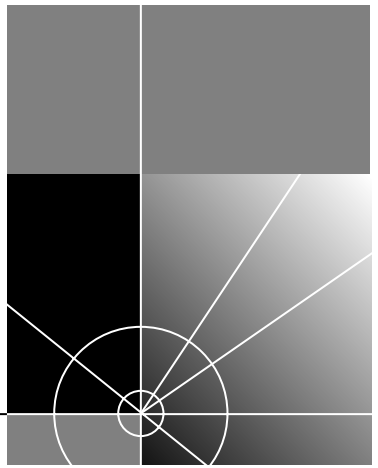
SuperStack II™ Switch 2000 TR User Guide

Version 4.0



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About This Guide

Introduction

This guide provides the information you need to install and configure the SuperStack II™ Switch 2000 TR (3C510600) into your Token Ring network for maximum benefit.

This guide is intended for use by network administrators responsible for installing and setting up networking equipment. It assumes a basic working knowledge of Local Area Networks and Token Ring in particular.

NOTE: *If the information in the release notes shipped with the Switch 2000 TR differs from the information in this guide, follow the release notes.*

How to Use This Guide

This table lists where specific information can be found.

Chapter	Information
1	Overview
2	Getting Started
3	Setting Up Management
4	Configuring with the VT100 Interface
5	Configuring with the LCD Console
6	Monitoring the Switch 2000 TR
7	Virtual LANs
Appendix	
A	Software Upgrade Utility
B	Screen Access Rights
C	Serial Port Cable Pin-outs
D	Troubleshooting
E	Technical Specifications
F	Technical Support

Conventions

The following tables list icon and text conventions that are used throughout this guide.

Table 1 Notice Icons

Icon	Type	Description
	Information Note	Information notes call attention to important features or instructions.
	Caution	Cautions contain directions that you must follow to avoid immediate system damage or loss of data.
	Warning	Warnings contain directions that you must follow for your personal safety. Follow all instructions carefully.

Table 2 Text Conventions

Convention	Description
Italics	Italics are used for emphasis or to denote new terms.
"Enter" vs. "Press"	The word "enter" means to type something and then press the Return or Enter key. Do not press the Return or Enter key when an instruction simply says "press."
Text represented as `screen display`	`This typeface` is used to represent displays that appear on your terminal screen; for example: `Select a menu option`
Keys	When specific keys are referred to in the text, they are called out by their labels, such as the "Return key" or the "Escape key," or they may be shown as [Return] or [Esc]. If two or more keys are to be pressed simultaneously, the keys are linked with a plus sign (+); for example: Press [Ctrl]+[Alt]+[Del].

Related Publications

Within the Switch 2000 TR document set:

- Switch 2000 TR Quick Reference Guide. (Part Number #99033)
- Switch 2000 TR User Guide. (Part Number #99032)
- Switch 2000 TR Release Notes. (Part Number #99034)
- SuperStack II Switch 2000 TR ATM OC-3 Module User Guide (Part Number #99041)
- SuperStack II Switch 2000 TR FDDI Module User Guide (Part Number #99048)
- SuperStack II Switch 2000 TR TR-in-FE Module User Guide (Part Number #99045)

1 OVERVIEW

This chapter describes the major features, components, and concepts of the Switch 2000 TR, including:

- About the SuperStack™ II Switch 2000 TR
- Summary of Features
- Typical Applications of Token Ring Switching
- The Front Panel
- The Rear Panel
- Optional Slide-In Modules
- Token Ring Switching Concepts

About the SuperStack™ II Switch 2000 TR

The SuperStack II Switch 2000 TR is a multiport internetworking switch for Token Ring networks. Designed to satisfy the high demand for bandwidth in expanding Token Ring networks while preserving the investment in existing equipment, the Switch 2000 TR provides a natural migration path for network growth and high-speed technologies, including ATM and FDDI.

The Switch 2000 TR is a 12-port Token Ring stackable switch that supports throughput rates of more than 400,000 packets per second. Designed to fit comfortably within the data center or the workgroup environments, the Switch 2000 TR supports up to 72 rings per stack at 4 or 16 Mbps.

System Benefits

- **Network segmentation**—When used in place of low- performance PC bridges or routers, the Switch 2000 TR provides a simple method for segmenting Token Ring networks into smaller, more manageable workgroups.
- **Increased bandwidth**—A key benefit of segmentation is reduced traffic load, which translates into increased bandwidth and improved manageability.

- **Port population**—High density port population relieves traffic congestion and supports 4 and 16 Mbps data rates. In addition, the Switch 2000 TR has four custom-configurable ports designed for direct workstation or dedicated server connection.
- **Network management**—Switch 2000 TR is supported by the Transcend® Enterprise Manager applications for UNIX and Microsoft Windows 95®. Both network management applications provide Simple Network Management Protocol Remote Monitoring Management Information Base (SNMP RMON MIB) data using an intuitive graphical interface to report historical and performance statistics.

System Features

- **Congestion Control—**The Congestion Control feature optimizes available buffer space in the Switch 2000 TR by using the buffering ability in all Token Ring end stations. This is especially useful when many ports are transmitting to a common port such as a server connection. Having congestion control eliminates the chances of dropped packets in high-traffic client-server environments.
- **Slide-in Option Slot**—Optional downlink modules are available for the Switch 2000 TR. These modules provide downlinks to high-speed backbones such as FDDI, ATM, and Fast Ethernet.
  - The FDDI module supplies a 100 Mbps point of aggregation for multiple Token Ring switched segments and supports either Single Attached Stations (SAS) or Dual Attached Stations (DAS).
  - The ATM module supplies 155 Mbps UNI interface, and retains all virtual LAN emulation configuration data, provides ATM signaling, and offers standard LAN emulation.
  - The TR-in-FE module combines Token Ring and Ethernet for the purpose of utilizing Fast Ethernet as a backbone and method of server attachment for Token Ring networks. Through a process known as ***tunneling*** or ***encapsulation***, TR-in-FE uses Fast Ethernet to transport natively formatted Token Ring frames.
- **High-speed Cascade Interface**—The high-speed cascade interface enables multiple Switch 2000 TRs to connect to form a single, large switched domain while reducing the cost typically incurred with FDDI or ATM functionality. This connection allows as many as six Switch 2000 TRs to be stacked.
- **VLAN Support**—The Switch 2000 TR supports virtual LAN (VLAN) operation by allowing any switch port to become a member of any one of 15 unique VLANs (workgroups). By establishing VLANs, LAN administration tasks such as adds, moves, and changes become easier while bulk downloads and configurations remain across workgroups. VLANs also enhance security and increase network efficiency by controlling traffic flow and containing broadcasts. VLANs are preserved over the High Speed Cascade Interface. In addition, industry-standard LAN emulation over ATM provides a method for creating enterprise-wide virtual LANs that reflect how networks actually function.

- **Roving Analysis**—The Roving Analysis Port (RAP) feature allows you to configure the SuperStack II Switch 2000 TR to capture and monitor traffic on any Token Ring LAN connected to the switch using any industry-standard LAN analyzer.

  This feature operates on Port 1 of the Switch 2000 TR and applies to all ports of the same switch. To view traffic on other switches in a stack you must connect to Port 1 of the appropriate switch and select the port you wish to view.

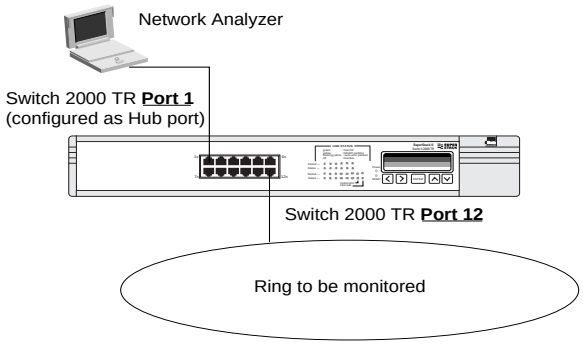

Figure 1-1 Roving Analysis

Summary of Features

- 12 switched shielded RJ-45 Token Ring ports
- 4 ports selectable for direct end station attachment
- High-speed cascade interface
- Front Panel LCD Console for fast configuration
- Flexible Option Slot for FDDI, ATM, or TR-in-FE expansion
- 400,000 packet-per-second aggregate forwarding rate
- Cut-Thru, Store-and-Forward, or Dynamic Cut-thru modes
  - Low latency in cut-through mode
  - No forwarded errors propagated in store-and-forward mode
  - Dynamic Cut-thru monitors error rates and selects Cut-thru or Store and Forward as appropriate
- Source route, transparent, and SRT bridging modes supported
- IBM and 802.1d Spanning Tree protocols supported with configurable BPDU addresses for additional flexibility
- Congestion Control
- SNMP network management support
  - Transcend® Enterprise Manager for HP OpenView, NetView/6000, SunNet Manager, Microsoft® Windows 95
- SmartAgent support

- SNMP over IP
- SNMP MIB II
- Bridge MIB
- SR Bridge MIB
- BOOTP
- Switch 2000 TR Private (3Com Private)

- Part of SuperStack™ II architecture
  - Redundant Power System
  - Uninterruptable Power Supply
  - Integrated network management
  - One RS-232 DB-9 connector for local configuration

Typical Applications of Token Ring Switching

Token Ring switches are best suited for, although not limited to, expanding Token Ring networks. These networks demand high bandwidth, performance, monitoring, management, and a logical migration path for the continued growth of the network while preserving your investment in existing infrastructure.

Offering a significant advantage over traditional inter-networking equipment, Token Ring switches bring immediate relief to networks, solving throughput and management problems. By replacing low performance two-port PC bridges or routers, Token Ring switching provides the ability to perform Source Route bridging, transparent bridging, or both with Source Route Transparent (SRT) bridging. The following illustrations depict some possible uses of the Switch 2000 TR, including ring segmentation and migration to high-speed technologies.

Ring Segmentation

High-speed switches offer a more efficient solution over 2-port PC bridges or routers. As illustrated below, segmentation with a Token Ring switch brings immediate improvement over existing networks by re-distributing traffic

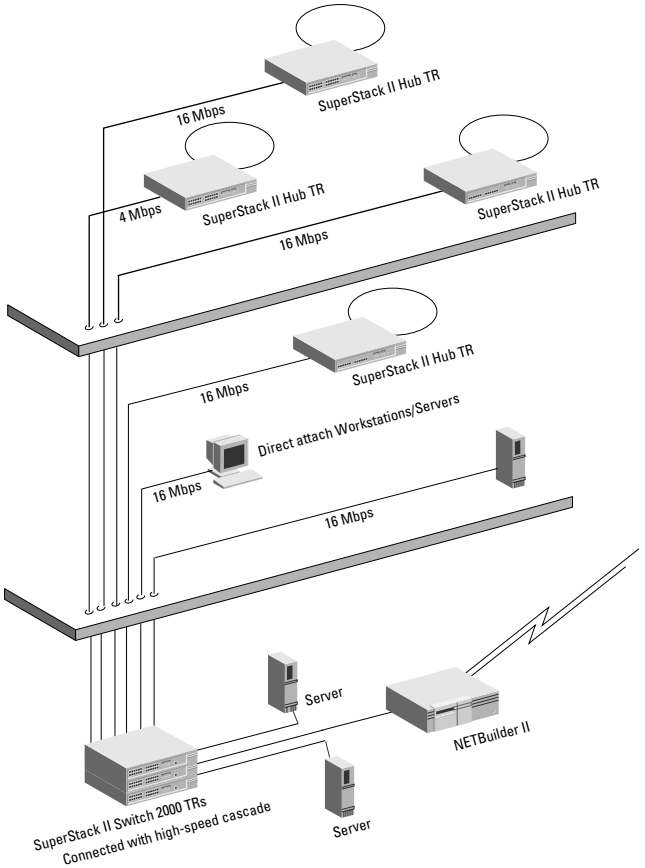

Figure 1-2 Using Switch 2000 TR to Segment Network

The Front Panel

This section describes the front panel components and LEDs of the SuperStack II Switch 2000 TR. Figure 1-3 shows the front panel.

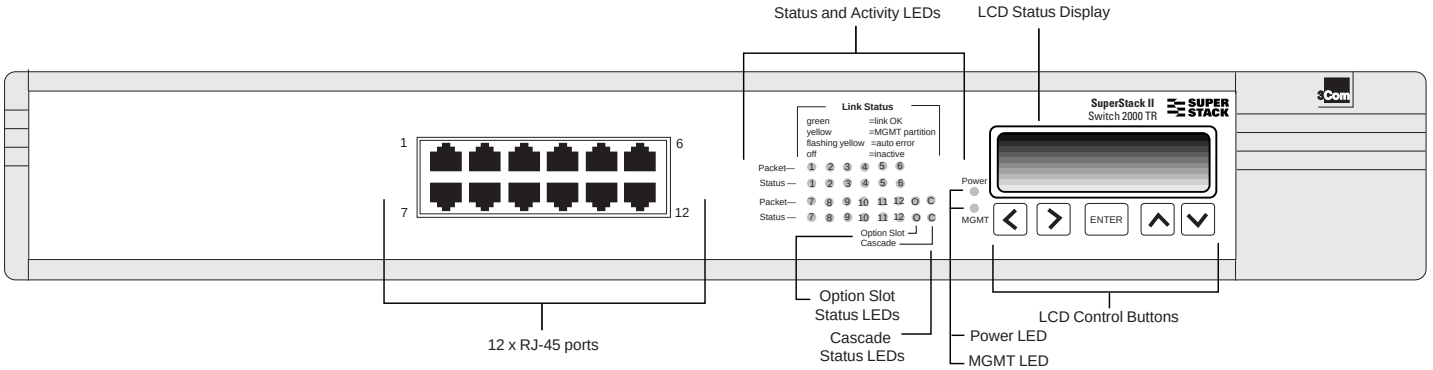

Figure 1-3 SuperStack II Switch 2000 TR Front Panel RJ-45 Ports

RJ-45 Ports

12 RJ-45 ports support unshielded Twisted Pair (UTP) or Shielded Twisted Pair cabling (STP) at 4 Mbps or 16 Mbps wire speed.

All 12 ports default to adapter mode for connection to a Token Ring hub. Additionally, ports 1 through 4 can be configured to hub mode to allow direct attachment of workstations or servers.

Front Panel LEDs

The LEDs on the front panel of the Switch 2000 TR reflect the current status of the switch. Use Table 1-2 to interpret the LED states.

Table 1-1 LED States

LED Name	Color	Indicates
Packet LEDs	Green	Traffic present
	Flashing yellow	Error frames present
Status LEDs	Green	Port inserted
	Yellow	Partitioned via management
	Flashing yellow	Auto Error Partition
	Off	Port not inserted
Option Slot *Status/Packet*	Green	Presence of Option card
	Flashing green	Activity on link
Cascade *Status/ Packet*	Green	Cascade connection present

Table 1-1 LED States

LED Name	Color	Indicates
	Flashing green	Activity on link
Power	Green	Power ON
	Yellow	RPS w/alarm
MGMT	Off	Operation normal
	Flashing green	(slow) Software download
	Flashing green	(fast) Power On Self Test (POST)
	Yellow	POST has failed

LCD Display Buttons

Use the LCD display on the front panel of the Switch 2000 TR to select ports, change system parameters, receive status information, and set the Unit ID number.

- **Right and Left buttons**—Change or move digits or go to the previous menu.
- **Up and Down buttons**—Scroll up or down in specific menu and increase or decrease digit value.
- **Enter button**—Enter a menu or use to enter the edit mode.

Figure 1-4 LCD Display Buttons

The Rear Panel

This section describes the rear panel components of the Switch 2000 TR. Figure 1-5 shows the rear panel.

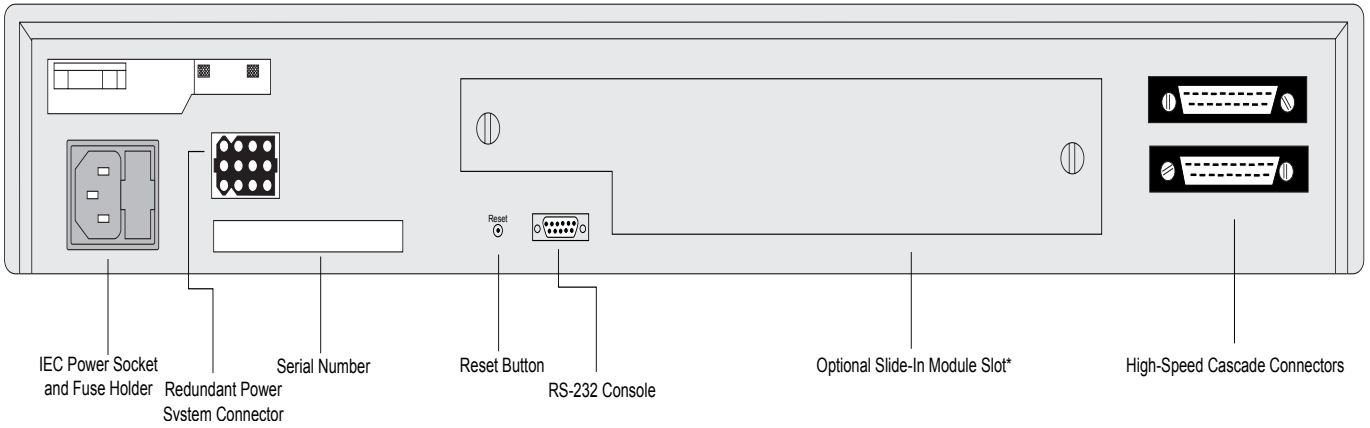

Figure 1-5 Switch 2000 TR Rear Panel

* Refer to the appropriate module installation manual for more information.

Power Socket

The Switch 2000 TR automatically adjusts to the supply voltage. The fuse is suitable for both 110 AC and 220-240 AC operation. Refer to "Replacing the Fuse in Chapter 2 for information on replacing fuses.

NOTE: *The Switch 2000 TR has no ON/OFF switch.*

Serial Number

Refer to this number if you need to report a fault.

Redundant Power System Connector

Use this connector to attach a Redundant Power System (RPS) to the Switch 2000 TR. Disconnect the AC plug when using an RPS.

Reset Button

Using the Reset button simulates a power on/off cycle. You can also perform a software reset using the VT100 interface. Refer to "Setting Up the VT100 Console in Chapter 3.

