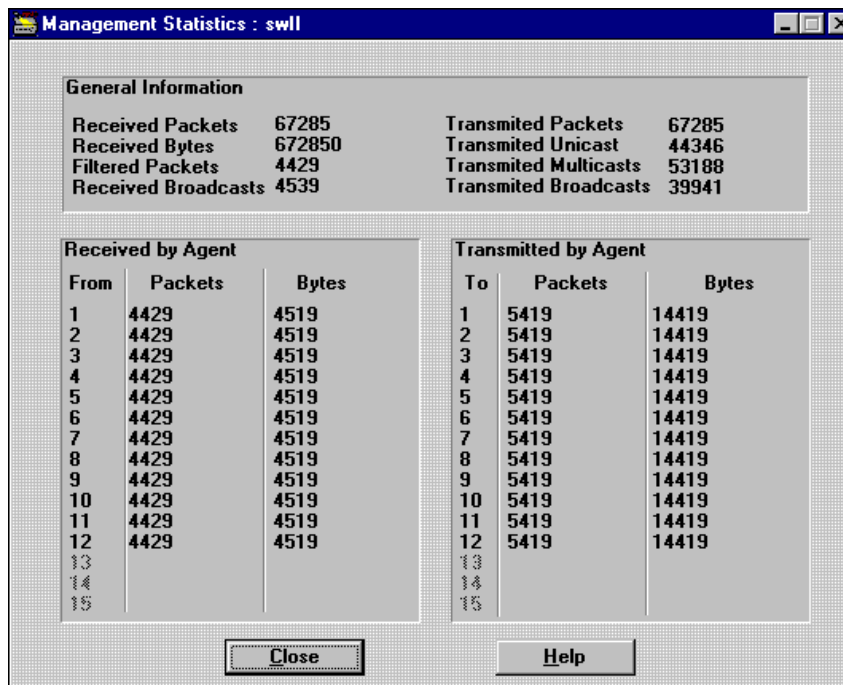**Figure 4-16: Management Statistics Window**

Table 4-7 describes the values in the General Information section of the Management Statistics window.

Table 4-7: Management Statistics Window Values

Item	Description
Received Packets	Number of packets received by the SNMP agent through the management port.

Item	Description
Received Bytes	Number of bytes received by the SNMP agent through the management port.
Filtered Packets	Number of filtered packets received by the SNMP agent through the management port.
Received Broadcasts	Number of broadcast packets received by the SNMP agent through the management port.
Transmit Packets	Number of packets transmitted by the SNMP agent through the management port. This counter indicates the number of packets generated by the management software. A certain packet will be transmitted once, to a single switch port, or multiple times, to multiple switch ports.
Transmitted Unicast	Number of unicast packets transmitted by the SNMP agent through the management port.
Transmitted Multicast	Number of multicast packets transmitted by the SNMP agent through the management port. This counter indicates the number of packets generated by the management software. A certain packet will be transmitted once to a single switch port, or multiple times to multiple switch ports.
Transmitted Broadcast	Number of broadcast packets transmitted by the SNMP agent through the management port. This counter indicates the number of packets generated by the management software. A certain packet will be transmitted once to a single switch port, or multiple times to multiple switch ports.

The per-port information section lists the number of packets and bytes transmitted by the system management agent to each port of the switch, as well as the number of packets and bytes received by the system management agent from each port.

Control Tools

The Control Tools window (Figure 4-17) provides a set of tools that allows you to execute special control functions such as:

- Resetting the device (Warm Reset and Cold Reset)

- Operating the internal ping process (Ping)

- Operating an internal traffic generator (Frame Generator)

- Operating the port mirroring capability of the switch (Port Mirroring)

- Resetting statistics (Reset Statistics)

You access the Control Tools window by selecting Control Tools from the System Information window (Figure 4-1) or the device main window (Figure 2-4).

CAUTION

These are special operations that should be activated carefully. Incorrect use of reset operations, port mirroring, or ping and traffic generators may alter the network and the switch behavior.

This window also provides you with reset and error information about the selected switch.

Figure 4-17: Control Tools Window
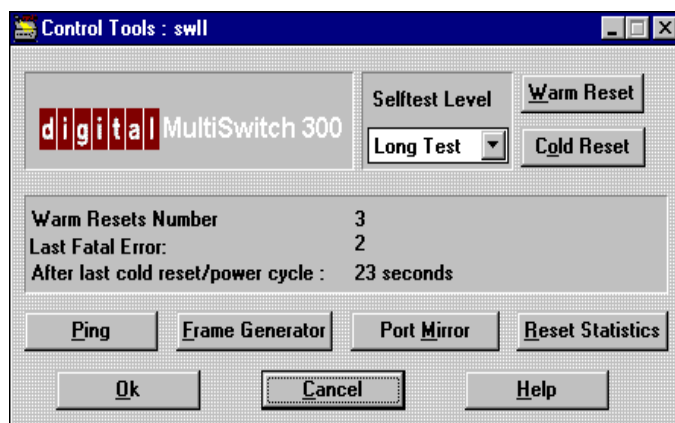
Warm Reset

A warm reset restarts the switch without executing an internal self-test or an internal software download. However, a warm reset restarts the Spanning Tree algorithm (if enabled), disconnecting the MultiSwitch 300 Manager and the device for 45 seconds to 1 minute. Connection is then reestablished and the device is again fully manageable.