Console Port

Use the RS-232 console port for connecting a terminal for serial remote or local out-of-band management and configuration. Use the following settings to configure the VT100:

- 9600 baud
- 8 bit
- No parity
- 1 stop bit

Optional Slide-In Modules

Option modules provide alternate downlinks for the Switch 2000 TR.

NOTE: Be *sure the filler plate cover is installed when the module slot is not occupied.*

Slide-in modules are available for the following:

The ATM Module

The SuperStack II Switch TR ATM OC-3 module provides a high-speed ATM connection between the Switch 2000 TR and ATM networks. When positioned in workgroup or departmental LANs, the ATM downlink module offers a 155 Mbps data path to building, campus or ATM network backbones directly from the Switch 2000 TR. Perfect for providing cost-effective ATM access to smaller isolated LANs or bandwidth intensive and mission critical applications, the ATM downlink also provides a logical migration path for existing Token Ring LANs to mainstream high-speed networking technologies.

Redundant links can protect your Switch 2000 TR from network failure or equipment inconsistencies. The built-in Software Upgrade feature allows you to download software revisions easily.

Benefits of an ATM

ATM is the only computer networking technology designed to carry video, voice and data traffic simultaneously. ATM provides the level of service necessary

to run each of these bandwidth-intensive applications across networks.

The primary benefits of ATM include:

- ATM is a cell-based communications technology that easily scales from T1 or ATM 25 to OC-3 (155 Mbps), OC-12 (622 Mbps), OC-48 (2.488 Gbps), and OC-192 (10 Gbps).
- Additional services are easily added to existing ATM networks.
- ATM networks are designed for growth and provide future scalability.
- ATM provides LAN Emulation (LANE) technology which provides interoperability between existing Token Ring, Ethernet, and ATM devices.

Summary of ATM Features

The following list summarizes the features of the SuperStack II Switch 2000 TR ATM module.

- Conforms to ATM Forum Standards
- Meets OC-3c 155 Mbps interface
  - SONET (STS 3c) and SDH (STM-1) compliant
  - Multimode Fiber, SC connections
- LAN Emulation (LANE) version 1.0
  - 16 Emulated LAN Clients
  - 512 Virtual Circuits
  - 1024 remote MAC addresses
- User-to-Network Interface (UNI) 3.1
- Interim Local Management Interface (ILMI)
- AAL5 ATM Adaptation Layer
- 16 Virtual LANs (VLANs)
- Data buffer to store 40,000 ATM cells
- Wire Rate Transmission on ATM port
- Low Latency (68 microseconds between ATM and Token Ring components).
- 3Com SmartAgent support, including:
  - SNMP management using 3Com's Transcend Enterprise Manager.
  - Telnet management using VT100 interface.

The FDDI Module

The SuperStack II Switch TR FDDI module provides a high-speed connection between the Switch 2000 TR and FDDI backbone networks. When positioned in workgroup or departmental LANs, the FDDI downlink module offers a 100 MB data path to building, campus or FDDI network backbones directly from the Switch 2000 TR. Perfect for providing cost-effective FDDI access to smaller isolated LANs or bandwidth intensive and mission critical applications. The FDDI downlink also provides a logical migration path for existing Token Ring LANs to mainstream networking technologies.

Redundant links can protect your Switch 2000 TR from network failure or equipment inconsistencies. The built-in Software Upgrade feature allows you to download software revisions easily.

Benefits of FDDI

Fiber Distributed Data Interface (FDDI) is a 100-Mbps fiber optic local area network standard supported by the ANSI committee.

The primary benefits of FDDI include:

- A 100 Mbps point of aggregation for multiple Token Ring segments.
- Supports Single Attached Station (SAS) or Dual Attached Station (DAS) functions.
- Supports server connections via Token Ring FDDI translation of IP, SNA, IPX, and NetBIOS.
- Additional services are easily added to existing FDDI networks.
- FDDI networks are designed for growth and provide future scalability.

Summary of FDDI Module Features

The following list summarizes the features of the SuperStack II Switch 2000 TR FDDI module.

- Conforms to FDDI ANSI Standards
- Wire Rate Transmission on FDDI port
- Low Latency.
- 3Com SmartAgent support, including:
  - SNMP management using 3Com's Transcend Enterprise Manager.
  - Telnet management using VT100 interface.

The Token Ring-in-Fast Ethernet (TR-in-FE) Module

TR-in-FE is a 3Com developed technology that encapsulates Token Ring frames in Fast Ethernet frames. Bridging the gap between Token Ring and Ethernet, this technology offers a more cost-effective integration than traditional bridging and routing, and allows Token Ring users to expand their bandwidth while preserving their TR infrastructure.

TR-in-FE is a unique way of combining Token Ring and Ethernet for the purpose of utilizing Fast Ethernet as a backbone and method of server attachment for TR networks. Through a process known as ***tunneling*** or ***encapsulation***, TR-in-FE uses Fast Ethernet to transport natively formatted Token Ring frames. This means that both source route and transparent TR frames addressing information is maintained through Fast Ethernet (FE) so that it may be interpreted and utilized by either a destination Token Ring (TR) switch or FE server.

Benefits of TR-in-FE

TR-in-FE offers improvement in the following areas:

- Scalability
  - TR switching
  - High-speed technologies
  - Wire-speed performance
- Flexibility
  - High-speed flexibility (choice of D/L technology)
  - Desktop flexibility (TR, Ethernet)

- Manageability
  - Simple to configure and administer

TR-in-FE allows both Token Ring and Ethernet to share the same Fast Ethernet physical wiring infrastructure and server base without impacting network performance. TR-in-FE accomplishes this by introducing routing or traditional bridging via Source-Route to Transparent translation.

Fast Ethernet is relatively well understood and easy to configure. Additionally, many tools exist to manage and administer Fast Ethernet due to its wide acceptance in the industry and its similarity to Ethernet.

TR-in-FE benefits MIS managers most interested in:

- Preserving existing investments in TR infrastructure
- Seeking low-cost, high-speed connectivity
- Combining Ethernet and Token Ring for common server access

Fast Ethernet is less expensive than other options, such as FDDI and ATM. Using FE, the price per port for server attachment is 20% that of ATM and FDDI.

Token Ring switching allows the install base of TR equipment and its configuration to remain intact and operational while allowing for an upgrade to higher performance through microsegmentation and interfaces to higher speed technologies. TR-in-FE represents one option for integrating Fast Ethernet into the TR switched environment.

Summary of TR-in-FE Module Features

The following lists summarize the features of the SuperStack II Switch 2000 TR TR-in-FE module.

- Full duplex operation
- Automatic configuration through PCI registration
- RJ-45 connector for 100 Mbps data rates over category 5 UTP wiring up to 100 meters
- LEDs to indicate link integrity and link activity
- Promiscuous mode support for NDIS 3.0 and ODI32 drivers
- Compliance with FCC Class B, CISPR B, and CE
- Software configurable
- DOS diagnostics and configuration utility
- Support for frame sizes up to 3992 bytes

Migrating to High-speed Technologies

Managers want to migrate to FDDI, ATM, or TR-in-FE easily. Using Switch 2000 TRs, critical resources attach directly to high-speed technologies while preserving the investment in Token Ring hardware. They also merge easily with existing network management applications. These features allow network managers to introduce additional switches, servers, and stations seamlessly via direct connections. Switch 2000 TRs can be contained in data centers while remaining connected to high-speed links with single ATM, FDDI, or TR-in-FE module.

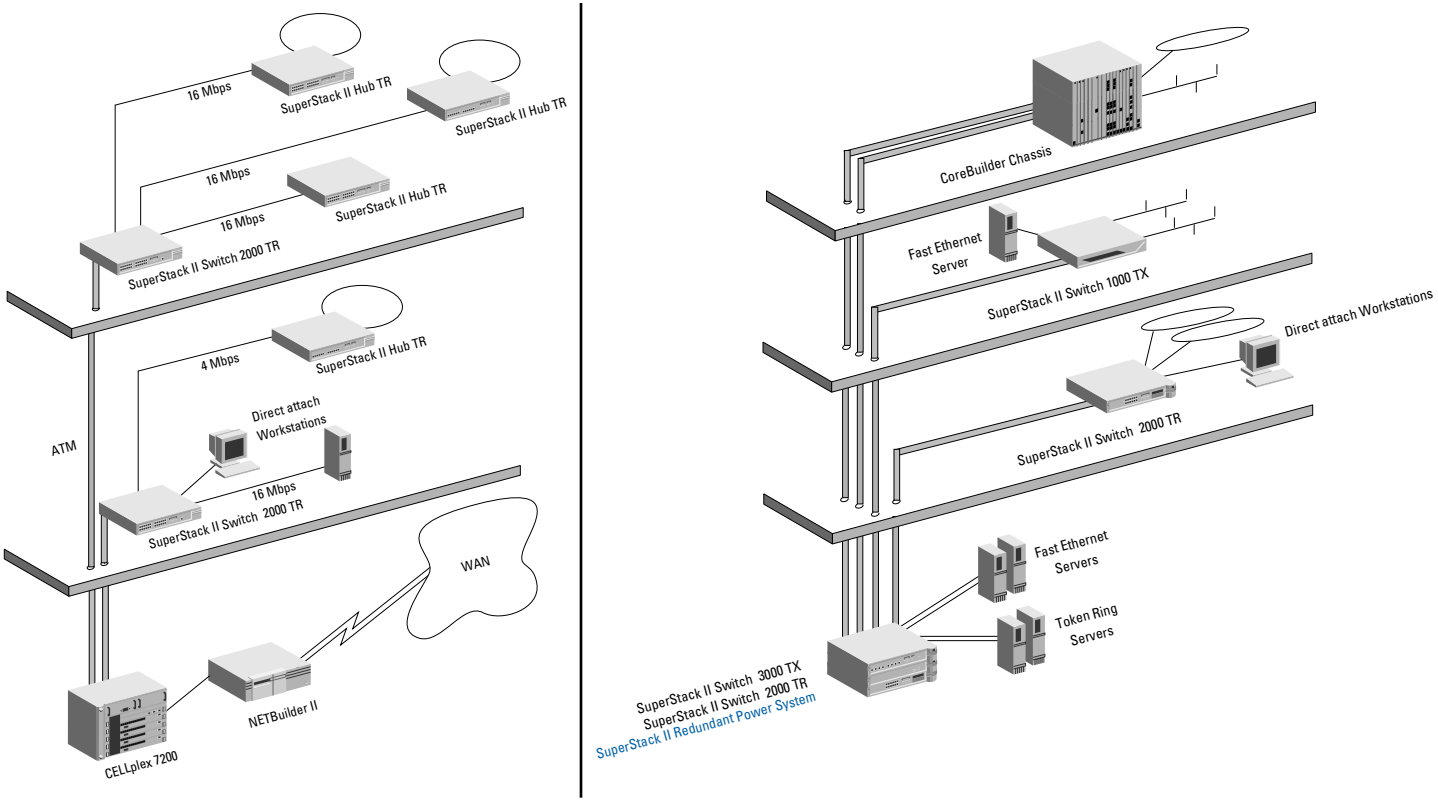

Figure 1-6 Using Switch 2000 TR for Migration to High-Speed Technologies

High-speed Cascade Connectors

These connectors provide a high-speed cascade connection between Switch 2000 TRs in a stack. You can connect multiple units to form a single switched domain. You can connect up to six Switch 2000 TRs with these connectors.

A stack of Switch 2000 TRs act as a single multiport switch. The setup configuration parameters are shared among switches and the entire stack can be managed and downloaded as a single IP entity.

Token Ring Switching Concepts

This section describes Token Ring Switching and unique features of the Switch 2000 TR, including:

- Why Token Ring Switching?
- Source Route Bridging
- Transparent Bridging
- Source Route Transparent Bridging
- Spanning Tree (802.1d and IBM)
- Store-and-Forward
- Cut-through
- Dynamic Cut-through
- Congestion Control
- Workgroups

Why Token Ring Switching?

Existing Token Ring networks are built around shared media technology and typically operate at 16 Mbps wire speed. This 16 Mbps of bandwidth is shared between all stations on the ring. As applications become more sophisticated, or as work-stations become more powerful, or as the number of users per ring grows, the demand for bandwidth increases. As a result, stations are limited not by their own processing power but by the limitations of the physical network.

In an effort to reduce the traffic per ring and increase the overall bandwidth availability, existing rings have been divided into multiple smaller rings. This division provides more bandwidth per station.

With an optional FDDI or ATM downlink module, Token Ring switching also solves problems found in client-server applications where a shared 100 Mbps (FDDI) or 155 Mbps (ATM) pipeline can provide easy access to servers and WAN links.

The major benefits of Token Ring switching are:

- Bandwidth relief
- Migration path to high-speed technologies
- Cost-effective method for achieving LAN interconnectivity

Source Route Bridging (SRT)

Source Route Bridging is a method of allowing a ring station (node) on a Token Ring network to communicate with another ring station on a different ring interconnected by bridges. The "source" ring station, in other words, the node initiating the communication, is responsible for dynamically determining and then maintaining information about the "route" to

the destination ring station. A route is simply the path a packet takes through a source route bridged network from the source ring station to the destination ring station.

In a multiple ring environments, nodes on different rings need additional bridging information before they can communicate with each other. A source ring station must first determine if one or more routes exist to another station on a remote ring.

In general, the source ring station determines the route by sending a "discovery" packet out across the multi-ring network. Source routing bridges forward this "discovery" packet while adding path information. Likewise, switches forward any response from the destination ring station to the "discovery" packet originator. When a source ring station receives a response it updates its own bridging table with the information. After determining the optimal path, the ring stations include the path information in every packet transmitted between them.

Switching provides connectivity between LANs, forming enterprise-wide networks. In a Token Ring environment, source routing switches connect Token Ring LANs and enable peer-to-peer and terminal-to-host communications across both local and wide area Token Ring networks. Both PC workgroup protocols and IBM's Systems Network Architecture (SNA) networks are supported by source routing switches.

Another advantage of switching is that it allows the segmentation of the Token Ring network into multiple rings to reduce traffic on any one particular ring segment. The adjacent rings may be connected by parallel source routing switches to provide fault tolerance. In the event one switch fails, the other parallel switch can be configured to automatically maintain connectivity, providing an alternate route for data between the two rings.

Transparent Bridging (TP)

Transparent bridging provides the simplest data communication method. In transparent bridging end stations are not aware of existing intermediate bridges. As such, a transparent bridge learns about its surrounding network from the source addresses of the packets that it receives. Forwarding decisions are based on the destination addresses contained in the MAC header. Transparent bridges consult their bridging table (see "Bridge Table) to determine which port should forward the traffic on to the destination port.

Bridge Table

A switch dynamically manages and updates its bridging table. All switches receive every packet transmitted on the segments attached to its ports. As a result, a switch is able to "learn" the source MAC addresses of each station that transmits packets on its attached segments. Since a switch never places its own MAC address in a packet that it forwards, the received source MAC address always identifies the original transmitter of the packet.

A switch uses the received source address information to construct its bridging table. The bridging table contains a list of all received MAC addresses and the ports on which they were learned. From its bridging

table, a switch knows which port must be used to reach each known MAC address.

Every time a switch receives a packet, it examines its bridging table to determine if the source MAC address is contained in its bridging table. If it is not, it creates a new entry. The switch then searches its bridging table for the address contained in the packet's destination address field. The switch then forwards the packet to the port associated with the destination MAC address. If the port specified in the bridging table is the same port on which the packet was received, the switch discards the packet.

The "learned" entries in the switch's bridge table are subject to aging. That means that if the switch does not receive a packet from each entry before the entry's Age Timer expires, the switches bridging table deletes the entry. This feature allows entries associated with dormant stations to be removed from the switch's bridge table.

Source Route Transparent Bridging

As the name implies, source route transparent (SRT) bridge performs both source routing and transparent bridging. If a frame with routing information is received at the bridge, the bridge performs source route bridging. Likewise, if a frame without routing information is received at the switch, the switch performs transparent bridging.

Spanning Tree

Spanning Tree support is provided in the Switch 2000 TR.

- 802.1d Spanning Tree
- IBM Spanning Tree

802.1d Spanning Tree

Spanning Tree is an industry standard protocol (802.1d) which prevents redundant paths (loops) from existing within a network. By ensuring that only one active data path exists between any two rings, the Spanning Tree protocol prevents the following:

- Packet duplications
- Broadcast storms
- Packet misordering

In addition, Spanning Tree also provides fault tolerance within the network by automatically reconfiguring the active topology if a fault is detected in the network. This provides contingency paths in the event that the active path is disabled and guarantees stability.

IBM Spanning Tree

IBM Spanning Tree operates the same as 802.1d in that it resolves network loops. However, IBM Spanning Tree uses different addresses and parameters which do not interoperate with 802.1d Spanning Tree.

The IBM Spanning Tree algorithm reduces the number of broadcast frames in source routed networks. A single path is formed between networks from the root bridge. IBM Spanning Tree applies only to Spanning Tree Explorer frames (STEs). All Route Explorer frames (AREs), and Specifically Routed Frames (SRFs)

can use any path in the network. ARE packets are flooded through all bridges onto all rings. This creates multiple copies if redundant paths exist in the network.

When multiple requests are received at the destination; each one causes a response. Implementing Spanning Tree ensures that the number of broadcast packets are significantly reduced.

For more information on Spanning Tree, refer to "Spanning Tree Fields in Chapter 4.

Congestion Control

Congestion control prevents loss of packets due to congestion on destination ports. You have a choice among:

- **Flow Control**—Flow control balances the bandwidth use of the client ring to that of the server ring. This is especially useful in focused load conditions where many ports are sending data to a single port.

  Flow control monitors buffer usage and shifts the load onto the end station. This allows the Switch 2000 TR to use the available bandwidth to access the port by balancing traffic on the sending ports.

- **Nonblocking**—Occasionally packets that are destined for a particular port cannot be delivered. This is especially true if a ring is busy or not operating. These packets inadvertently impede the delivery of packets destined for known good or free rings. Nonblocking provides a means for discarding packets that can not be delivered while ensuring delivery of packets with known good or free destinations.

- **Off**—In Off mode there is no congestion control. Packet transfers are based on queue availability in the receive buffer. If there is no buffer space on the receiving port, packets are dropped.

Forwarding Modes

Switch 2000 TR provides three forwarding methods.