To warm reset the switch

1) Click on Warm Reset from the Control Tools window.

A Confirm dialog box (Figure 4-18) asks for confirmation to continue the reset process.

Figure 4-18: Warm Reset Confirm Dialog Box
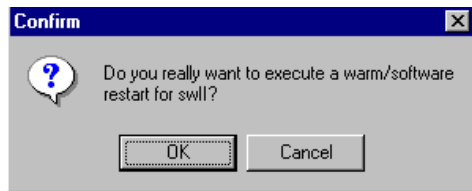
2) Click on OK if you want to continue or Cancel to cancel the reset.

Cold Reset

A cold reset restarts the switch and also executes an internal self-test and an internal software download. After the cold reset, the switch will start as if it has executed a power-on cycle. If the Spanning Tree algorithm is enabled, the connection between the MultiSwitch 300 Manager and the device will be lost for 45 seconds to 1 minute. Connection is then reestablished and the device will again be fully manageable.

To cold reset the system

1) Click on Cold Reset from the Control Tools window.

A Confirm dialog box (Figure 4-19) asks for confirmation to continue the reset process.

Figure 4-19: Cold Reset Confirm Dialog Box

2) Click on OK if you want to continue or Cancel to cancel the reset.

Ping

The Ping window allows you to initiate a ping process from the switch to an IP host in the network. This is a useful feature that lets you easily test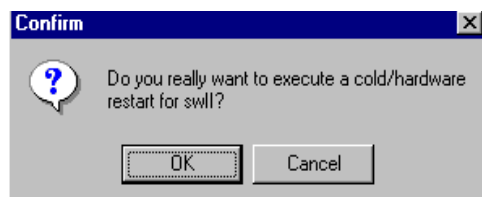 the IP level connectivity to an IP host. The Ping window also contains information about the configuration and control of the ping process.

You access the Ping window from the Control Tools window (Figure 4-17). To start the ping process, click on the Start button. When the ping process is running, the Start button becomes a Stop button, which you click to stop the ping process.

Figure 4-20: Ping Window
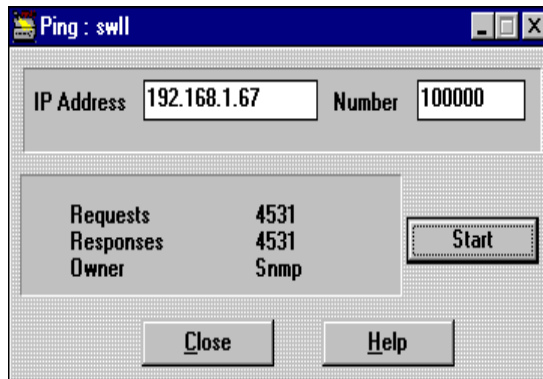
Table 4-8 describes the parameters in the Ping window.

Table 4-8: Ping Window Parameters

.

Parameter	Description
IP Address	IP address of the IP host addressed by the ping process. If ping is inactive, you can fill in this field with the IP address of the target IP host. The default value for this field after any device reset cycle is the loopback IP address 127.0.0.1. The switch preserves the IP address between different activations of the ping.
	Note: This field cannot be changed while the ping process is running.

Number	Number of ICMP requests you want generated whenever the ping process is started. The default value for this field after any device reset cycle is 1. Entering a 0 indicates an endless ping process.
	<u>Note:</u> This field cannot be changed while the ping process is running.
Requests	Number of ICMP requests generated by the switch's ping process. This is a monitoring field only.
Responses	Number of ICMP responses received during the ping process. This is a monitoring field only.
Owner	Indicates whether the ping process was started from the MultiSwitch 300 Manager or from the administrative interface. This is a monitoring field only. After a reset cycle, this field is undefined. The other values are SNMP (meaning the MultiSwitch 300 Manager) or Admin (meaning the administrative interface).
Start/Stop	Starts or stops the ping process.

Frame Generator

The Frame Generator window (Figure 4-21) allows you to initiate a traffic generation process that originates at the switch. This is a useful network testing feature that offers you an easy way to generate traffic on one or more selected segments. After you set the Ethernet packet parameters, as well as the rate and the number of packets to be sent, the frame generator continuously sends one Ethernet frame at the packet rate specified.

This window also contains monitoring information about the configuration and control of the process.

You access the Frame Generator window from the Control Tools window (Figure 4-17). To start the frame generation process, click on the Start button. When the frame generation process is running, the Start button becomes a Stop button, which you click to stop the process.
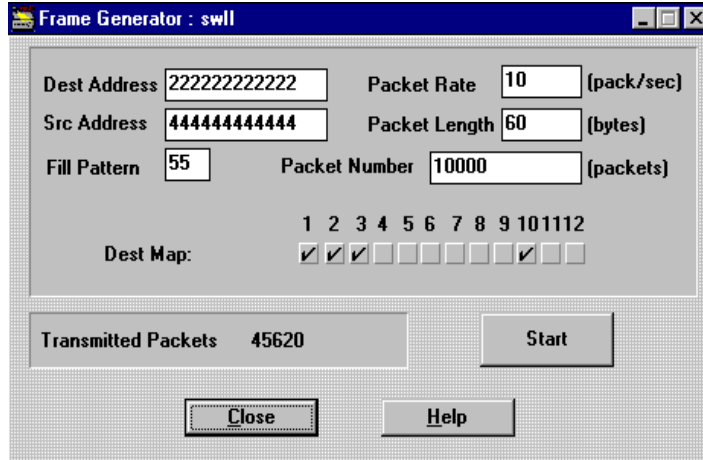
Figure 4-21: Frame Generator Window

Table 4-9 describes the parameter in the Frame Generator window.

Table 4-9: Frame Generator Window Parameters

Parameter	Description
Dest Address	Destination MAC address of the Ethernet packet to be sent. Twelve hexadecimal digits are required to configure a MAC address. The default value after a reset cycle is 000000000000, the null address
Src Address	Source MAC address of the Ethernet packet to be sent. Twelve hexadecimal digits are required to configure a MAC address. The default value after a reset cycle is 000000000000, the null address.
Fill Pattern	Value of the byte used as data in the Ethernet frame to be sent. The default value after a reset cycle is 0.
Packet Rate	Rate at which the Ethernet frame is sent. The real rate will approximate the required value. The maximum rate depends on the frame size. For 64-byte frames, the maximum rate is approximately 3500 packets/s. The default value after a reset cycle is 1 packets/s.
Packet Size	Size in bytes of the Ethernet frame to be sent, excluding CRC. The default value after a reset cycle is 60 bytes.
Dest Map	List of ports to which the Ethernet packet will be sent. To select a port, click on the appropriate check box.
Start/Stop	Starts or stops the frame generator process.
Transmitted Packets	Number of packets generated by the frame generator process. This is a monitoring field only.

NOTE

Configuration fields are not accessible during the frame generator process.

Port Mirroring

One of the most difficult tasks in a switched environment is monitoring traffic on the multiple interconnected segments. With the MultiSwitch 300 Manager, you can set up a port mirroring session, which allows you to see the traffic on any switched port or another port that contains a monitoring device, such as an RMON probe or a LAN analyzer. Port mirroring is a simple concept—it takes all traffic that is bound for a particular port and also directs it to another port on the switch. Without interrupting any other network traffic, you can attach a monitoring device to a particular port and watch the traffic bound for a different segment.

To set up a port mirroring session

1) Click on Port Mirror in the Control Tools window.

The Port Mirror window appears (Figure 4-22).

Figure 4-22: Port Mirror Window
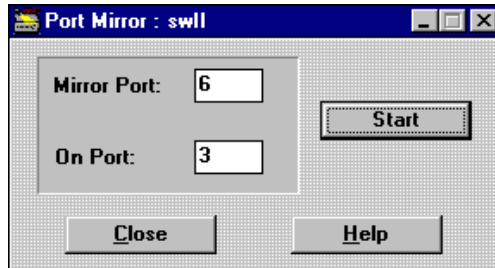
2) In the Mirror Port field, enter the number of the port whose traffic you want to mirror.

3) In the On Port field, enter the number of the port to which the traffic will be mirrored.

4) Click on Start.

The switch is informed and begins mirroring immediately. The Start button changes to a Stop button. Mirroring continues regardless of whether or not a Port Mirror window is open.

To turn off port mirroring

To turn off port mirroring, click on Stop. You can now initiate another session with different parameters.

CAUTION

Do not use the port containing the monitoring device for regular connectivity purposes. The amount of traffic that is redirected from the mirrored ports may impact the connectivity of the hosts residing on it.

Chapter 5

MultiSwitch 300 Port Management

The DIGITAL MultiSwitch 300 Manager incorporates a comprehensive set of port monitoring and control tools that ensure smooth operation of the network. These tools assist you in ongoing fault management, where you can make modifications before it is too late, avoiding noticeable network downtime. Port management has been designed to help you monitor and verify the function of interconnecting switches as well as end-to-end flows. Because performance and traffic is monitored over time, you can see what changed and what it looked like before.

To facilitate monitoring, control, and analysis, flexible viewing options are a key element in the MultiSwitch 300 Manager's port management tools. You can dynamically view information for one specific port or multiple ports, or for a specific counter category or multiple categories in a variety of formats: in table statistics or in graphical form as a speedometer or line graph.

This chapter describes the tools available for configuring and monitoring the ports in your network. It includes:

- Selecting a port

- Viewing and changing port configurations

- Monitoring port performance

- Monitoring Ethernet, Port Spanning Tree, and RMON statistics

Selecting a Port

The MultiSwitch 300 Manager maintains individual data for each port on a device. After selecting a device and a port, you can modify configurations and monitor traffic on any port.

To select a device and a port

1) In the MultiSwitch 300 Manager main window, double-click on the icon of the device you wish to view.

The front panel of the switch displays (Figure 5-1). See About the Device Main Window in Chapter 2 for a detailed description of this front panel.