- **Store-and-Forward**—Switch 2000 TR can use a conventional store-and-forward method typically found in bridges. In this mode, packets are received and buffered (stored) in their entirety before they are forwarded. This guarantees that errored frames on the source ring are not forwarded to the destination. Although store-and-forward guarantees packet stability, it also involves a transit delay depending on the length of the packet.

- **Cut-thru**—Cut-thru avoids the transit delay found in standard store-and-forward methods. Although cut-through can be applied only between ports that are operating at the same wire speed or from a high speed port to a low speed port, it does provide better transit rates by forwarding a frame as soon as enough information is available to determine the destination port.

- **Dynamic Cut-thru**—In Dynamic Cut-thru mode the switch monitors error rates on the source. If a user set threshold is exceeded, the switch port changes to store and forward mode until the error rate reduces. At this point the port reverts to

Cut-thru mode. The default mode for the Switch 2000 TR is Dynamic Cut-thru.

VLANs

A VLAN is defined as a group of location- and topology- independent devices that communicate as though they were on the same physical LAN. This means that they are not restricted by the hardware that physically connects them, and segments are defined by flexible user groups created by the user. For example, with VLANS, the user can define a network according to:

Department Groups—A VLAN could be created for the Marketing Department, another VLAN for the Finance Department, and still another for the Development Department.

Hierarchical Groups—A VLAN could be created for directors, another for managers, and still another for general staff.

Usage Groups—A VLAN could be created for Email users, another for multimedia users, and so on.

Advantages of VLAN

All 802 media and shared media support VLANs. In addition, implementing VLANs:

- Eases the change of devices
- Helps control broadcast traffic
- Provides extra security

VLANs facilitate the administration of logical groups of stations that can communicate as though they were on the same LAN. VLANs also facilitate moves, adds, and changes of members of logical groups.

Traffic between VLANs is ***firewalled***. This limits the propagation of multicast and broadcast traffic between VLANs.

Each distinct VLAN is uniquely identified throughout the bridged LAN. A consistent representation of a VLAN exists across a VLAN fabric (including ATM). This means that the shared VLAN knowledge of a particular packet remains the same as the packet travels from one point to another.

2 GETTING STARTED

This chapter describes the installation and setup procedures for the Switch 2000 TR:

- Important Safety Information
- Positioning the Switch 2000 TR
- Installing the Slide-in Modules
- Installing the Switch 2000 TR
- Connecting Redundant Power System
- Connecting to the Serial Port
- Device Defaults

Important Safety Information

NOTE: *Warnings contain directions that you must follow for your personal safety. Follow all instructions carefully. Please read the following safety information before installing the Switch 2000 TR.*

- Installation or removal of any add-in module or cable must be performed by qualified personnel only.
- The Switch 2000 TR must be attached to a grounded power source.
- The power cord must comply with the standards of the country in which the Switch 2000 TR is to be installed.
- For USA and Canada:
  - The cord must be UL-approved and CSA certified.
  - The minimum specifications for the flexible cord:

    No. 18 AWG

    Type SV or SJ

    3-conductor
  - The cord must have a rated current capacity of at least 10 Amps.

- If the power supply plug is unsuitable and you must replace it, refer to the following specifications:
  - Brown wire to the Live (Line) plug terminal. The terminal may be marked with the letter L or colored red.
  - Blue wire to the Neutral plug terminal. The terminal may be marked with the letter N or colored black.
  - Yellow/green wire to the Ground (earth) plug terminal which may be marked with the letter (E) or the earth symbol or colored yellow/green.
- The Switch 2000 TR operates under SELV conditions (Safety Extra Low Voltage) according to IEC 950. This standard is complied with only when the unit is connected to equipment following the same standard.
- Use only fuses of the same type and manufacture with the Switch 2000 TR.

CAUTION: *Never remove the cover. The Switch 2000 TR contains no user-serviceable parts.*

CAUTION: ***Ne****ver remove an Optional Slide-in module filler plate without disconnecting the power source first.*

Positioning the Switch 2000 TR

The Switch 2000 TR is suited for data center and workgroup applications. It can be mounted in a standard 19-inch rack, on a wall, or free-standing on a table or similar surface. A mounting kit with two brackets is provided for wall or rack mounting.

Considerations for Placement

Be aware of the following considerations when installing the Switch 2000 TR:

- Can cable lengths and media be supported properly?
- Is cabling located away from sources of electrical noise such as radios, transmitters and other radio frequency equipment?
- Are all objects removed from the top of the unit or stack?
- Is air flow adequate through the side vents?
- Is unit installed in moisture and water-proof environment?

Configuration Guidelines

The cable topology rules for Token Ring are shown below:

Media	4 Mbps	16 Mbps
Category 3 UTP	660 ft/200m	330 ft/100m
Category 4, 5 UTP	1,320 ft/400m	660 ft/200m
Type 1 STP	2,000 ft/600m	1,000 ft/300m

Power Supply and Fuse

The Switch 2000 TR automatically adjusts to the supplied voltage. The fuse is suitable for either 90-110V A.C. or 220-240V A.C. A spare fuse is provided in the fuse drawer.

Replacing the Fuse

Refer to Figure 2-1 for the location of the fuse. When necessary, replace the Switch 2000 TR fuse with a fuse that has the following specifications:

- **250 volts — 4A Slo-Blo**

1. Power down the Switch 2000 TR by removing the AC power cord or the Redundant Power System cords.
2. Gently pry open the fuse holder cover with a small flat-blade screwdriver.

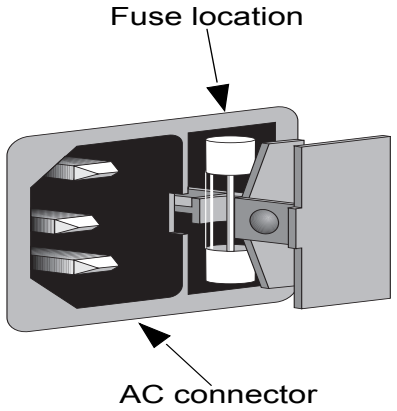

Figure 2-1 Switch 2000 TR Fuse Location

3. Slide out the fuse holder drawer and remove the fuse.
4. Install the replacement fuse and close the fuse drawer.
5. Re-insert the power cord and apply power.

Installing the Slide-in Modules

This section explains how to install the three optional modules into a SuperStack II Switch 2000 TR device. The modules are:

- ATM
- FDDI
- TR-in-FE

CAUTION: *Always follow Electrostatic Discharge (ESD) procedures when installing an I/O Module.*

1 If the Switch is connected to the network, turn off the power and disconnect the switch from the main power supply and the network.

2 Place the Switch on a flat, clean, hard, work surface.

3 Locate and remove the blanking plate that covers the slot. See Figure 2-2. Retain the blanking plate and the screws for future use.

4 Use the guide rails within the Switch slot to align the module. The location of the guide rails and the correct positioning of the plate is shown in Figure 2-2.

5 Slide the module into the slot without touching the top or bottom of the circuit board, which positions upside down on the plate. Ensure that the module is pushed fully into the unit.

6 Use the thumb screws attached to the module to fix the module firmly into place.

7 Connect the cable to the module port.

NOTE: For cable specifications see the guide that came with your module.

8 Each end of the cable has a transmit (Tx) and receive (Rx) connector. Connect the Rx connector to the port's Tx socket. Connect the Tx connector to the port's Rx socket. Do the same at the other end of the connection.

9 Power up the switch. The link status LED turns green once a valid connection is made.

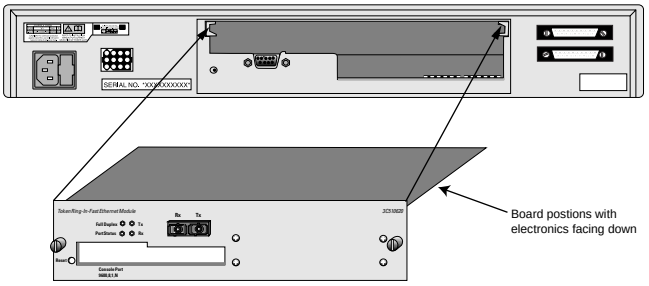

Figure 2-2 Inserting a Slide-in Module into a Switch 2000 TR

Installing the Switch 2000 TR

Rack Mounting

The Switch 2000 TR fits a standard 19-inch data communications rack typically found in wiring closets.

1. Unpack the Switch 2000 TR and place it on a hard, flat surface.
2. Position one of the enclosed mounting brackets over the mounting holes and attach. See Figure 2-3.

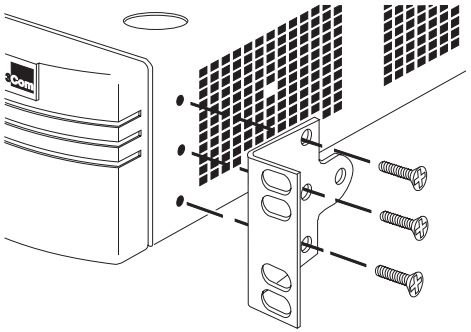

Figure 2-3 Rack Mounting the Switch 2000 TR

3. Repeat the process for the second bracket.
4. Insert the Switch 2000 TR in the rack and secure it with suitable screws (not included). Be sure to allow for adequate ventilation.

Wall Mounting

The Switch 2000 TR can be mounted to a wall with the enclosed brackets. Be sure that the wall is suitable for mounting the unit. A flat, smooth surface that is dry and sturdy is best.

1. Unpack the Switch 2000 TR and place on a hard, flat surface.
2. Position one of the enclosed mounting brackets over the mounting holes and attach. See Figure 2-4.

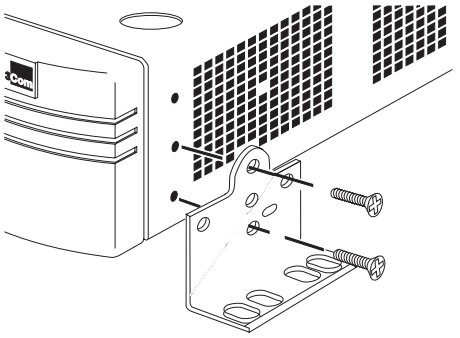

Figure 2-4 Wall Mounting the Switch 2000 TR

3. Repeat the process for the second bracket.
4. Mount the Switch 2000 TR to the wall. Be sure to allow for adequate ventilation.

Stack Mounting

The Switch 2000 TR can be stacked with other components of the SuperStack system using the four enclosed self-adhesive rubber pads. Apply the rubber adhesive pads to the underside of the unit. Stack the units, ensuring that the pads of the upper unit sit in the recesses in the cover of the lower unit.

Connecting Redundant Power System

To install an RPS, proceed as follows:

1. Power down by disconnecting the AC power cord on the Switch 2000 TR.
2. Connect an RPS cable assembly to the RPS connector on the back panel of the Switch 2000 TR.
3. Connect the other end of the RPS cable assembly to the RPS connector on the back panel of the RPS unit.

Connecting to the Serial Port

The Switch 2000 TR serial port settings are set to:

- Character size—8
- Parity—None
- Stop Bit—1
- Baud Rate—9600

Terminals connected to the Switch 2000 TR must be configured to these same settings before you can communicate.

Connection to the serial port can be direct for local management or through a modem for remote management.

For more information on the serial port console, refer to "Setting Up the VT100 Console in Chapter 3.

Connecting a VT100 Terminal

To connect a VT100 terminal directly to the serial port on the Switch 2000 TR you need a standard null modem cable. Follow these steps:

1. Connect one end of the cable to the serial port on the Switch 2000 TR and the other end to the serial port on the VT100 terminal.
2. Ensure that your terminal is configured to the appropriate settings listed above.

Device Defaults

The tables list the factory defaults for the Switch 2000 TR.

Table 2-1 Unit Defaults

Unit ID	#6

CAUTION: *Setting the Unit # ensures that all configuration parameters are retained when connecting additional switches. Change this number to reflect position of switch in stack. The first (bottom) switch should be set to 1.*

Table 2-2 Port Defaults

Admin State	Enabled
Workgroup ID	Unit 1
Personality	Ports 1 through 12 adapter
Internal Priority	Normal
Congestion Control	Non-blocking
Token Priority	Normal

Speed	16 Mbps
Forwarding Mode	Cut-through
Dynamic Cut-thru	
Rising	20%
Falling	10%
Broadcast Storm	
Rising Threshold	60%
Falling Threshold	50%
Rising Action	none
Falling Action	none
Port Bridge Defaults	
Priority	100
Path Cost	62
Attached LAN ID	FFFF (hex)
Max-Route Desc.	8
STE Mode	Auto-Span

Table 2-3 Stack Defaults

BootP Client	Enable

Table 2-4 Workgroup Defaults

WorkGroup Name	WGroup Created (single)

Table 2-5 Bridge Defaults

Number of Ports	12
Bridge Type	SRT
BPDU Address	C0-00-00-00-01-00
Spanning Tree Support	Disabled
Spanning Tree Parameters:	802.1d
Priority	32768
Max Age	20 seconds
Hello Time	200 seconds
Forward Delay	15 seconds
Transparent Parameter:	
Entry Age	300 seconds

3 SETTING UP FOR MANAGEMENT

This chapter describes background information for configuration and the procedures for initial setup of the SuperStack II Switch 2000 TR, including:

- Switch 2000 TR Management Options
- Configuring Switch 2000 TR in Stack
- Managing over the Network
- Management Prerequisites
- Switch 2000 TR Management Consoles
- Setting Up the VT100 Console
- Setting Up the LCD Console
- Setting Up BOOTP
- Auto Logout
- Upgrading Software
- Resetting the Switch 2000 TR

The first step required for setup is assigning a Unit ID number which you configure with the LCD Console. Refer to "Management Prerequisites, Setting Unit ID" for instructions on assigning the Unit ID. You have two methods for the initial setup—VT100 or LCD console. When the switch has been configured for management, you assign the remainder of the parameters as described in Chapters 4 and 5.

Switch 2000 TR Management Options

You manage the Switch 2000 TR using one of the following communication methods:

- Use an SNMP network manager such as Transcend® Enterprise Manager over a network running IP protocols. Each network manager application provides its own user interface.
- Use the VT100 interface for out-of-band communications by connecting a VT100 terminal (or workstation with terminal emulation software) to the serial port of the Switch 2000 TR.
- Use the VT100 interface over a TCP/IP network for in-band communications using a workstation running a VT100 terminal emulation program and Telnet.
- Use the front panel liquid crystal display (LCD) and associated buttons.

These communications methods are summarized in the following table and explained in detail in following sections.

Table 3-1 Switch 2000 TR Management Options

Access mechanism	Allows you to. . .	Using . . .
Serial Port	Establish an out-of-band connection to the VT100 console.	VT100 Console
IP	Establish in-band connection to the VT100 console	Telnet on TCP/IP protocol stack
SNMP	Manage devices using SNMP network management application	SNMP on TCP/IP protocol stack
LCD	Set basic parameter, view port status, and set Unit ID	Front panel display

VT100 Management Interface

The menu-driven interface for the Switch 2000 TR is known as the VT100 interface or Local Management interface. Using a simple series of menus, the VT100 interface provides access to switch functions, including port, stack, unit, bridge, switch, and workgroup settings and statistics; communication parameters, and security levels for individual users. Refer to "The VT100 Console" for more information.

You establish VT100 management communications with the Switch 2000 TR via the serial port or an IP Network connection as explained next.

Via the Serial Port

Access the management interface via a VT100 terminal or using VT100 terminal emulation software. You can connect directly to the Switch 2000 TR using the serial port or via a modem connection. This method is especially useful for initial setup and configuration or if the device is not reachable via network management applications.

This method allows you to manage the Switch 2000 TR when:

- You configure and initialize the system.
- The LAN is unable to provide reliable service.
- The network manager does not have direct LAN connection.
- The network manager software does not support SNMP.

When a connection has been established, the main Switch 2000 TR banner appears and you can log on.

Via an IP Network Connection

Access the management interface via a Telnet utility over a network running TCP/IP. The console interface is the same as that of the interface for the serial port. The Telnet application requires a VT100 terminal emulation application interface.

Before you can start a Telnet session, you must set up the IP parameters. To open a Telnet session, you must specify the IP address of the device you want to manage. Up to three Telnet sessions can exist simultaneously.

When a connection has been established, the main Switch 2000 TR banner appears and you can log on.

Configuring Switch 2000 TR in Stack

Head Unit

One of the unique characteristics of the Switch 2000 TR is its ability to be part of a stack. When installed as members of a stack, up to 6 Switch 2000 TRs form the equivalent of a switching chassis, managed using the same IP address. All traffic, management, monitoring, and configuration tasks and inquiries operate through the high-speed cascade interface located at the rear of each unit. See Figure 3-1.

Configuration rules for the Switch 2000 TR are simple:

- The head unit must have the lowest Unit ID number in the stack.
- The head unit should be at the bottom of the stack.
- It is recommended that each consecutive unit have sequential Unit IDs.
- To ensure redundancy each consecutive unit should have the same IP address setting as the head unit.

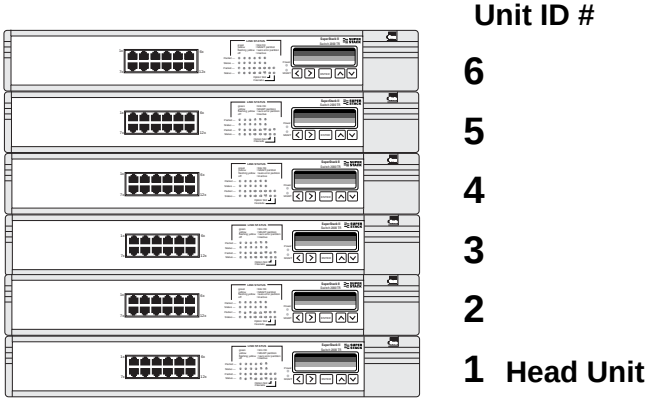

Figure 3-1 Switch 2000 TR in stack setting.

Cascade Connections

Cascade connectors must attach from the top connector of bottom unit to the bottom connector of next highest unit, up through the stack. See Figure 3-2.