Figure 5-1: Device Main Window
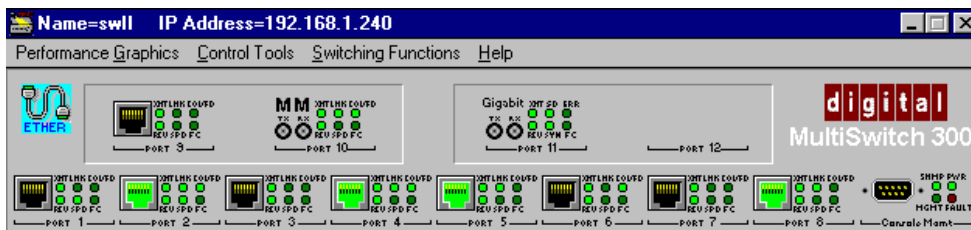
2) Click on the port you wish to monitor or configure.

The Port Information window for the selected port appears (Figure 5-2).

Figure 5-2: Port Information Window

Port Information

The Port Information window (Figure 5-2) presents information relating to packets received and transmitted by a port. The window also provides controls for accessing other port statistics. Table 5-1 describes the parameters listed in the Port Information window.

Table 5-1: Port Information Window Parameters
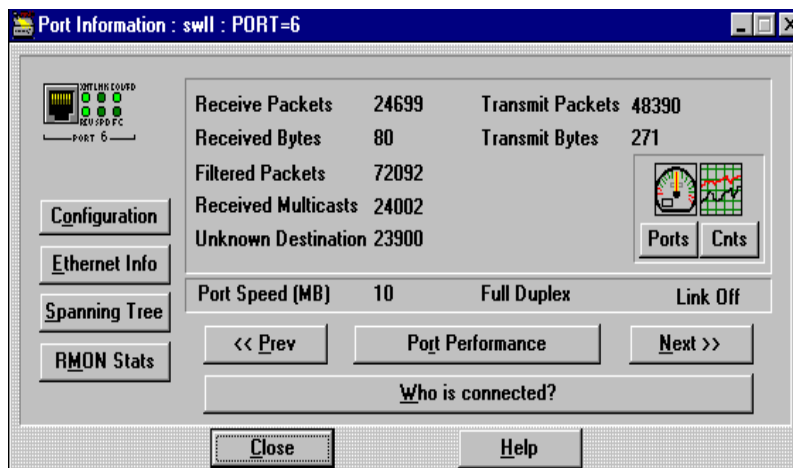
Parameter	Description
Receive Packets	Number of frames received by this port.
Received Bytes	Number of bytes received by this port.
Filtered Packets	Number of valid frames received by this port which were filtered by the forwarding process.
Received Multicasts	Number of multicast frames received by the switching entity on this port.
Unknown Destination	Number of packets received by the switching entity on this port with an unknown destination port. As a result these packets were forwarded to all the other ports causing flooding.
Transmit Packets	Number of frames transmitted by this port.
Transmit Bytes	Number of bytes transmitted by this port.

From the Port Information window, you can open and monitor port information for any port, access additional information about the currently selected port, or choose to view data in other configurations. Table 5-2 describes the function of each button in the Port Information window.

Table 5-2: Port Information Window Buttons

Button	Description
Prev	Displays the Port Information window for the previous port.
Next	Displays the Port Information window for the next port.
Configuration	Displays the Port Configuration window.

Selecting a Port

| Button	Description
Ethernet Info	Displays the Ethernet Information window.
Spanning Tree	Displays the Port Spanning Tree Parameters window.
RMON Stats	Displays the RMON Statistics window.
Port Performance	Displays the Port Performance window.
Ports	Displays the Port Information Graphs (Ports) window.
Cnts	Displays the Port Information Graphs (Counters) window.

Opening Port Graphics Windows

You can view more specific traffic information for all ports on a switch through the display option buttons in the Port Graphics section of the Port Information window. Port statistics are dynamically presented either on a per-port or per-counter basis. These windows also contain controls for displaying data graphically as a line graph or speedometer.

To view a device's port statistics on a per-port basis

1) In the Ports Graphics section of the System Information window, click on Ports.

   The Port Graphs window appears (Figure 5-3), displaying the traffic of a port on the device.

Figure 5-3: Port Graphs Window
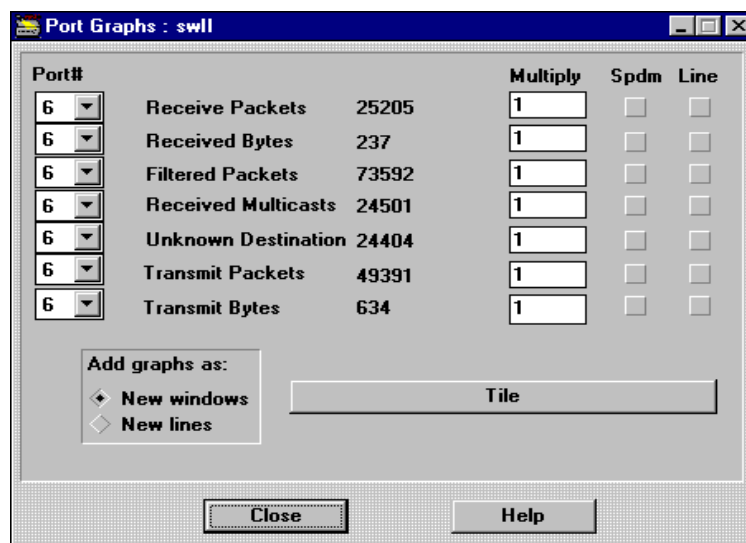
2) To select another port, use the pull-down menus next to each port number.