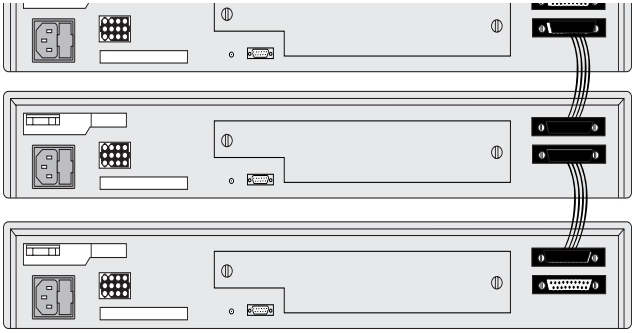

Figure 3-2 Switch 2000 TR Cascade Connections

Managing over the Network

Any network manager application running Simple Network Management Protocol (SNMP) can manage the Switch 2000 TR, provided the Management Information Base (MIB) is installed correctly on the management station. SNMP files for all 3Com products are available on the "3Com Bulletin Board Service" in Appendix F.

Network management applications provide their own user interface to the management facilities. 3Com's Transcend® family of network managers, for instance, have all the facilities for managing the Switch 2000 TR. The Switch 2000 TR supports SNMP over TCP/IP protocol.

IP Addresses

Internet Protocol (IP) addresses are designed using dotted decimal notation, such as n.n.n.n, where n is a number between 0 and 255.

A sample IP address is 192.128.40.120.

IP addresses have two parts:

- The first part of the address (192.128.40 in the example) identifies the network on which the device resides. Network addresses are assigned by international organizations. Each set of network numbers is unique within the context of the Internet.
- The second part of the address (.120 in the example) identifies the device within the network.

Assigning unique device addresses is the responsibility of your network organization.

Operating IP in a Closed Network

If you are the manager of a network that has no connection to the outside world, you might not need uniquely assigned network addresses. If you are using the IP protocol for internal management of your network, you can assign arbitrary addresses, provided each device is unique.

If you decide to use the IP protocol internally we suggest using addresses in the 192.100.X.Y, series where X and Y are numbers between 1 and 254.

If you later connect to the outside world, you will have to re-assign new, valid network numbers assigned to your network by the NIC or other international organization. Refer to "Obtaining Network Addresses".

A subnet address is a filtering system for IP addresses. We suggest using a general mask such as 255.255.255.0 if you are unsure what mask to use.

Obtaining Network Addresses

Contact one of the following organizations to obtain a valid set of network addresses.

- **In the United States**

  InterNIC Registration Services
  505 Huntmar Park Drive
  Herndon, VA 22070
  Telephone number:

1-800-444-4345, 1-619-455-4600, 1-703-742-4777

- **In Europe**

  RIPE NCC
  Kruislaan 409
  NL-1098 SJ
  Amsterdam
  The Netherlands
  Telephone number:

  +31 20 592 5065

- **In Asia Pacific**

  Asia Pacific Network Information Center (APNIC-DOM)
  c/o Computer Center, University of Tokyo
  2-11-16 Yayoi
  Bunkyo-ku, Tokyo 113
  Japan
  Telephone number:

  +81 3 3580 3782

Management Prerequisites

Before you can successfully operate and manage the Switch 2000 TR you must assign a Unit ID number to the device. This section describes the necessary steps for assigning a Unit ID#.

The only method for assigning a Unit number is via the LCD Console located on the front panel of the Switch 2000 TR.

Locate the LCD Console and proceed as follows:

1. Power on the Switch 2000 TR.

   Switch 2000 TR>Unit ID 6 appears in the LCD Console. This is the factory default.

2. Press [Enter] to enter the working menu of the LCD Console.

   Switch 2000 TR>Unit appears.

3. Press [Enter].

   UNIT>Unit # appears.

4. Press [Enter].

   Unit #>6 appears.

5. Press the [Down Arrow] once. The number 1 appears.
6. Press [Enter]. The Unit ID number has now been set.
7. Press [Left Arrow] twice to return to the main LCD Console menu.

Continue with the management setup as described in the remainder of this chapter.

Source Routing Prerequisites

If you plan to operate the Switch 2000 TR in a source routing environment, you need to assign a segment ID. Follow the instructions below, from the Port Setup screen:

1 Select Bridge from the bottom of the Port Setup screen.

The Port Bridge Setup screen appears.

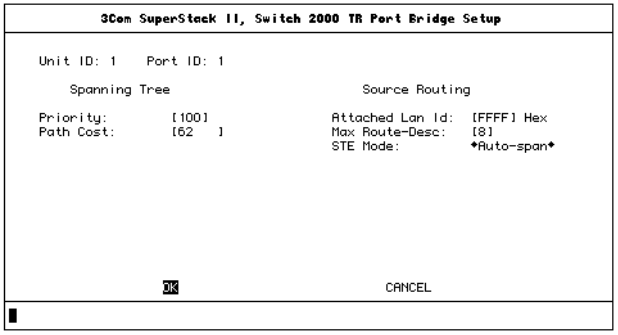

Figure 3-3 Port Bridge Setup Screen (Attached LAN ID Setting)

2 Assign an Attached LAN ID under the Source Routing heading on the right side of the screen.

The Attached LAN ID is set to FFFF which is the default setting for "not assigned."

You must assign a value to this field to perform source routing. Refer to "Setting Source Route Bridging in Chapter 4 for more information.

Switch 2000 TR Management Consoles

The following sections describe how to get started managing your Switch 2000 TR. If you plan to manage the Switch 2000 TR using IP or SNMP, you will have to assign an IP address to the Switch 2000 TR using one of these interfaces:

- VT100 Console Interface. See Chapter 4.
- LCD Console Interface. See Chapter 5.
- BootP may also be used to assign IP address. Refer to "Setting Up BOOTP".

The VT100 Console

This section describes the screen conventions used in the Switch 2000 TR VT100 console interface. The VT100 interface allows you to set and/or view these switch parameters:

- IP and associated addresses and management
- Port personality, speed, and state
- Bridge type, bridge number and Spanning Tree state
- Switch 2000 TR status and hardware and software version numbers

Choice Field

Example display:

```
*text*
```

Text enclosed with asterisks is a list from which you can select one option. Press [Space] to cycle through the options. When your choice is highlighted press

[Down Arrow] or [Return] to move to the next field. Refer to "Switch 2000 TR VT100 Console Interface Menu Map".

Entry Field

Example display:

```
[text]
```

Text enclosed in square brackets on the screen indicates a text entry field. This field may be text, numeric data, or hexadecimal data.

Password fields are hidden, meaning the text you type is not shown on the screen.

In some cases an Entry field has a default entry. To change the default value, simply type in a new value for this field and the default entry will be erased. Press [Down Arrow] or [Return] to move on to the next field.

Button

Example display:

```
OK
```

Text for button is always shown in uppercase letters. Buttons carry out actions. For example OK: or CANCEL. To select a button, move the cursor to the button and press [Return].

List Boxes

Example display:

```
monitor, manager, or security
```

A list box allows you to select one or more items from a list. These keys allow you to select from a list:

- **[Return]**—moves the cursor to the next field. Carries out a button's action.
- **[Space Bar]—**moves through a text list for a field. Use it to highlight the item or value you want.
- **[Down Arrow]**—moves down a list item by item and starts over again at the top.
- **[Ctrl] + [U]**—moves the cursor one screen up the list box.
- **[Ctrl] + [D]**—moves the cursor one page down the list box.

Key Board Shortcuts

Here are some shortcuts you can use to navigate within the console screens:

- **[Tab]**—Moves from one field on a form to the next on any screen without making a change.
- **[Return]**—Moves you to the next form field after you have made an entry.
- **[Left Arrow]**—Moves you to the previous field on the screen or the ***previous*** character in an editable field.
- **[Right Arrow]**—Moves you to the next field on the screen or the ***next*** character in an editable field.
- **[Ctrl] + [R]**—Refreshes the screen.
- **[Ctrl] + [B]**—Moves the cursor to the next button.
- **[Ctrl] + [P]**—Returns to the previous screen.

- **[Ctrl] + [N]**—Moves to the next screen after implementing current screen settings.
- **[Ctrl] + [K]**—Displays list of key strokes.

Correcting Text Entries

Use [Delete] on a VT100 terminal or [Backspace] on a PC. This key moves the cursor one space to the left and deletes a character. To delete more than one character, press the key once for each character.

NOTE: Check *carefully before using the Control keys. If you are using Telnet or a terminal emulation program you may find that some Control keys do not work the same or that they control other functions. Refer to the documentation that accompanies your Telnet or terminal emulation software.*

Default Users

Three default user types are allowed by the resident management console. They cannot be deleted or altered by the network administrator. Refer to Table 3-2 for default names and passwords. Refer to Appendix B for a listing of Screen Access Rights.

Table 3-2 Default User Names and Passwords

Default Name	Password	Access Level
monitor	monitor	monitor
manager	manager	manager
security	security	security

VT100 Console Menu Map

Figure 3-4 displays the menu structure for the Switch 2000 TR VT100 console interface.

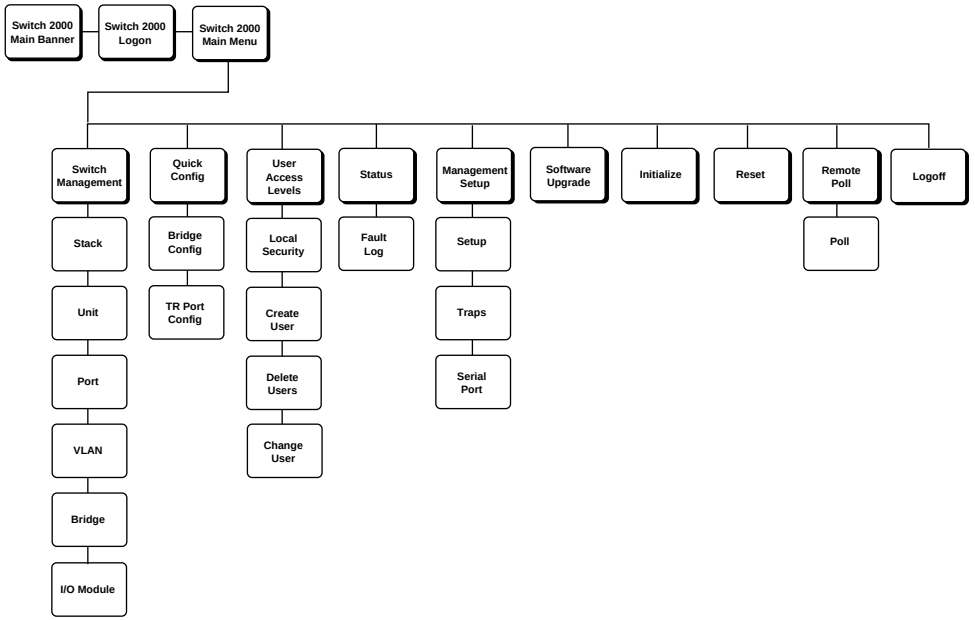

Figure 3-4 Switch 2000 TR VT100 Console Interface Menu Map

Setting Up the VT100 Console

This section provides instructions for setting up the VT100 console for local or remote management.

1 Connect a VT100-compatible terminal to the serial port of the Switch 2000 TR. Configure the terminal to the following settings:

- 9600 baud
- 8 data bits
- 1 stop bit
- No parity

2 Press [Return] one or more times until the Switch 2000 Main Banner appears. See Figure 3-5.

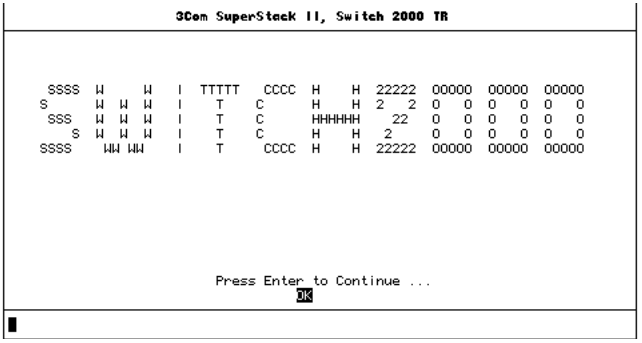

Figure 3-5 Main Banner

NOTE: You *cannot modify these settings. If your terminal is already set up with these values, the Main Banner appears as soon as power-up completes.*

3 Press [Return] at the Main Banner.

4 Log on using the default name ***security*** and password ***security***. See Figure 3-6.

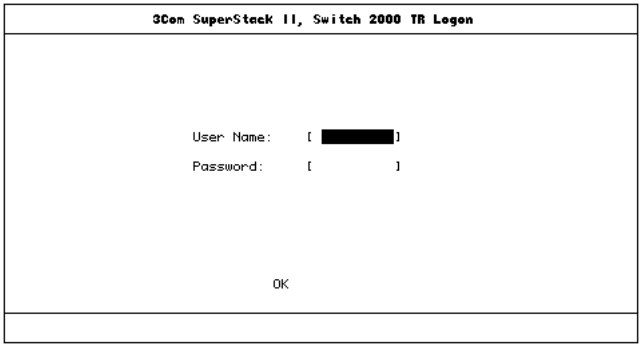

Figure 3-6 Logon Screen

5 Select OK. The Main Menu appears. See Figure 3-7.

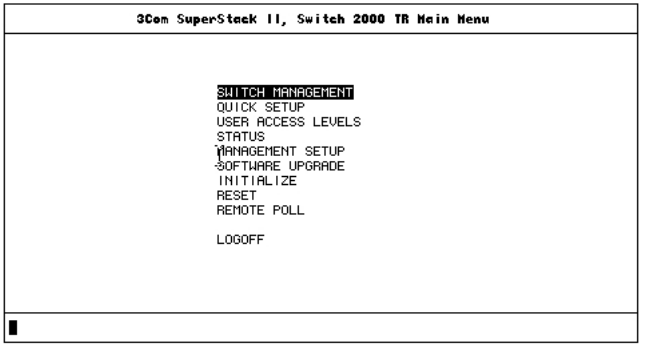

Figure 3-7 Main Menu

6 Select the Management Setup option.

The 3Com Switch 2000 TR Management Setup screen appears. See "Switch 2000 TR Management Setup Fields".

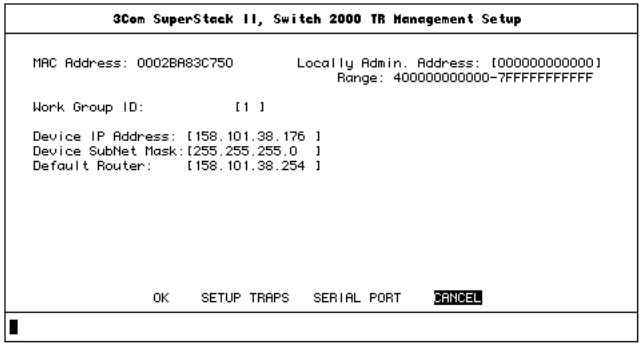

Figure 3-8 Switch 2000 TR Management Setup Screen

7 Fill in the following fields:

- Device IP Address
- Device Subnet Mask (if applicable)
- Default Router (if applicable)

8 Select OK when you have finished Management Setup. You will be asked to confirm your settings.

9 Press [Enter]. Settings are confirmed.

10 Reboot the Switch 2000 TR by returning to the main menu and selecting RESET. See "Resetting the Switch 2000 TR" on page 3-18.

You are now ready to communicate with the Switch 2000 TR using IP and an SNMP-based management application.

Switch 2000 TR Management Setup Fields

MAC Address

Displays the Switch 2000 TR unit MAC address.

Locally Admin Address

Use this field to assign locally administered addresses to the management port. You need to reset the Switch 2000 TR for the address to take effect. The Locally Administered Address field allows you to assign a unique MAC address to the unit. This feature is useful for identifying specific units by their addresses.

To set a Locally Administered Address, take these steps.

1 Enter address in hexadecimal from the Locally Admin. field. This must be in the range of 400000 000000 to 7FFFFF FFFFFF.

2 Select OK.

3 Reset the Switch 2000 TR.

NOTE: *The Locally Administered address will not be valid unless the Switch 2000 TR is reset. Refer to "Resetting the Switch 2000 TR" for instructions on resetting.*

To reverse the Locally Administered address and revert to the resident MAC address you must enter all zeros and reset the Switch 2000 TR.

Work Group ID

The workgroup number for purposes of management. Management is only part of a single workgroup and should be viewed as a sub-net. If you move your management setup to a new or different subnet, you will need to change the workgroup ID.

Device IP Address

You must assign a unique address to the device in this field. You change the IP address using this field.

Device SubNet Mask

You must assign a suitable network mask to the device in this field. For a class B address, 255.255.0.0 is suitable. You change the Device SubNet Mask using this field.

Default Router

Enter the IP address of the router with which the Switch 2000 TR communicates. You can change the Default Router IP address using this field.

NOTE: *The above IP address parameters and Work Group ID will not be valid unless the Switch 2000 TR is reset.*

SETUP TRAPS

Select this button to display the setup screen for SNMP trap parameters. Refer to Chapter 4.

SERIAL PORT

Select this button to display the setup screen for serial port parameters. Refer to Chapter 4.

The LCD Console

This section describes the LCD Console. The LCD Console allows you to enter specific configuration parameters and obtain status data on the Switch 2000 TR without using a management workstation console or application.

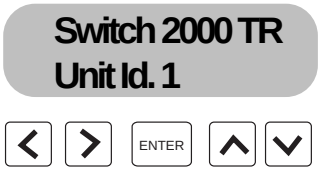

Figure 3-9 Switch 2000 TR LCD Console

Use the left, right, up, down, and enter buttons to view, enter, edit, or delete configuration parameters.

- Unit ID
- IP and associated addresses and management
- Port personality, speed, state
- Bridge type and Spanning Tree state
- Switch status; hardware and software versions

LCD Console Buttons

Enter

Use this button to accept or change data on any field or scroll further down in LCD menu.

Left Arrow

Use the left arrow to go to the previous menu.

Right Arrow

Use the right arrow to move to a specific digit on any data field line.

Up Arrow

Use the up arrow to scroll up in a specific menu or to decrease the value of a highlighted digit.

Down Arrow

Use the down arrow to scroll down in a specific menu or to increase the value of a highlighted digit.

LCD Console Menu Map

Figure 3-10 displays the menu structure for the LCD console interface on the front panel of the Switch 2000 TR.

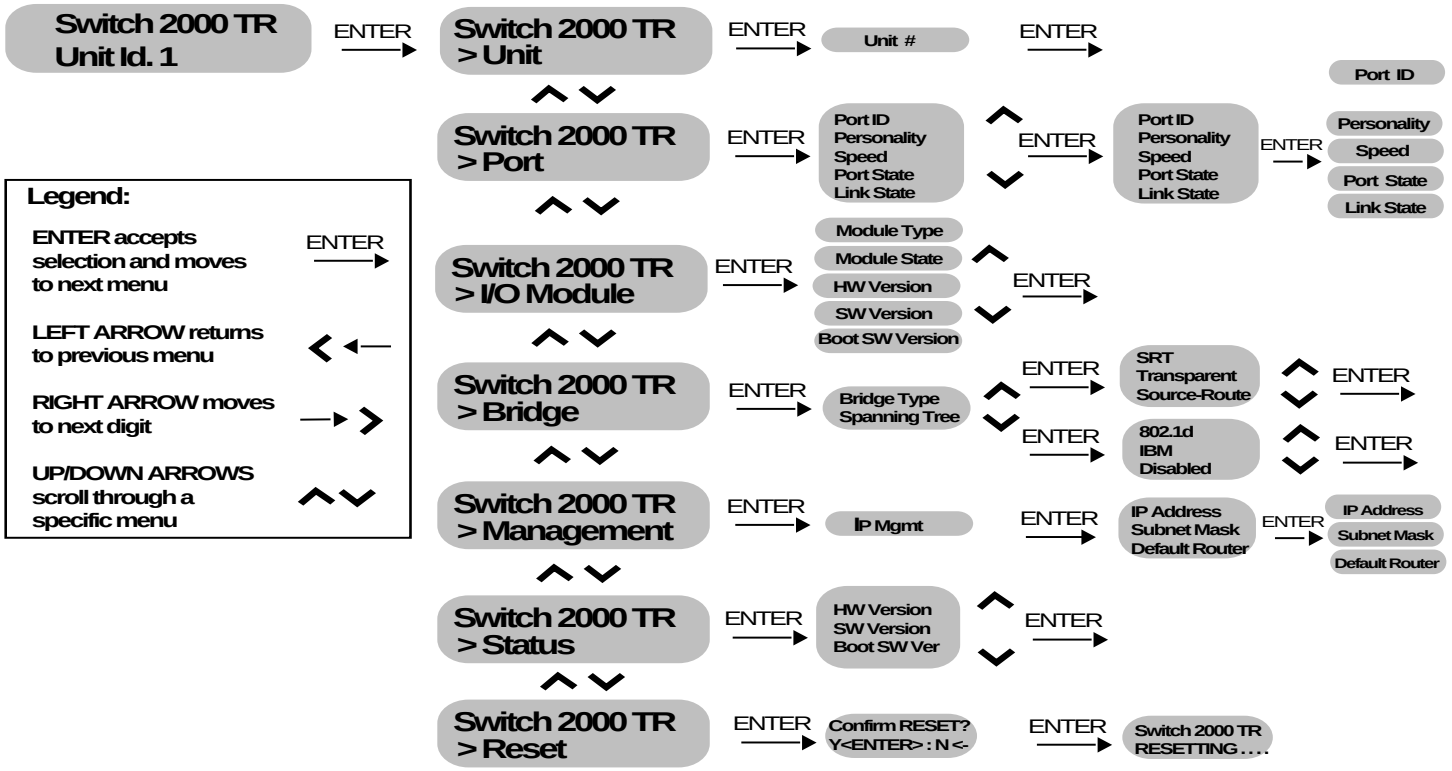

Figure 3-10 Switch 2000 TR LCD Console Menu Map

Setting Up the LCD Console

This section provides instructions for setting up the LCD console for local or remote management.

1 Press the [Enter] button on the front panel LCD to enter the main menu.

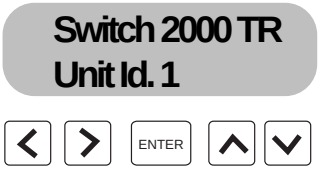

Figure 3-11 Front Panel LCD Main Banner

2 Press [Down Arrow] until the **Switch 2000 TR >Management** screen appears.

3 Press [Enter] to enter the management menu and select the desired management type.

At this point you can choose IP.

- If you choose IP, you need to assign an IP address, subnet mask and default router in order to communicate with the Switch 2000 TR. Refer to "IP Address Setup" on.

IP Address Setup

From the **Management>IP Mgmt** screen, proceed as follows:

1 Press [Enter] to select IP address field.

The **IP Mgmt >IP Address** screen appears.

2 Press [Enter].

A blank decimal notation appears on the IP Address.

3 Enter IP address as follows:

- Select the value of the digit by moving the [Up or Down Arrow] until the desired value appears. Choose from 0 through 9 and ".".
- Select the next digit by moving the [Right Arrow].

NOTE: *Be sure to use standard dotted decimal notation for the IP address.*

4 Press [Enter] to accept the address.

If the address is valid, you return to the previous menu by pressing [Enter]. If the address is invalid an error message displays and returns you to the previous menu when you press [Enter].

5 Press [Down Arrow].

The **IP Mgmt >Subnet Mask** screen appears.

6 Press [Enter].

A blank decimal notation appears in the Subnet Mask field.

7 Enter the Subnet Mask address as follows:

- Select the value of the digit by moving the [Up or Down Arrow] until the desired value appears. Choose from 0 through 9 and ".".
- Select the first digit by moving the [Right Arrow].

8 Press [Enter] to accept the address.

9 Press [Down Arrow].

The **IP Mgmt >Default Router** screen appears.

10 Press [Enter].

A blank decimal notation appears in the Default Router field.

11 Enter the Default Router address as follows:

- Select the value of the digit by moving the [Up or Down Arrow] until the desired value appears. Choose from 0 through 9 and ".".
- Select the desired digit by moving the [Right Arrow].

12 Press [Enter] to accept the address.

13 Press [Left Arrow] to return to the higher level screens in the LCD console.

NOTE: *RESET the Switch 2000 TR for any address settings to take effect. Refer to "Resetting the Switch 2000 TR" for instructions.*

You are now ready to communicate with the Switch 2000 TR using IP and an SNMP-based management application. Refer to Chapter 5 for more information on configuring the bridge, port, and other management tasks.

Setting Up BOOTP

The BOOTP option allows you to enable or disable the bootstrap protocol. The BOOTP (bootstrap protocol) allows the switch to discover and learn its own IP address and routing table information. To configure a Switch 2000 TR with the BOOTP option you will need a BOOTP server program. The MAC address, recorded on a label on the rear panel of the Switch 2000 TR, must be entered in the BOOTP server program along with the corresponding IP address of the Switch 2000 TR and its default route information. This allows the BOOTP request from the agent to be logged by the BOOTP server which then supplies the required IP information.

Table 3-3

BOOTP State	IP Address Configured	BOOTP Requests. . .
Enabled (default)	No	Sent continuously (approx. every 512 secs.) until address is discovered
Enabled	Yes	Not sent, IP address is known
Disabled	Yes/No	Not sent

Follow the instructions below to set the BootP communications parameters.

1 Log on to the Switch 2000 TR.

2 Select Switch Management from the main menu.

3 Select *Stack*

4 Select Setup.

The Stack Setup screen appears. See Figure 3-12.

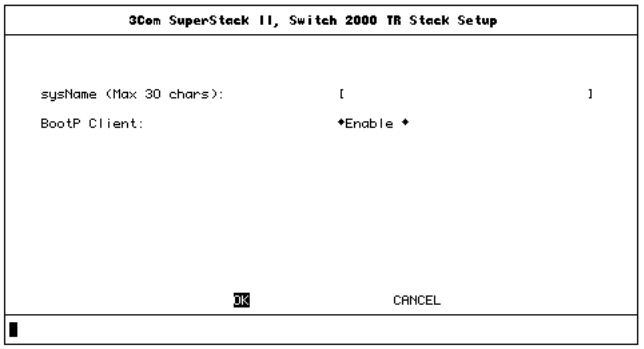

Figure 3-12 Stack Setup Screen (BootP Setup)

5 (Optional) Enter a sysname for the stack.

6 Toggle the [Space Bar] to Enable or Disable BootP.

Auto Logout

The Switch 2000 TR has a built-in auto logout feature which disables the VT100 interface after approximately three minutes without keyboard activity. This feature provides a level of security for network managers.

To view the Auto Logout screen proceed as follows:

1 After approximately three minutes without keyboard activity from any VT100 screen the following message appears at the bottom of the screen:

"Warning:Inactivity timer expiring within 10 seconds." After the above warning is posted the following message appears:

"Inactivity timer expired."

2 Press [Enter].

The Auto Logout screen appears. See Figure 3-13.

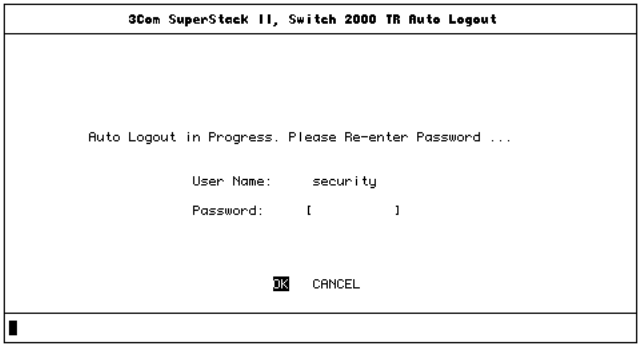

Figure 3-13 Switch 2000 TR Auto Logout Screen

3 Enter your password.

4 Press [Enter].

You return to the screen you were viewing before the inactivity timer expired. Refer to Table 3-2 for passwords.

Upgrading Software

The Software Upgrade feature allows you to download new software images using TFTP running over UDP/IP.

When 3Com Corporation issues a new version of the software image for the Switch 2000 TR, you can obtain it from the 3Com Bulletin Board Service. See "3Com Bulletin Board Service in Appendix F.

You can download a version of the software image from a single unit in a stack. In most cases this unit will be the head unit. The file name "Unit # n" (see the Field Name field in Figure 3-14) is reserved for that purpose, where "n" specifies the ID of the unit from which the download occurs.

The following download procedure assumes that you have more than one switch in your stack and that the download proceeds from the head unit:

1 From the Switch 2000 TR main menu, select SOFTWARE UPGRADE.

2 Press [Return].

The Software Upgrade screen appears. See Figure 3-14.

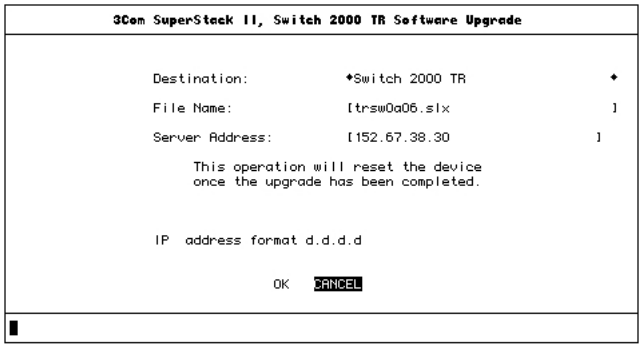

Figure 3-14 Software Upgrade Screen

3 In the Destination field, press [Space Bar] until *Switch 2000 TR* appears.

The Destination field identifies the device that will receive the software upgrade.

4 Enter the name of the file in File Name field.

This name identifies the file that contains the software image to be downloaded. You must place the image file in a location where it is accessible to the TFTP load request. Check with your system administrator if you are unsure of where to place the image file.

5 Enter the address of the Server where the image is stored.

The address identifies the host that contains the software image.

6 Select OK.

The software download begins. While the download is under way, the MGMT LED flashes green and the

screen locks. When the download completes, the Switch 2000 TR automatically resets and re-boots with the new software image.

7 In the File Name field, enter "UNIT # n".

Where "n" specifies the unit ID of the unit from which the download occurs. In most cases this unit will be the head unit: Unit # 1.

This procedure downloads the software image from "Unit # 1" to all other units in the stack

Upgrading Module Software

The ATM, FDDI, and TR-in-FE Modules have their own software which is upgraded independently of the Switch software. If you own one of these modules, you will need to upgrade the software.

To perform a software upgrade for a module, follow the steps in "Upgrading Software" above, except in Step 3 select ATM Module, FDDI Module, or TR-in-FE Module in the Destination field.

For more information regarding these modules, see:

- SuperStack II Switch 2000 TR ATM OC-3 Module User Guide (Part Number #99041)
- SuperStack II Switch 2000 TR FDDI Module User Guide (Part Number #99048)
- SuperStack II Switch 2000 TR Token Ring-in-Fast Ethernet Module User Guide (Part Number #99045)

Resetting the Switch 2000 TR

This section provides instructions for resetting the Switch 2000 TR.

Because some configurable parameters require that you reset the Switch 2000 TR after making changes, it is important to understand the reset procedure before proceeding.

You have four different ways to reset the Switch 2000 TR:

- VT100 Console
- LCD Console
- Reset button
- Power cycle

VT100 Console Reset

The Switch 2000 TR must be reset after making certain changes using the VT100 interface. You may make more than one change before committing them to memory by resetting.

To reset the Switch 2000 TR from the VT100 interface when you have made changes, take these steps:

1 Select RESET from the Switch 2000 TR Main Menu.

The Switch 2000 TR TR Reset screen appears. See Figure 3-15.

2 Select OK to confirm the reset or CANCEL to stop the reset. If you select OK you will be prompted to confirm again.

The Switch 2000 TR resets.

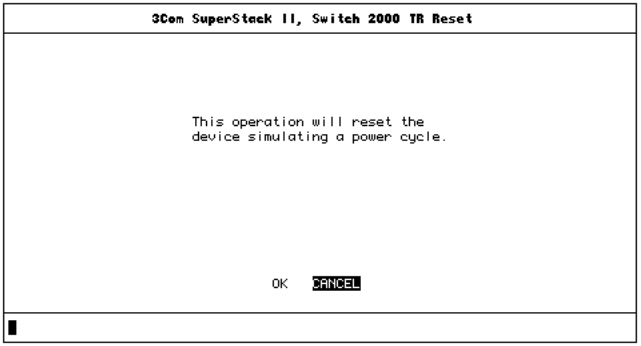

Figure 3-15 Switch 2000 TR Reset Screen

LCD Console Reset

When you make certain parameter changes using the front panel LCD console, you must commit them to system memory by performing a reset.

To reset the Switch 2000 TR using the LCD, proceed as follows:

1 Press [Up or Down Arrow] until **Switch 2000 TR>Reset** appears.

2 Press [Enter].

The Confirm RESET? screen appears.

3 Press [Enter] to confirm.

If you decide not to reset at this point you may press [Left Arrow] to cancel and return to the previous screen.

The Switch 2000 TR resets.

Reset Button

The Switch 2000 TR has a reset button on the rear panel of the unit. See Figure 3-16.

To reset the Switch 2000 TR using the Reset button, proceed as follows:

1. Locate the Reset button on the rear panel of the Switch 2000 TR.
2. Press the switch once.

   The Switch 2000 TR resets.

NOTE: The *rear panel Reset button also provides access to the Emergency Software Download facility. Press switch twice quickly to view. Refer to Appendix A for more information.*

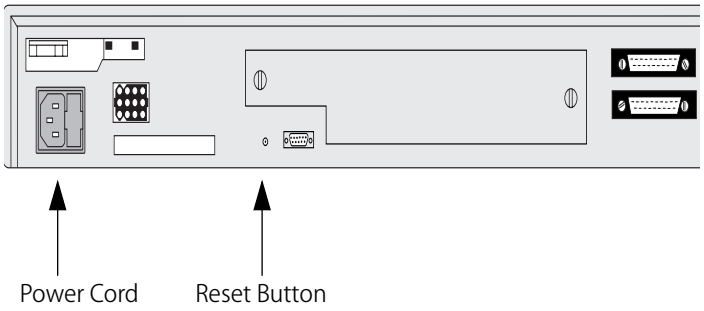

Figure 3-16 Location of Reset Button and Power Cord on the rear panel of the Switch 2000 TR.

Power Cycle Reset

The Switch 2000 TR can also be reset by removing the power cord from the rear panel of the unit.

To reset the Switch 2000 TR by removing the power cord, take these steps:

1. Locate the power cord on the rear panel of the Switch 2000 TR.
2. Remove the power cord from the power socket.
3. Insert the power cord.

   The Switch 2000 TR resets.

4 CONFIGURING WITH THE VT100 INTERFACE

The VT100 console is accessed via the serial console and provides access to all configuration, management, and monitoring facilities.

- Quick Setup
- Bridge Configuration
- Port Configuration
- Port Bridge Configuration
- I/O Module Configuration
- Stack Configuration
- VLAN Configuration
- Unit Configuration
- Administrative Configuration
- About the Switch Database (SDB)
- Switch Database Configuration
- SNMP Trap Configuration
- Serial Port Configuration
- Initializing the Switch 2000 TR

Figure 4-1 illustrates the portion of the VT100 interface that pertains to the configuration parameters. For more information on the VT100 interface, refer to Chapter 3.

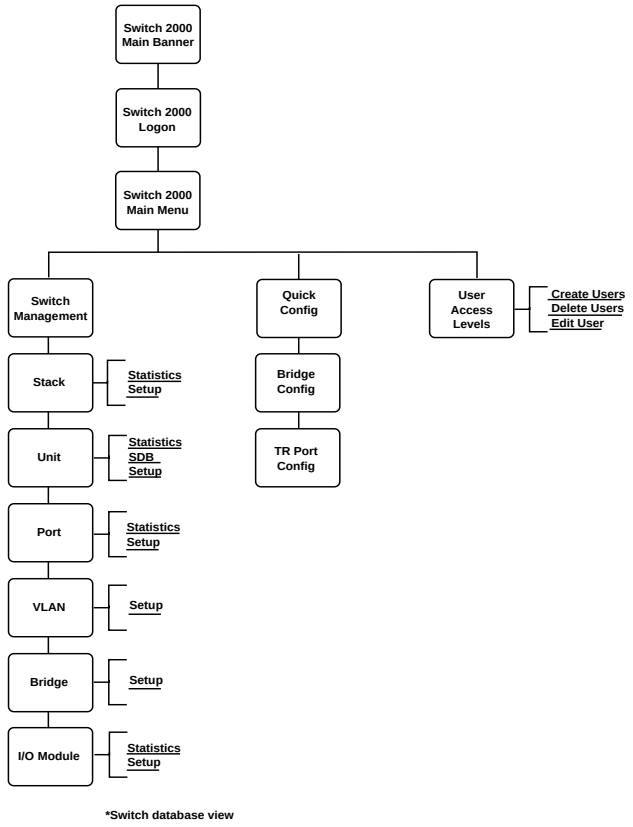

Figure 4-1 VT100 Configuration Path

Quick Setup

The Quick Setup option provides direct access to the Bridge Setup and TR Port Setup screens.