3) You can graphically display counter contents as either a speedometer or a line graph. See Using Graphic Support in Chapter 2.

To view a device's port statistics on a per counter basis

1) In the Ports Graphics section of the System Information window, click on Cnts.

   The Counters Graphs window appears (Figure 5-4), displaying the traffic of a port on the device.

Figure 5-4: Counter Graphs Window

2) To select another counter category, use the pull-down menu above the ports.

3) You can graphically display counter contents as either a speedometer or a line graph. See Using Graphic Support in Chapter 2.

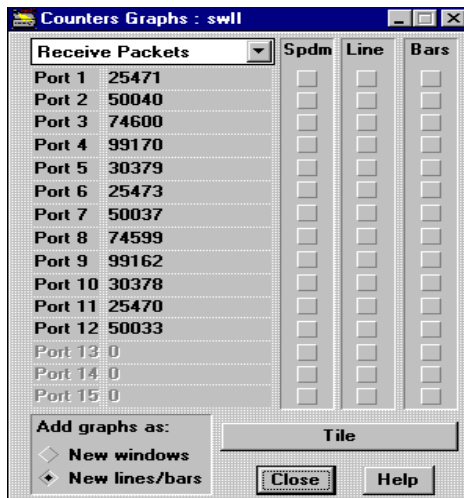# MultiSwitch 300 Port Image LEDs

In the Port Information window (Figure 5-2) and the device main window (Figure 5-1), LEDs on the MultiSwitch 300 port image are continuously updated and provide you with current port activity status for the window you are currently viewing. Figure 5-5 depicts the port image for a port on the MultiSwitch 300, a 100 Mb/s Fast Ethernet switch. For descriptions of other port images and their respective LEDs, see Appendix A.

Figure 5-5: Port Image

Viewing and Changing Port Configuration

The Port Configuration window (Figure 5-6) displays information about the current configuration status of the port and transceiver, which can be reset. You access the Port Configuration window by clicking the Configuration button in the Port Information window (Figure 5-2).

Figure 5-6: Port Configuration Window
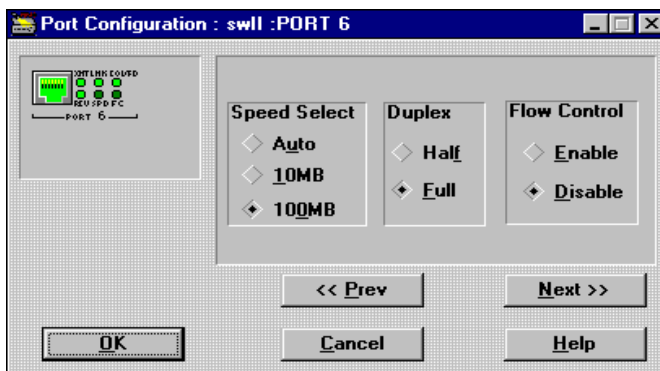
Table 5-3 lists the Port Configuration window parameters.

Table 5-3: Port Configuration Window Parameters

Parameter	Description	
Speed Select	Displays the line speed selected for the port.	
	You can change the following options:	
	Auto	Allows the switch to automatically determine use of 10 Mb/s or 100 Mb/s.
	10MB	Sets the port speed to 10 Mb/s.
	100MB	Sets the port speed to 100 Mb/s.

Parameter	Description	
Duplex	Displays the state of the port's duplex mode:	
	Note: Duplex is not adjustable in auto-select mode.	
	Full	Port is in full duplex mode.
	Half	Port is in half duplex mode.
Flow Control	Displays the state of the port's flow control mechanism:	
	Enable	Enables flow control on the port.
	Disable	Disables flow control onthe port.

To change port configurations

1) Open the Port Information window by clicking on a port in the device main window.

2) Click on the Configuration button.

The Port Configuration window (Figure 5-6) displays, showing the current configuration status.

3) Make required modifications for Speed Select, Duplex, or Flow Control.

4) Click on OK to accept the changes and send a configuration message to the switch or click on Cancel to abandon any changes and close the window.

Monitoring Port Performance

The Port Performance window (Figure 5-7) displays a table of the cumulative or averaged traffic that has passed between the ports on a switch. You can monitor the number of bytes and the number of frames transmitted to the selected port from the listed ports. Included is the number of frames/bytes that have come in through the selected port. The INTERPORT COMMUNICATIONS histogram displays the information as a bar graph.

You can also view statistics on a per-port or per-counter basis as well as a graphic by choosing Ports or Cnts. You access the Port Performance window by clicking the Port Performance button on the Port Information window (Figure 5-2). For additional information on these alternative monitoring views, see Opening Ports Graphics Windows in Chapter 4, and Using Graphic Support in Chapter 2.