1 Log on to the Switch 2000 TR.

The Main Menu appears. See Figure 4-2.

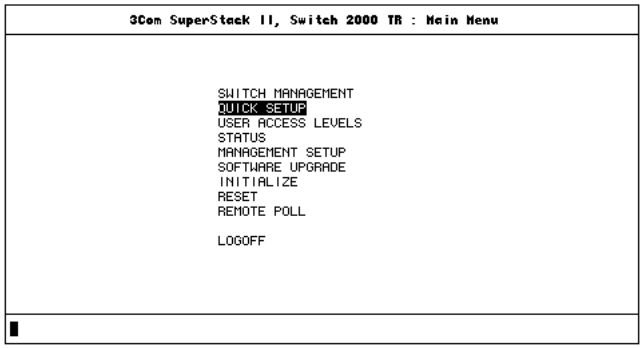

Figure 4-2 Main Menu with Quick Setup Highlighted

2 From the Main Menu, select Quick Setup.

The Quick Config screen appears. See Figure 4-3.

Figure 4-3 Quick Config Screen

3 From the Quick Config screen, select either Bridge Setup or TR Port Setup.

See the "Bridge Configuration" and "Port Configuration" sections for information about the setup screens.

Bridge Configuration

The bridge configuration section includes information on the following:

- Source Routing Transparent (SRT)
- Source Route (SR)
- Transparent (TP)
- Spanning Tree Fields

Setting Source Routing Transparent (VT100)

NOTE:*This bridge setting requires that you reset the switch. Refer to "Resetting the Switch 2000 TR in Chapter 3 for instructions.*

1. Log on to the Switch 2000 TR.
2. Select Switch Management from the Main Menu.
3. Press [Space Bar] and select *Bridge*.
4. Select SETUP. The TR Bridge Setup screen appears.

```
3Com SuperStack II, Switch 2000 TR Bridge Setup

Number Of Logical Ports:  28
Bridge Type:              *SRT                *
Spanning Tree Support:    *Disabled*
BPDU Address:              Not Applicable
Bridge Number:            [1] Hex


  Spanning Tree Parameters                Transparent Parameters

Priority:          [32768]                   Entry Age: [300   ] seconds
Bridge Hello Time: [2 ]   seconds
Bridge Max Age:    [20]   seconds
Forward Delay:     [15]   seconds

     OK          PORT SETUP                    CANCEL
```

Figure 4-4 TR Bridge Setup Screen

5. Select OK.
6. Select *SRT*. Press [Space Bar] to change.
7. Press [Return].
8. Select *IBM*, *802.1d*, or *disabled* in the Spanning Tree Support field. A BPDU value is automatically assigned:
   - 802.1d Spanning Tree—80-01-43-00-00-00
   - IBM Spanning Tree—C0-00-00-00-01-00
9. Assign a Bridge Number. Enter in Hex. Choose from 0 to f.
10. Select OK.
11. From the Main Menu, press [Space Bar] until *Port* appears. Select the proper unit and port ID to configure.
12. Select SETUP. The TR Port Setup screen appears. See Figure 4-5.

```
3Com SuperStack II, Switch 2000 TR Port Setup

  Unit ID: 6                                MAC Address:       0002ba83c751
  Port ID: UNKN
  Admin. State:     *Disabled*              VLAN ID:           [1 ]
  Personality:      *Adapter*               Internal Priority: *Normal*
  Congestion Ctrl:  *Non-Blocking*          Token Priority     *Normal  *
  Speed:            *16 Mbit/sec*
  Forwarding Mode:  *Cut-Thru         *     Forwarding State:  Cut-Thru

Dynamic Cut-Thru Control
  Rising Threshold%:   [0 ]                 Loc. Adm. Address: [000000000000]
  Falling Threshold%:  [0 ]                 Range: 400000000000-7FFFFFFFFFFF

Broadcast Storm Control
  Rising Threshold%:   [0 ]                 Rising Action:     *none         *
  Falling Threshold%:  [0 ]                 Falling Action:    *none         *

                  OK          BRIDGE          CANCEL
```

Figure 4-5 TR Port Setup Screen

13 At the bottom of the TR Port Setup screen, select BRIDGE. The Port Bridge Setup screen appears. See Figure 4-6.

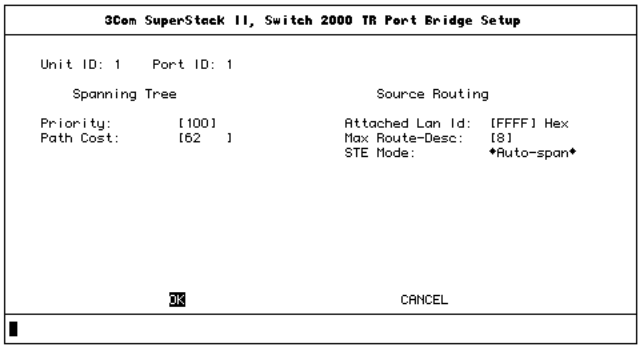

Figure 4-6 Port Bridge Setup Screen

14 In the Attached LAN ID field, enter the LAN ID in hex.

15 From the STE Mode field, select *Auto-Span*.

16 Select OK. Repeat for all ports as desired.

Setting Source Route Bridging

1 Log on to the Switch 2000 TR.

2 From the Main Menu, select Switch Management.

3 Press [Space Bar] and select *Bridge*.

4 Select SETUP. The TR Bridge Setup screen appears.

5 In the Bridge Type field, select *Source-route only* by toggling the [Space Bar].

6 In the Spanning Tree Support field, select *IBM*. The BPDU value is automatically assigned: C0-00-00-00-01-00

7 Assign a Bridge Number. Enter in Hex from 0 to F.

8 In the Max Age field, type 6.

9 In the Forward Delay field, type 4.

10 Select OK.

11 In the TR Management screen, press [Space Bar] until *Port* appears. Select SETUP. The TR Port Setup screen appears.

12 At the bottom of the TR Port Setup screen, select BRIDGE. The TR Port Bridge Setup screen appears.

13 In the attached Lan Id field, enter a LAN ID in hex (0-FFF).

NOTE: *A value of FFFF indicates an unassigned LAN ID. Use FFFF if the port is either unused or attached to a transparent-only segment.*

14 In the STE Mode field, select *Auto-span*.

15 Select OK. Repeat for all ports as desired.

Setting Transparent Bridging

NOTE: *This bridge setting requires that you reset the switch. Refer to "Resetting the Switch 2000 TR in Chapter 3 for instructions.*

1 Log on to the Switch 2000 TR.

2 From the Main Menu, select Switch Management.

3 Press [Space Bar] and select *Bridge*. The TR Bridge Setup screen appears.

4 In the Bridge Type field, select *Transparent-only*.

5 In the Spanning Tree field, select *802.1d* to enable 802.1d compliant Spanning Tree for the Switch 2000 TR. The BPDU value is automatically assigned: 80-01-43-00-00-00.

6 Select OK. Repeat for all ports as desired.

Spanning Tree Fields

Spanning Tree is an algorithm designed to eliminate loops in networks. The algorithm detects and logically prohibits redundant paths by placing some bridge ports in the blocking state so that only one route exits between any two LANs and therefore any two stations. After Spanning Tree eliminates redundant paths, the network reconfigures and stabilizes. Any time the network topology changes the algorithm automatically re-learns the new configuration and adjusts the bridge ports accordingly. This guarantees that all stations are connected.

Spanning Tree Parameters

The following parameters are components of the Spanning Tree algorithm. These are set to factory defaults.

- **Priority**—This setting influences the choice between the root bridge and the designated bridge. The bridge with the lowest priority is the one most likely to be used as the root bridge by Spanning Tree.
- **Entry Age**—The period of time that must expire between sends before a MAC address is "aged out" (removed) from the switch data base (transparent bridging table).
- **Bridge Hello Time**—The period of time between the generation of configuration messages by a root bridge is known as Hello Time.

  In networks where the probability of losing configuration messages is high, a short Hello Time is desirable. In networks that are fairly stable, a longer time lowers the overhead of the Spanning Tree algorithm.
- **Bridge Max. Age**—Maximum Age determines the amount of time the current Spanning Tree configuration data is judged too old and discarded from the Switch 2000 TR's memory. Maximum Age should never be reached in a properly configured Spanning Tree.

  If this value is too small, the Spanning Tree must configure too frequently. If this setting is too high the network requires more time to adjust to changes in the topology.
- **Forward Delay**—The Forward Delay value determines the amount of time the Switch 2000 TR spends in the "listening "and "learning" states. This prevents the forwarding of data packets until all parts of the topology have been notified of a change in the topology.

  A low value can result in temporary loops as the Spanning Tree reconfigures the topology. A setting that is too high forces the network to wait longer for Spanning Tree to reconfigure the topology.

NOTE:*For more information on Spanning Tree and bridging concepts refer to* ***Interconnections:Bridges and Routers*** *by Radia Perlman. Addison-Wesley Publishing Company, Reading MA. © 1992.*

Port Configuration

The Port configuration section includes directions for configuring ports of the Switch 2000 TR, including:

- Admin State
- VLAN ID
- Port Personality
- Internal Priority
- Congestion Control
- Token Priority
- Speed
- Forwarding Mode
- Cut-Thru Threshold%
- Locally Administered Address
- Broadcast Storm Control
- Port Bridge Settings
- Spanning Tree Fields

NOTE:*All settings in the Port Setup screens are "live" settings. They take effect immediately unless otherwise noted.*

For more information on the port, refer to "Port Statistics in Chapter 6.

Setting Up Ports

1. Log on to the Switch 2000 TR.
2. Select Switch Management from the Main Menu.
3. Press [Space Bar] and select *Port*.
4. Enter the desired port and unit ID.
5. Select SETUP. The TR Port Setup screen appears.

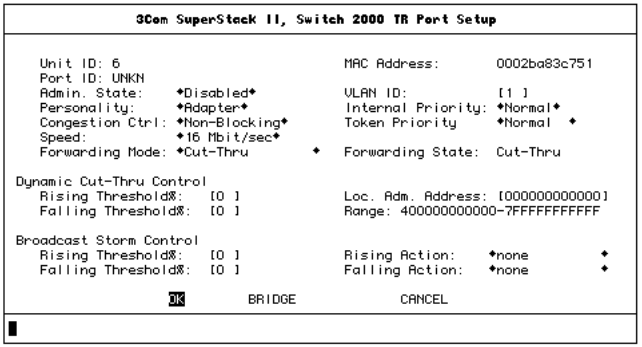

Figure 4-7 TR Port Setup Screen

Setting the Port Admin. State

Use the Admin. State field to enable or disable individual ports.

1. Set this field by toggling the [Space Bar].
2. Press [Return].

Setting VLAN ID

The VLAN ID field allows you to assign ports to a VLAN (workgroup) which can only communicate with other ports in the same VLAN. You have the ability to assign ports to up to 15 separate VLANS. VLANs are

identified by their VLAN ID. All ports are configured by default to VLAN 1.

1 Set this field by entering the desired VLAN number for the current port.

2 Press [Return].

Setting Port Personality

Ports 1 through 4 on the Switch 2000 TR can be set to *Adapter* or *Hub*. In "adapter" mode, the port can connect to a token ring hub such as a SuperStack II Hub TR. In "hub" mode, the port acts like a hub port and can support a directly-connected workstation or server. Ports 5 through 12 support "adapter" mode only.

An external adapter cable can be used to directly attach workstations to ports 5 through12.

1 Set this field by toggling the [Space Bar] to your choice.

2 Press [Return].

Setting Port Priorities

Switch 2000 TR has two fields for setting priority:

- **Internal Priority**—The Internal Priority field allows you to distribute the available bandwidth among the ports. High-priority ports are given priority access to internal resources, taking priority over Normal priority ports. Settings are High or Normal.
- **Token Priority**—The Token Priority field determines the priority of a token ring port on the Switch 2000 TR when transmitting to a segment.

For example: In Normal-priority a token level of 4 is reserved and all packets are transmitted with a token priority of 4 or higher, if necessary. In High-priority mode, a token level of 6 is reserved and all packets are transmitted with a token priority of 6 or higher, if necessary.

If Token Priority is disabled on a port, then packets are transmitted from that port with the priority token that is available at the time. Token Priority is turned off if disabled.

1 Set this field by toggling the [Space Bar].

2 Press [Return].

Setting Congestion Control

Congestion Control provides a method for determining how the Switch 2000 TR reacts in high-traffic load scenarios. Rather than discarding packets, this unique feature allows you to control the flow of traffic by assigning alternate methods for traffic handling. Choices:

- **Flow Control**—Flow Control allows you to eliminate frame loss by buffering excess frames at the end station where space is available until the Switch 2000 TR's buffers are free. Once the buffers on the Switch 2000 TR are free, the end station's buffers are emptied to the Switch 2000 TR and packet loss is eliminated.
- **Non-blocking**—Non-blocking is the factory default state. In this mode frames are forwarded to available destination rings. This occurs even if a frame has been buffered due to a busy or down

ring ahead in the queue. The frame that has been buffered for the busy or down queue is discarded so that deliverable packets can proceed.

- **Disabled**—In the disabled mode, neither Flow Control or Non-blocking are in use.

1 Set this field to one of the aforementioned fields by toggling the [Space Bar].

2 Press [Return].

Setting Port Speed

Speed sets the data rate of ports. Choices:

- **16 Mbps** (default)
- **4 Mbps**

1 Set this field by toggling the [Space Bar].

2 Press [Return].

Setting Forwarding Mode

Set the forwarding mode for individual ports using this field. Choices:

- **Store & Forward**—In this mode, packets are received and buffered (stored) in their entirety until they are forwarded. Errored frames will not be forwarded on the source ring. Although this guarantees packet stability, it also involves a transit delay.
- **Cut-thru**—Cut-thru avoids the transit delay found in standard store-and-forward methods. Cut-thru can only be applied between ports that are operating at the same wire speed or from a high-speed port to a low-speed port.
- **Dynamic Cut-thru**—Dynamic Cut-thru monitors the error rates on the port. If a user-defined threshold is exceeded, the switch port changes to store-and-forward until the error rate reduces. Once the error rate is reduced, the switch returns to cut-thru mode.

1 Set this field by toggling the [Space Bar].

2 Press [Return].

Dynamic Cut-Thru Threshold%

The Dynamic Cut-Thru Threshold% field allows you to view the forwarding mode threshold percentage, which determines the degree to which errored packets are allowed to pass before the Switch 2000 TR reverts to Store & Forward mode. These thresholds apply only when the Switch 2000 TR is configured in Dynamic Cut-thru mode. The two threshold fields are:

- **Rising Threshold**—When this threshold is exceeded, the Switch 2000 TR reverts to Store&Forward mode.
- **Falling Threshold**—When this threshold is crossed, the Switch 2000 TR reverts to Cut-thru mode.

Setting the Locally Admin. Address

The Locally Administered Address field allows you to assign individual MAC addresses to each port. This feature is useful for identifying specific ports by their addresses.

To set a Locally Administered Address, take these steps in the Locally Admin. field:

1 Enter address in hexadecimal.

This should be between 400000 000000 and 7FFFFF FFFFFF.

2 Press [OK].

3 Reset the Switch 2000 TR.

NOTE:*The Locally Administered address will not be valid until the Switch 2000 TR is reset. Refer to "Resetting the Switch 2000 TR in Chapter 3 for instructions on resetting.*

To reverse the Locally Administered address and revert to the resident MAC address enter all zeros and reset the Switch 2000 TR.

Setting Broadcast Storm Control

The Switch 2000 TR automatically creates an alarm on each of its ports for monitoring broadcast levels if an alarm is set. This field allows you to set broadcast threshold levels on each port. You can also set the threshold action per port. Thresholds are calculated using a moving 20 second window.

Rising Threshold%

The Rising threshold percentage setting determines the amount of broadcast traffic that will be allowed before an alarm is sent. The default setting is 60%.

Falling Threshold%

The Falling threshold percentage setting determines the level at which the broadcast threshold will be reset. This setting prevents the rising threshold events from being triggered continuously. Events are only enabled after the Falling Threshold is met. The default setting is 50%.

1 Set the threshold fields by entering a number between 0 and 99.

2 Press [Return].

Rising Action

Use this field to set alarm action for the rising threshold. You have the following choices:

- **None**—No action
- **Event**—Event generated for SNMP
- **Blip**—Port disabled, then enabled after 5 seconds
- **Event+blip**—Port disabled, then enabled after 5 seconds and event generated

Falling Action

Use this field to set the action for the falling threshold. Choices:

- **None**—No action. Default
- **Event**—Event generated

1 Set the action fields by toggling [Space Bar] to the desired threshold actions.

2 Press [Return].

Port Bridge Configuration

Set the Spanning Tree and Source Routing fields for the Port using the Bridge selection, located at the bottom of the Port Setup screen. Choices are:

- Priority
- Path Cost
- Attached LAN ID
- Max. Route-Desc
- STE Mode

From the Port Setup screen, perform these steps.

1 Select *Bridge* from the lower portion of the Port Setup screen.

The Switch 2000 TR Port Bridge Setup screen appears. See Figure 4-8.

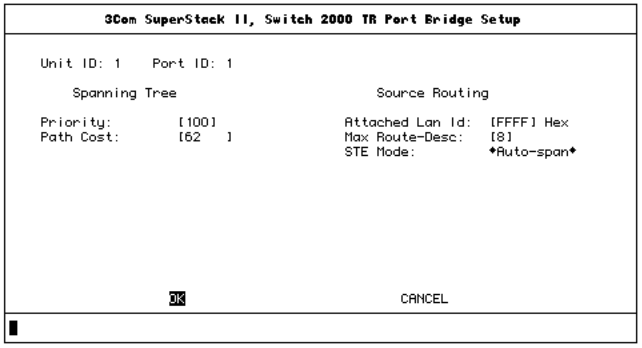

Figure 4-8 Switch 2000 TR Port Bridge Setup Screen

2 Set Spanning Tree parameters as follows:

- **Priority**—Port priority determines the choice of port when the Switch 2000 TR has two ports connected to the same LAN, creating a loop.

  The port with the lowest value has the highest priority and is deleted by Spanning Tree first.

- **Path Cost**—Path cost determines the amount of overhead required to forward packets to the root through this port.

  The higher the path cost, the less likely Spanning Tree will use a port for forwarding. The lower the cost, the more likely Spanning Tree will use a port for routing.

3 Set the Source Routing parameters by toggling the [Space Bar] as follows:

- **Attached LAN ID**—A unique number that identifies the segment to which port is connected. This value can be set between 0 and FFF (0-4095). A value of FFFF (65535) indicates that no segment number has been assigned to this port.
- **Max. Route-Desc**—This value describes the number of routing descriptions allowed in All Route Explorer (ARE) or Spanning Tree Explorer (STE) frames. This is also referred to as "hop count" limit since it limits the number of rings a packet can traverse.
- **STE Mode**—This value determines how this port responds when presented with Spanning Tree Explorer (STE) packets. Set fields accordingly by toggling the [Space Bar].
  - **Disabled**—Indicates that the port will not accept or propagate STE packets and any packets received will be discarded.

- **Forced**— Indicates that the port will always accept and propagate STE packets.
- **Auto-Span**—Indicates that the port will accept and propagate STE packets when its Spanning Tree state is forwarding.

NOTE:*Spanning Tree does not have to be enabled for this to function correctly.*

4 Select OK to save changes.

I/O Module Configuration

I/O Module configuration allows you to set up for the following module options:

- FDDI
- ATM
- TR-in-FE

For detailed information on configuring your module option, see their respective manuals:

- SuperStack II Switch 2000 TR ATM OC-3 Module User Guide
- SuperStack II Switch 2000 TR FDDI Module User Guide
- SuperStack II Switch 2000 TR TR-in-FE Module User Guide

Stack Configuration

Stack configuration allows you to set these stack attributes:

- sysName
- BootP Client

NOTE:*All settings in the Stack Setup screens are "live" settings. They take effect immediately.*

For more information on the stack, refer to "Stack Status in Chapter 6.

Setting Up the Stack

1 Log on to the Switch 2000 TR.

2 Select Switch Management from the Main Menu.

3 Press [Space Bar] and select *Stack*.

4 Select SETUP. The TR Stack Setup screen appears. See Figure 4-9.

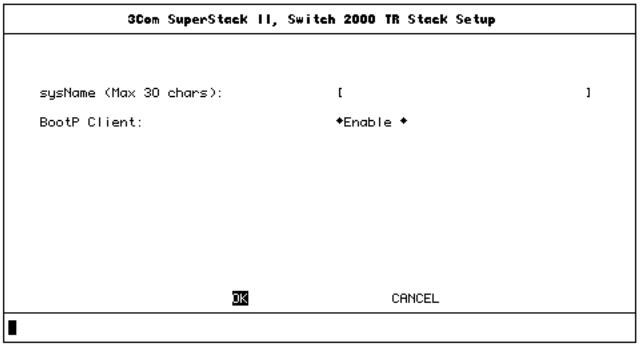

Figure 4-9 TR Stack Setup Screen

Setting sysName

The sysName field allows you to assign an identifying name to the stack. This name is displayed on the top level form.

1 Enter any combination of up to 30 alpha or numeric characters as an identifier. Spaces are allowed.

2 Select OK.

BOOTP Client

If BOOTP Client is enabled and you have a BootP server on your network, an IP address will be assigned automatically to the Switch 2000 TR at power up.

VLAN Configuration

The VLAN Setup screen allows you to:

- Assign ports to VLANs, if those ports use Port VLAN Mode
- Define a backbone port for each VLAN
- View VLAN setup information for the Switch

To access the VLAN Setup screen:

1 From the VT100 Main Menu, select SWITCH MANAGEMENT. The Switch Management screen appears.

2 In the Management Level field, choose VLAN.

3 Choose the SETUP button. The VLAN Setup screen appears as shown in Figure 4-10.

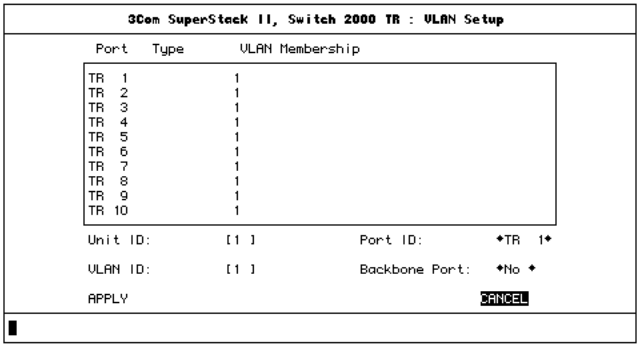

Figure 4-10 VLAN Setup Screen

The screen shows a listbox containing three fields:

- **Port**—This field allows you to select the ID of the port that you want to set up.
- **Type**—This field displays information about the setup of the port:
  - **Bp**—The port is a Backbone port for the VLAN(s) specified in the VLAN Membership field.

    A backbone port is used to connect each VLAN to the backbone of your network, and has the following attributes:

    Addresses received on the port are not stored in the Switch Database.

    Frames with unknown addresses received by the Switch are forwarded to the port.

- **ATM**—The port is an ATM OC-3c Module port. For more information, see the ***SuperStack II Switch ATM OC-3c Module User Guide.***

- **VLAN Membership**—This field displays the ID of the VLAN(s) to which the port belongs.
  - **Port ID**—This field displays the ID of the port currently selected in the listbox.
  - **VLAN ID**—This field allows you to enter the ID of the VLAN to which the port is assigned. All ports by default belong to VLAN 1.

Backbone Port—If the port specified in the Port ID field uses Port VLAN Mode, this field allows you to specify whether the port is a backbone port. Any port in a VLAN can be designated as the backbone port for that VLAN, but you can only have one backbone port per VLAN. By default, all ports belong to the Default VLAN (VLAN 1). Because of this, an unconfigured Switch unit can only have one backbone port.

If you specify that an ATM OC-3c Module port is a backbone port, the port becomes a backbone port for all the VLANs on which it is active. It cannot be the backbone port for one VLAN and a standard port for another.

***NOTE**: If you fit a Plug-in Module into a Switch with no specified backbone ports, the Module automatically becomes the backbone port for the Default VLAN when you power up or initialize the Switch. If a Switch has no Plug-in Module, the high speed cascade interface becomes the backbone port for the Default VLAN when you power up or initialize the Switch.*

APPLY—This button applies any changes to the VLAN database.

VLAN LEC Setup—If the port is an ATM OC-3c Module port, this button allows you access the VLAN LEC Setup screen for extending your VLANs into an ATM network. For more information, see the ***SuperStack II Switch ATM OC-3c Module User Guide.***

Assigning a Port to a VLAN

1. In the Port ID field, type the ID of the required port.
2. In the VLAN ID field, type the ID of the required VLAN.
3. Select APPLY.

***CAUTION:** Initially, all Switch ports belong to the Default VLAN (VLAN 1). This VLAN is the only VLAN which allows an SNMP Network Manager to access the management agent of the unit. If you remove all ports from VLAN 1, then an SNMP Network Manager cannot manage the Switch.*

Specifying a Backbone Port

1. In the Port ID field, type the ID of the required port.
2. In the VLAN ID field, type the ID of the required VLAN.
3. In the Select Port Type field, select Backbone Port.
4. Select APPLY.

Unit Configuration

Unit configuration allows you to view these unit parameters:

- Unit ID
- Unit Name
- Port Capacity
- Option Slot
- Power Supply

For more information on the unit, refer to "Unit Statistics in Chapter 6.

Setting Up the Unit

1. Log on to the Switch 2000 TR.
2. Select Switch Management from the Main Menu.
3. Press [Space Bar] and select *Unit*.
4. Enter the ID of the unit you wish to set up.
5. Select SETUP. The TR Unit Setup screen appears. See Figure 4-11.

Unit ID

The Unit ID identifies the number of the unit for purposes of network management. If you are managing the Switch 2000 TR using Transcend Enterprise Manager, this ID allows you to identify the unit in a stack. Unit number 1 appears at the bottom of the stack. Unit number 6 appears at the top of the stack.

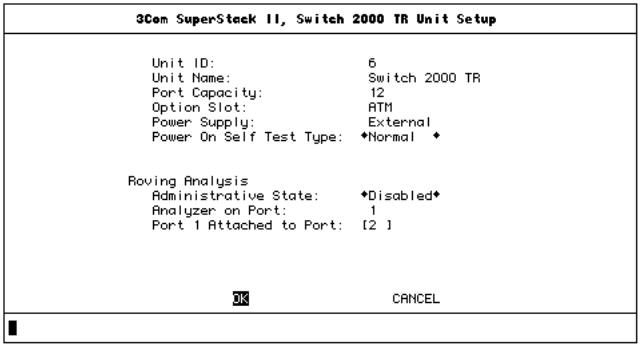

Figure 4-11 TR Unit Setup Screen

Unit Name

Unit Name identifies the type of unit.

For example: Switch 2000 TR

Port Capacity

Indicates the number of ports on a unit.

Option Slot

Identifies any module options activated within the unit.

Power Supply

Identifies the power source as follows:

- **Internal**—Through the internal power supply of the Switch 2000 TR.
- **External**—Through a Redundant Power System (RPS).

Power On Self Test

Use this field to specify the type of self-test to run at start-up:

- **Normal**—A 10 second test that verifies the Switch 2000 TR's basic functions.
- **Extended**—A more comprehensive test that lasts up to 300 seconds.

Roving Analysis

Use the following fields to set up the Roving Analysis function:

- **Administrative State**—Allows you to *enable* or *disable* the Roving Analysis function of port 1 of the Switch 2000 TR. When this field is enabled, port 1 of the Switch 2000 TR can be connected to a LAN analyzer. Roving Analysis is disabled by default.
- **Analyzer on Port—Indicates that Port 1 is the analyzer port. This field cannot be changed.**
- **Port 1 Attached to Port—**Use to select the port you wish to analyze. Choose from ports 2 through 12.

NOTE: *The speed of the Roving Analysis Port must match the speed of the port you are roving into. Port 1 returns to its original state after the Roving Analysis has been disabled.*

Administrative Configuration

This section provides information on the Administrative settings for the Switch 2000 TR.

1 Log on and select USER ACCESS LEVELS from the Main Menu. The TR User Access Levels menu appears. See Figure 4-12.

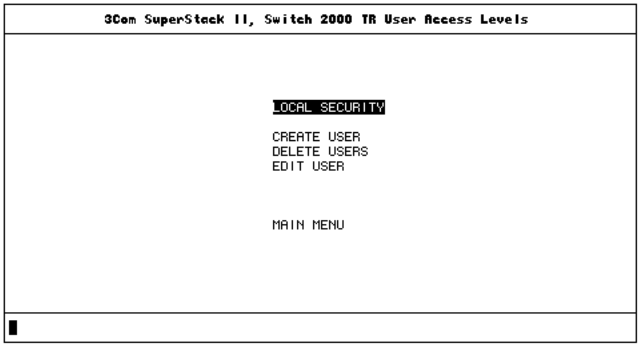

Figure 4-12 TR User Access Levels Screen

The User Access Levels menu allows you to control access to the Switch 2000 TR. Choices:

- **LOCAL SECURITY**—Allows you to view the security for access methods, including serial port, remote Telnet, and Community-SNMP.
- **CREATE USER**—Allows you to add as many as ten new users.
- **DELETE USERS**—Allows you to delete any user except the default users.

- **EDIT USER**—Allows you to change your password and community. You cannot change other passwords or community strings.

2 Select the menu item you want and see the appropriate description and instructions on the following pages.

Setting Local Security

The TR Local Security screen displays a matrix of access options for security levels. Choices:

- **Monitor**—Allows read-only access to a restricted set of manageable parameters.
- **Secure Monitor**—Allows read-only access to all manageable parameters.
- **Manager**—Allows read and write access to operational parameters of the Switch 2000 TR, but not special or security features.
- **Specialist**—Allows access to most manageable parameters except security features.
- **Security** —Allows access to all manageable parameters.

From the TR USER ACCESS LEVELS screen, take these steps:

1 Select LOCAL SECURITY

The Local Security screen appears. See Figure 4-13.

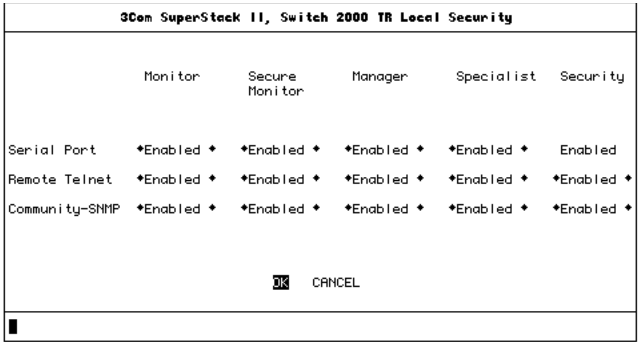

Figure 4-13 TR Local Security Screen

2 Fill in the fields according to these descriptions:

- **Serial Port**—Allows or prevents access to the management facilities via the serial port. You can enable or disable access for each of the security levels, including, Monitor, Secure Monitor, Manager, Specialist.

For security reasons, the serial port access for security level is enabled by default and cannot be changed.

- **Remote Telnet**—Allows or prevents access to the management facilities via the TCP/IP Telnet protocol. Because Telnet has no provision for security and provides access to everyone, you can disable it if your network has important or sensitive data.
- **Community-SNMP**—Allows or prevents access to the management facilities via SNMP using a remote network management application. Although SNMP has limited security features, it is an unsecured protocol. You can disable SNMP access if your network has important or sensitive data.

3 Select OK when you are finished filling in the fields.

Creating New Users

Follow these steps to create new users and assign access levels to the Switch 2000 TR.

From the TR USER ACCESS LEVELS screen:

1 Select CREATE USER.

The TR Create User screen appears. See Figure 4-14.

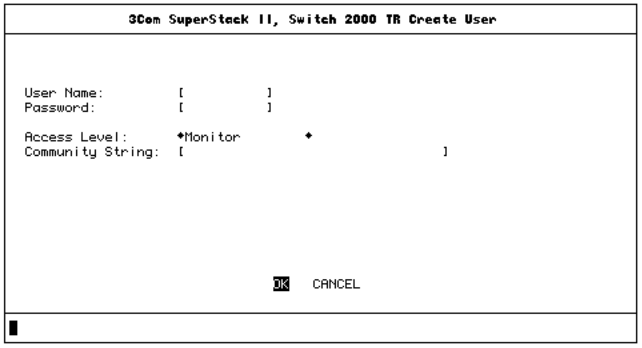

Figure 4-14 TR Create User Screen

2 Fill in the name and password fields according to these descriptions and your network needs. Press [Return] after filling in each field.

- **User Name**—Enter a name for the new user using no more than 10 characters. This field is case sensitive.
- **Password**—Allows you to enter the password for the new user. Passwords can contain up to 10 characters and are case-sensitive. Passwords are not displayed on screen.

3 Assign access levels according to these descriptions and your network needs. Toggle the [Space Bar] to view the levels.

- **Access Level**—Allows you to assign access level for new user as follows:
  - Monitor
  - Secure monitor
  - Manager
  - Specialist
  - Security

4 Press [Return] after assigning a level.

- **Community String**—Assign a community string using any text string of 32 characters or less. The community string is only needed for SNMP access. If you are using a remote SNMP network manager, the community string specified in the network manager's database must be the same as that for the device. The user name is the default.

5 Select OK when you are finished filling in the fields.

Deleting Users

The following steps allow you to delete users from the Switch 2000 TR database. From the TR USER ACCESS LEVELS screen, take these steps:

1 Select DELETE USER.

The Delete Users screen appears. See Figure 4-15.

2 Scroll using the [Down Arrow] until you highlight the user you want to delete. You cannot delete default users or the current user (that is, yourself).

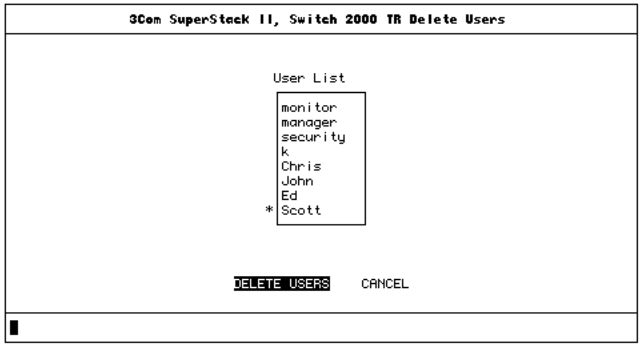

Figure 4-15 Delete User Screen

3 Press [Return] to delete user.

An asterisk appears next to the name you have chosen to delete.

4 Select DELETE USERS to delete the user from the User list.

Editing Users and Changing Passwords

You can edit information about existing users in the Switch 2000 TR database. From the TR USER ACCESS LEVELS screen, take these steps:

1 Select EDIT USER.

The TR Change User screen appears. See Figure 4-16.

2 Fill in fields you wish to edit, including:

- **User Name**—This read-only field displays the name of the user. This field cannot be changed using this screen. To change the name of the user, delete the user and create a new name.
- **Old Password**—Enter the old password for this user.
- **New Password**—Enter the new password for this user.
- **Confirm Password**—Re-enter the new password for verification.
- **Community String**—Enter a new community string.

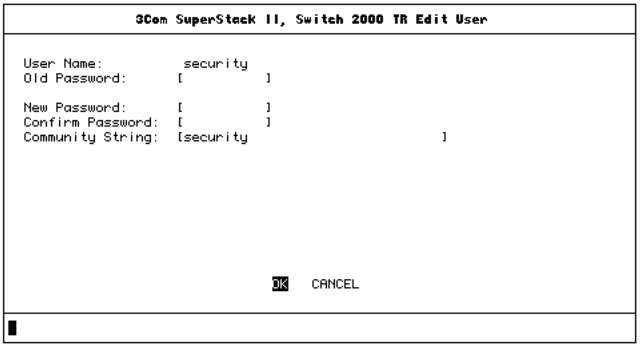

Figure 4-16 TR Change User Screen

3 Select OK when you have completed the changes.

NOTE: *If you forget your password while logged into the Switch 2000 TR, contact your local technical support representative for the next step.*

About the Switch Database (SDB)

The Switch 2000 TR supports a database of transparent addresses received on its local ports. Using this information, the Switch 2000 TR determines whether a transparent frame should be forwarded or filtered. The database holds a maximum of 2000 entries, each of which includes the MAC address and an identifier for the port on which it was received.