Figure 5-7: Port Performance Window
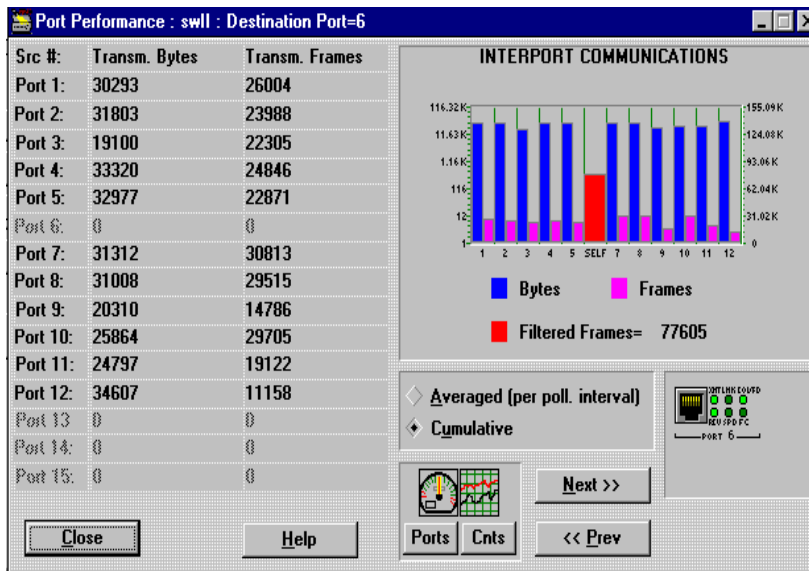
Monitoring Ethernet Performance

You monitor data relating to collisions, errors, lost and rejected packets, and flow controls through the Ethernet Information window (Figure 5-8). To access the Ethernet Information window, click the Ethernet Info button in the Port Information window (Figure 5-2). Information is presented as counters and a collision histogram. You can also view statistics on a per-port or per-counter basis as well as a graphic by choosing Ports or Cnts. For additional information on these alternative monitoring views, see Opening Ports Graphics Windows in Chapter 4, and Using Graphic Support in Chapter 2.

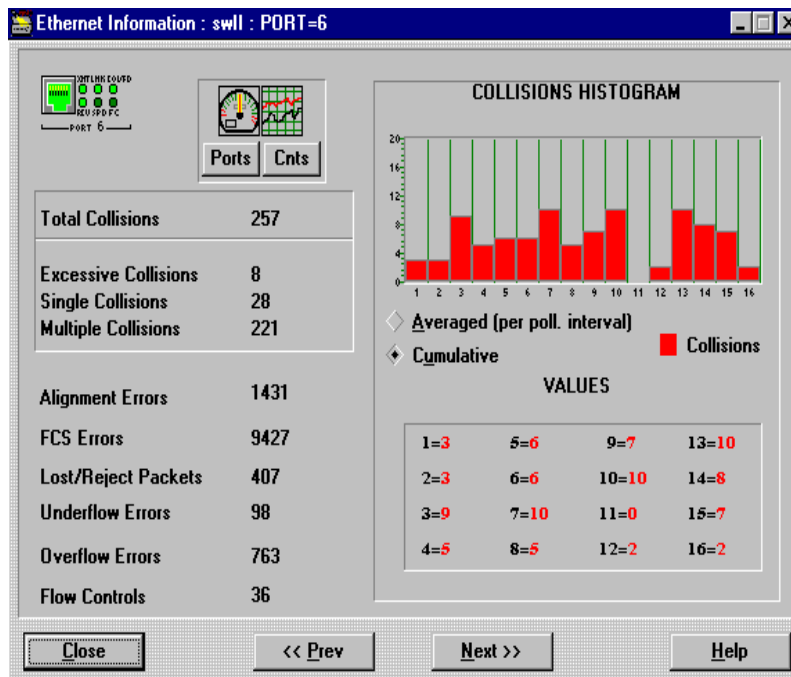**Figure 5-8: Ethernet Information Window**

Table 5-4 describes the parameters displayed in the Ethernet Information window.

Table 5-4: Ethernet Information Window Parameters

Parameter	Description
Excessive Collisions	Number of frames that failed to transmit on the port due to excessive collisions.
Single Collisions	Number of frames successfully transmitted on the port that encountered exactly one collision.
Multiple Collisions	Number of successfully transmitted frames on the port that encountered more than one collision.
Total Collisions	Sum of Excessive Collisions, Single Collisions, and Multiple Collisions.
Alignment Errors	Number of frames received on the port that are not an integral number of octets in length and do not pass the FCS check.
FCS Errors	Number of frames received on the port that are an integral number of octets in length, but do not pass the FCS check.
Lost/Reject Packets	Number of times the flow control mechanism was activated unsuccessfully 15 times. The number is correct if the flow control mechanism is enabled.
Underflow Errors	Number of frames for which transmission on the port fails due to an internal MAC sublayer transmit error.
Overflow Errors	Count of frames for which reception on the port fails due to an internal MAC sublayer receive error.
Lost/Flow Controls	Number of times the flow control mechanism was activated on the specified input port, due to a full buffer on the output port, if the flow control mechanism is enabled. If not, it represents the number of packets lost due to buffer overflow.

Interpreting the Collisions Histogram

The COLLISIONS HISTOGRAM section on the Ethernet Information window (Figure 5-8) shows a histogram and a values table of the cumulative (since last reset) collision counters. Sixteen counters show the number of frames with a given number of collisions.

The X axis of the histogram represents the number of collisions. Each of the 16 bars represents the number of collisions. The Y axis shows the number of frames with a given number of collisions. For example, the following information indicates that one frame passed after one collision, and five frames passed after three collisions:

.

1 = 1	5 = 0	9 = 0	13 = 0
2 = 0	6 = 0	10 = 0	14 = 0
3 = 5	7 = 0	11 = 0	15 = 0
4 = 0	8 = 0	9 = 0	16 = 0

You can view the histogram in two modes:

- Cumulative (default)

- Averaged values (changes of counter value per polling interval)

Monitoring the Port Spanning Tree

The Port Spanning Tree window (Figure 5-9) contains information relevant to the Spanning Tree algorithm from the *dot 1 bridge stp* table group. There are some relationships between the different parameters. Setting any of the following to a value that does not enforce these relationships will result in a different value default (see *ISO/IEC 10038 ANSI/IEEE Standard 802.1d*).

You access the Port Spanning Tree window by clicking the Spanning Tree button on the Port Information window (Figure 5-2).
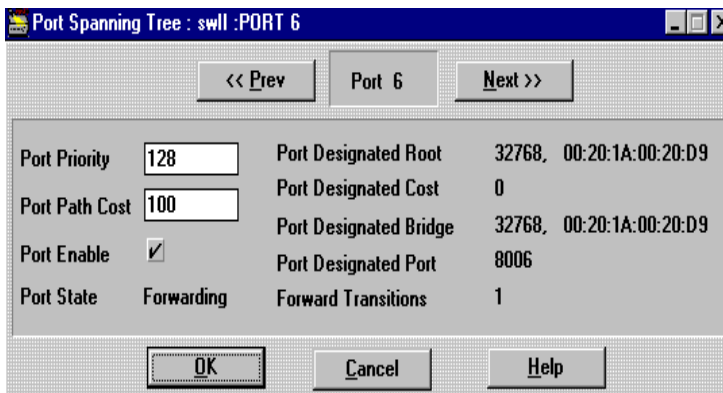
Figure 5-9: Port Spanning Tree Window

Table 5-5 describes the parameters shown on the Port Spanning Tree window.

Table 5-5: Port Spanning Tree Window Parameters

Parameter	Description
Port Priority (hexadecimal)	Value of the priority field which is contained in the first (in network byte order) octet of the (2 octet long) port ID. The other octet of the port ID is given by the value of port number.
Port Path Cost	Contribution of this port to the path cost of paths towards the Spanning Tree root which include this port.
Port Enable	Enabled/disabled status of the port.

Parameter	Description
Port State	Port's current state as defined by application of the Spanning Tree Protocol. This state controls what action a port takes on reception of a frame. If the bridge detects a port that is malfunctioning, it places that port into the broken (6) state. For disabled ports (see Port Enable), this object has a value of disabled(1).
Designated Root	Unique bridge identifier of the bridge recorded as the root in the configuration BPDUs transmitted by the designated bridge for the segment to which the port is attached.
Port Designated Cost	Path cost of the designated port of the segment connected to this port. This value is compared to the Root Path Cost field in received bridge PDUs.
Port Designated Bridge	Bridge identifier of the bridge which this port considers to be the designated bridge for this port's segment.
Port Designated Port	Port identifier of the port on the designated bridge for this port's segment.
Forwarding Transitions	Number of times this port has transitioned from the Learning state to the Forwarding state.

Monitoring RMON Statistics

RMON counts the cumulative line statistics for each Ethernet interface monitored by the MultiSwitch 300 Manager. The statistics are incremented for each occurrence of a particular packet-related event such as error conditions and size ranges. The RMON Statistics window (Figure 5-10) displays a table of the RMON statistics gathered by the switch for the current port.

You can view statistics on a per-port or per-counter basis as well as a graphic by choosing Ports or Cnts. To access the RMON Statistics window, click on the RMON Stats button in the Port Information window (Figure 5-2). For additional information about using the Ports and Cnts graphics, see Opening Ports Graphics Windows in Chapter 4, and Using Graphic Support in Chapter 2.
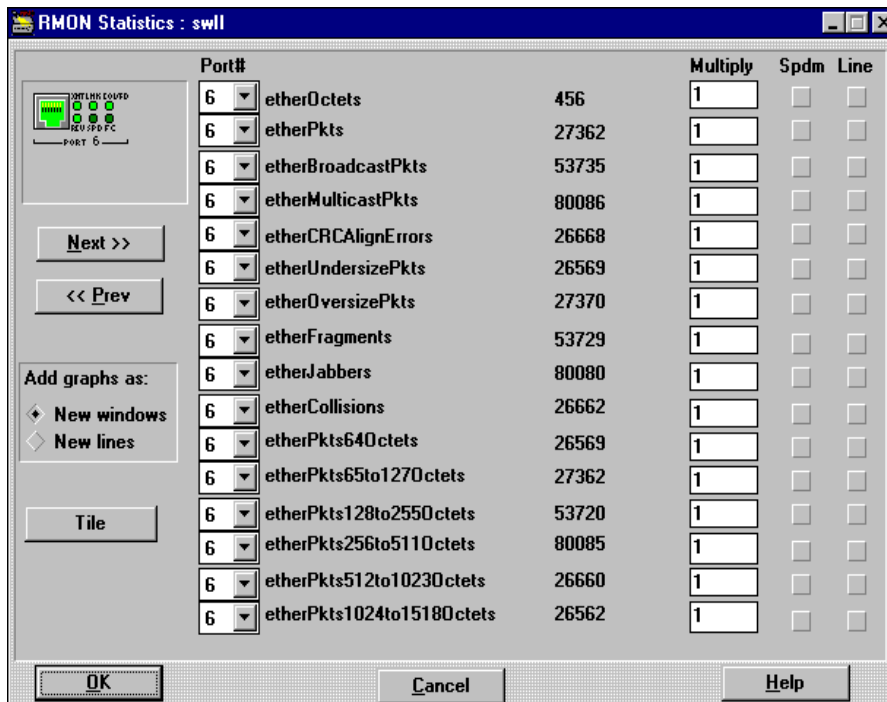
Figure 5-10: RMON Statistics Window

Table 5-6 describes the parameters shown in the RMON Statistics window.

Table 5-6: RMON Statistics Window Parameters

Parameter	Description
Ether Stats Octets	Total number of octets of data (including those in bad packets) received on the network (excluding framing bits, but including FCS octets).
Ether Stats Puts	Total number of packets (including error packets) received.
Ether Stats Broadcast Pkts	Total number of good packets received that were directed to the broadcast address.
Ether Stats Multicast Pkts	Total number of good packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.
Ether Stats CRC Align Errors	Total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but were not an integral number of octets in length or had a bad Frame Check Sequence (FCS).
Ether Stats Undersize Pkts	Total number of packets received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.
Ether Stats Oversize Pkts	Total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.
Ether Stats Fragments	Total number of packets received that were not an integral number of octets in length or that had a bad Frame Check Sequence (FCS), and were less than 64 octets in length (excluding framing bits but including FCS octets).
Ether Stats Jabbers	Total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and were not an integral number of octets in length or had a bad Frame Check Sequence (FCS).

Parameter	Description
Ether Stats Collisions	Best estimate of the total number of collisions on this Ethernet segment.
Ether Stats Pkts 64 Octets	Total number of packets (including error packets) received that were 64 octets in length (excluding framing bits, but including FCS octets).
Ether Stats Pkts 65-127 Octets	Total number of packets (including error packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits, but including FCS octets).
Ether Stats Pkts1 28-255 Octets	Total number of packets (including error packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits, but including FCS octets).
Ether Stats Pkts 256-511 Octets	Total number of packets (including error packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits, but including FCS octets).
Ether Stats Pkts 512-1023 Octets	Total number of packets (including error packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits, but including FCS octets).
Ether Stats Pkts 1024-1518 Octets	Total number of packets (including error packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits, but including FCS octets).

Appendix A

MultiSwitch 300 Port Image LEDs

Table A-1 describes the LEDs and what they indicate. All supported LEDs that are white indicate no information from the agent (no communication) since the DIGITAL MultiSwitch 300 Manager started.

Table A-1: Port Image LED States

LED	Color	State	Description
Link	Light green	On	Link is on.
Link	Dark green	Off	Link is off.
FC/FD	Gray	Off	Half-duplex (according to agent response).
FC/FD	Yellow	On	Full-duplex (according to agent response).
CLSN	Red	On	The total collisions number changed during the polling interval.
CLSN	Brown	Off	The total collisions number did not change during the polling interval.
ACT (RCV & XMT)	Light green	On	The counters changed during the polling interval.
ACT (RCV & XMT)	Dark green	Off	The counters did not change during the polling interval.
SPD	Light green	On	Port speed is 100 Mb/s.
SPD	Dark green	Off	Port speed is 10 Mb/s.

LED	Color	State	Description
COL/FD	Light green	On	Full-duplex mode (according to agent response).
COL/FD	Dark green	Off	Half-duplex mode (according to agent response).

Fast Ethernet Ports

Fast Ethernet ports have six status LEDs as illustrated in the following 100 BaseTX and 100 BaseFX example:
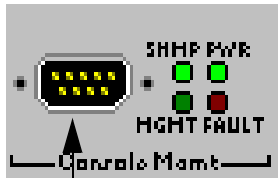
100BaseFX Ports
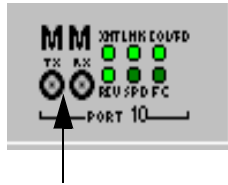
Fiber optics - 100 Mb/s
(ST connector)

Standard Ethernet Ports

Standard Ethernet ports have four status LEDs as illustrated in the following 10BaseT and 10Base5 example:
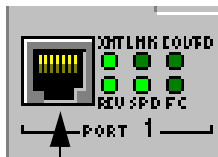
Administrative Interface

SLIP - serial
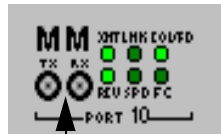(DB9 connector)

MultiSwitch 300 Ethernet Ports

MultiSwitch 300s have six status LEDs as illustrated in the following examples:

100BaseTX

Twisted pair - 100 Mb/s
(RJ45 connector)

100BaseFX Ports

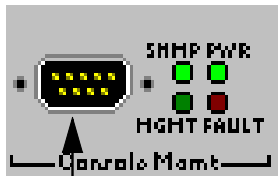Fiber optics - 100 Mb/s
(ST connector)

Gigabit Ports

Fiber optics - (ST connector)

MultiSwitch 300 Ethernet Ports

Administrative Interface

SLIP - serial
(DB9 connector)