The Switch 2000 TR Unit Database View allows you to set up, maintain, and view the Switch 2000 TR database.

SNMP Traps report the database status as follows:

- Database 90% full
- Database 100% full

These traps indicate that the maximum number of users has been or is about to be met. When the maximum number has been met, you cannot add any more users to the database until some are removed. This limitation does not apply to users connected to the remainder of the network.

Database Entries

The Switch 2000 TR database has two types of entries:

- **Aging Entries**—Initially, all entries in the database are the aging type. As traffic moves through the Switch 2000 TR, device addresses are learned and stored. Entries are removed (aged out) if the device has not transmitted any packets for a set period of time (aging time). This practice prevents the database from filling with obsolete entries. When a device is removed from the network, its entry is deleted from the database. Using an SNMP-based management application or the VT100 console (serial port or Telnet session), you can set the aging time (set in seconds) with a default of 5 minutes. Aging entries are deleted if the Switch 2000 TR is reset or turned off.
- **Permanent Entries**—Permanent entries are retained in the database even when the Switch 2000 TR is reset or powered down. Addresses are made permanent by a system administrator via a network manager application and the switch database. Refer to "Switch Database Configuration" for more information.

Database Entry Methods

Entries to the database happen in two ways:

- The Switch 2000 TR can learn up to 2000 addresses. Addresses include the source MAC address and the port identifier of the port on which the source MAC address is seen. Addresses are not learned on the designated downlink.
- The system administrator can enter and update entries using an SNMP MIB browser, a network manager application, or the Switch 2000 TR database screen. Refer to "Switch Database Configuration" for more information.

Switch Database Configuration

The Switch 2000 TR Unit Database View screen allows you to set up, maintain, and view the database. The Switching Database is distributed across the units in a stack. You need to choose a unit before you can observe the addresses learned by that unit. Choices:

- Adding entries to the database
- Deleting entries from the database
- Locating entries in the database

Select SDB at the bottom of the Unit Management screen to access the database. See the highlighted field in Figure 4-17.

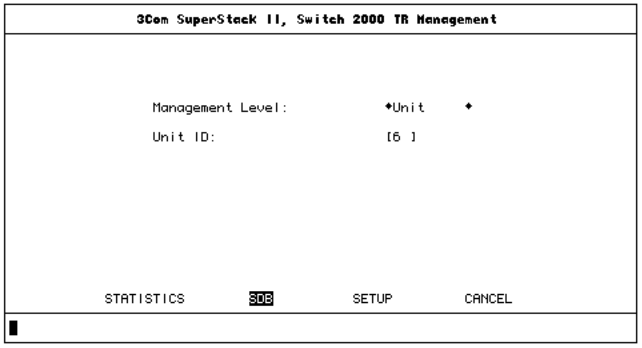

Figure 4-17 TR Management Screen

The Unit Database View appears. Refer to Figure 4-18 and the field descriptions.

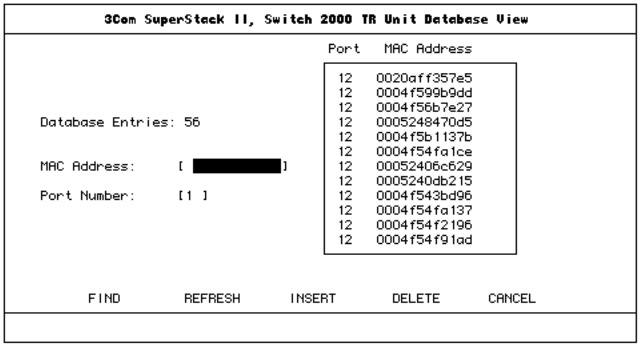

Figure 4-18 Switch 2000 TR Unit Database View Screen

When first powered up, the database appears empty. As addresses are learned or added, they appear in the scrolling list box.

- **Port/MAC Address**—Scrollable list box displays the current entries for each of the ports, except the downlink.
- **Database Entries**—Read-only field displays the number of entries in the database. The database holds up to 2000 addresses.
- **MAC Address**—Field displays the MAC address of a device highlighted in the scrollable list box. Press [Return] to view after you highlight an address.
- **Port Number**—Displays the Port Number of a device highlighted in the scrollable list box. Press [Return] to view after you highlight an address.
- **FIND**—Command allows you to locate any address entry in the database.

- **REFRESH**—Command allows you to refresh the database and display the latest address entries.
- **INSERT**—Command allows you to add an entry to the database.
- **DELETE**—Command allows you to remove an entry from the database.

Adding Entries to the Database

From the Unit Database View screen, take these steps:

1. Enter the MAC address of the device you want to add in the MAC Address field.
2. Enter the Port identifier of the device you want to add in the Port field.
3. Select INSERT.

   Addresses entered using this method are permanent, that is, they do not age out.
4. Press [Left Arrow] to move to a different port number.

Deleting Entries from the Database

From the Unit Database View screen, take these steps:

1. Highlight the device address you wish to remove and press [Return], or enter the address you wish to remove in the MAC address field.
2. Select DELETE.
3. Press [Left Arrow] to move to a different port number.

Finding Entries in the Database

From the Unit Database View screen, proceed as follows:

1. Enter the MAC address of the device you wish to find in the MAC Address field.
2. Select FIND.

   The entry appears highlighted in the list box.

SNMP Trap Configuration

The Switch 2000 TR uses the SNMP protocol to communicate across networks. Traps are messages sent to an SNMP management application. Typical messages include fault and change information.

Many SNMP network management applications have traps that are set automatically. Check the application documentation.

To access the Traps Setup screen, take these steps from the Switch 2000 TR Management Setup menu:

1. Select SETUP TRAPS from the bottom of the TR Management Setup screen.

   The TR Trap Setup screen appears, as shown in Figure 4-19.

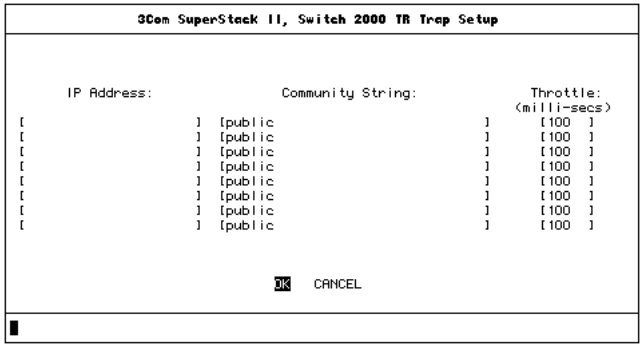

Figure 4-19 TR Trap Setup Screen

The TR Trap Setup screen has these fields:

- **IP Address**—Enter the network address of the remote network management station to which traps are to be sent.
- **Community String**—Enter a 32-character text string for authenticating SNMP communication between the Switch 2000 TR and a remote network manager. The network manager and the Switch 2000 TR must be configured with the same string.

The default community string is ***public.***

- **Throttle**—Prevents a remote network manager from receiving too many traps at the same time. You can configure the Switch 2000 TR to transmit traps within a specific delay time period known as a throttle. The unit of throttle is one thousandth of a second. The default value is 100, which provides a delay of one-tenth of a second between each transmission.

Serial Port Configuration

The VT100 interface provides a screen for setting the parameters of the serial port of the Switch 2000 TR. The serial port provides out-of-band communications with the Switch 2000 TR for purposes of local configuration and communication.

To view the Switch 2000 TR Serial Port Setup screen, proceed as follows, from the Switch 2000 TR Main Menu banner.

1 Select Management Setup.

The Management Setup screen appears.

2 Select SERIAL PORT.

The Serial Port Setup screen appears. See Figure 4-20.

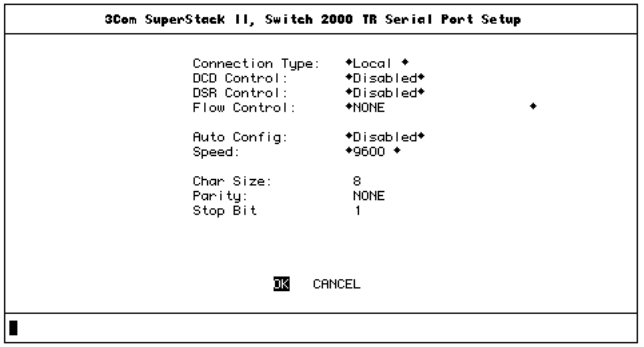

Figure 4-20 Switch 2000 TR Serial Port Setup Screen

NOTE:*If you change any of the serial port parameters, you will terminate any existing sessions that are using the serial port. Be sure that the connecting ter-*

minal's serial port parameters match those on the Switch 2000 TR. This allows you to continue to access the management facility from the equipment after you change the serial port parameters.

The Serial Port Setup screen displays the following:

Connection Type

Local/remote Select Remote if you wish to manage the Switch 2000 TR using a modem; DCD Control and DSR Control will be enabled. For all other cases this should remain at Local.

DCD Control

Enabled/Disabled This field applies to local connection types. This determines if DCD needs to be asserted for remote connection and if the connection requires that DCD be released. Refer to your terminal or modem documentation for more information.

DSR Control

Enabled/Disabled This field applies only to local connection types. This determines if DSR needs to be asserted for remote connection and if the connection requires that DSR be released. Refer to your terminal or modem documentation for more information.

Flow Control

XON/XOFF/NONE/RTS-CTS Unidirectional/RTS-CTS Bidirectional Select the correct flow control option for your terminal or modem. Refer to your terminal or modem documentation for more information.

Auto Config

Enabled/Disabled The Switch 2000 TR can auto-configure the line speed (baud) to work with your VT100-compatible terminal.

Speed

1200/2400/9600/19200 Select the correct line speed (baud) for your terminal or modem.

Char Size

8 Displays the character bit size for the Switch 2000 TR. You should set your terminal to the same value.

Parity

NONE Displays the parity setting for the Switch 2000 TR. You should configure your terminal to the same setting.

Stop Bit

1 Displays the Stop Bit setting for the Switch 2000 TR. You should configure your terminal to the same setting.

Initializing the Switch 2000 TR

The Switch 2000 TR VT100 interface allows you to initialize the nonvolatile memory on the unit and return to the factory defaults. Be aware that all configuration parameters, database entries, and setting will be erased and returned to the original factory-set defaults.

You should only initialize the Switch 2000 TR if:

- The current configuration scheme no longer suits your network.
- All other attempts to solve problems have not succeeded.

From the Switch 2000 TR Main Menu, proceed as follows:

1 Select INITIALIZE from the Main Menu.

The Initialization screen appears. See Figure 4-21.

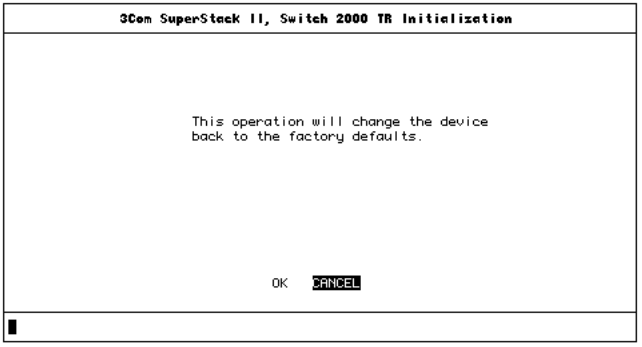

Figure 4-21 Switch 2000 TR Initialization Screen

2 Select OK if you wish to initialize

3 Confirm operation by pressing [Enter].

Switch 2000 TR resets.

Refer to "Device Defaults in Chapter 2 for default information and parameters.

5 CONFIGURING WITH THE LCD CONSOLE

This chapter describes the Switch 2000 TR LCD Console management facilities and provides procedures for configuring and managing the device. This console is accessed from the front panel and provides access to most configuration, management, and monitoring facilities. This chapter assumes you have prepared the Switch 2000 TR for management.

- Unit Configuration
- Bridge Configuration
- Port Configuration
- I/O Module Configuration

For more information on the LCD Console, refer to "LCD Status in Chapter 6 and "Setting Up the LCD Console in Chapter 3.

Unit Configuration

The most important task of setting up the Switch 2000 TR is assigning a Unit ID number to the individual units. When installed as members of a stack, up to 6 Switch 2000 TRs form the equivalent of a switching chassis, managed using the same IP address. All traffic, management, monitoring, and configuration tasks and inquiries operate through the high-speed cascade located at the rear of each unit. The Unit ID number represents the position of the Switch 2000 TR in a stack. Each Switch 2000 TR must be assigned a unique Unit ID number. The LCD Console provides the best method for this task.

To set the Unit ID number, proceed as follows from the Switch 2000 TR>Unit banner:

1. Press [Enter] twice.
2. Using the [Up or Down Arrows], set the Unit ID to #1.

NOTE: *If the unit you are configuring is to be the head unit, it must be the lowest number in the stack.*

3. Press [Enter] to accept (save) the Unit ID #.
4. Press the [Left Arrow] to return to the Switch 2000 TR >Unit screen and complete the remaining LCD configuration tasks as described in this section or use the VT100 console as described in Chapter 4.

Bridge Configuration

Bridge settings can be made using the LCD console. If you have made settings using the VT100 interface, those settings will be reflected in the LCD console. Refer to Chapter 3 for more information on navigating the LCD console.

Although many of the steps in the following procedure are similar, be aware that the settings will vary depending on the bridging environment you choose. Refer to Chapter 1 for more information on the types of bridging supported by the Switch 2000 TR.

NOTE: *Some bridge settings (Spanning Tree) will not take effect until the Switch 2000 TR is reset. Refer to "Resetting the Switch 2000 TR in Chapter 3 for instructions on resetting the Switch 2000 TR.*

From the Switch 2000 TR LCD banner, proceed as follows:

1. Press [Enter].

   Switch 2000 TR >Unit Id appears.

2. Press [Down Arrow] until Switch 2000 TR >Bridge appears.

3. Press [Enter].

   BRIDGE >Bridge Type appears.

4. Press [Enter].

   Bridge Type:<SRT> appears.

5. Press [Down Arrow] to select bridge type. Choose from:

   - SRT (Source Route Transparent)
   - Transparent Bridging
   - Source Route

6. Press [Enter] to select appropriate bridge type.

   BRIDGE >Bridge Type appears.

7. Press [Down Arrow].

   BRIDGE >Spanning Tree appears.

8. Press [Enter].

   Spanning Tree: <802.1d> appears.

9. Press [Down Arrow] to select Spanning Tree type. Choices:

   - **802.1d**—IEEE 802.1d standard. This setting is typically used for Transparent bridging or Source Route Transparent.
   - **IBM**—IBM Spanning Tree standard. This setting is typically used in Source Routing environments.
   - **Disabled**—No Spanning Tree support.

10. Press [Enter].

11. Press [Left Arrow] to return to the higher-level screens in the LCD console.

Port Configuration

Port parameters can also be set from the LCD console on the Switch 2000 TR front panel. If you have made settings using the VT100 interface, those settings will be reflected in the LCD console. Refer to Chapter 3 for more information on navigating the LCD console and the LCD console map.

The screens are circular, meaning that you can access them by scrolling either up or down. For the sake of simplicity, these instructions use only the Down Arrow to move through the screens.

You can set these parameters using the LCD console:

- Port ID
- Link State
- Port State
- Speed Mode
- Personality

Refer to the LCD Console menu map (Figure 3-9) for more information.

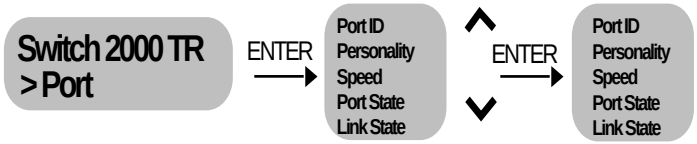

Figure 5-1 LCD Console Port Menu

Setting Port ID

From the Switch 2000 TR>Unit Id # LCD banner, proceed as follows:

1. Press [Enter].

   Switch 2000 TR >Unit appears.

2. Press [Down Arrow] until Switch 2000 TR >Port appears.

3. Press Enter.

   Port >Port ID appears with the port number. Initially the port number shows Port 1.

4. Press [Enter].

5. Use the [Up or Down Arrow] to scroll the ports and select the port you wish to configure.

6. Press [Enter] to select the port.

   Port >Port ID appears, and the port number reflects the port number you chose in step 5.

Viewing Link State

Link State reflects the current state of the port and cannot be changed. Refer to "Port Statistics in Chapter 6 for definitions of the states.

From the Switch 2000 TR>Unit Id # LCD banner, proceed as follows:

1. Press [Enter].

   Switch 2000 TR >Unit appears.

2. Press [Down Arrow] until Switch 2000 TR >Port appears.

3. Press Enter.

4 Press [Down Arrow] until Port # >Link State appears.

5 Press [Enter].

Link State # >[state] appears.

The Link State identifies the current state of the port you are viewing.

- Disabled
- Blocking
- Listening
- Learning
- Forwarding
- Broken

This read-only field cannot be changed.

6 Press [Left Arrow] to return to previous menu.

Setting Port State

From the Switch 2000 TR>Unit Id # LCD banner, proceed as follows:

1 Press [Enter].

Switch 2000 TR >Unit appears.

2 Press [Down Arrow] until Switch 2000 TR >Port appears.

3 Press [Enter].

4 Press [Down Arrow] until Port # >Port State appears.

5 Press [Enter].

Port State # >[state] appears.

The Port State identifies the current state of the port you are viewing.

6 Press [Down Arrow] to select the state. Choices:

- Enable
- Disable

7 Press [Enter] to confirm the state.

If you select Disable, the LED for the corresponding port lights yellow to show the current state.

Setting Speed

From the Switch 2000 TR>Unit Id # LCD banner, proceed as follows:

1 Press [Enter].

Switch 2000 TR >Unit appears.

2 Press [Down Arrow] until Switch 2000 TR >Port appears.

3 Press [Enter].

4 Press [Down Arrow] until Port # >Speed appears.

5 Press [Enter].

Speed # [speed] appears.

Press [Down Arrow] to select speed. Choices:

- 16 MB
- 4 MB

6 Press [Enter] to confirm the speed setting.

7 Press [Left Arrow] to return to the previous menu.

Setting Port Personality

Ports 1 through 4 can each be configured as either "Hub Port" or "Adapter Port." The Adapter mode is the default for these ports. Ports 5 through 12 can only be set as "Adapter Port." Refer to "SuperStack II Switch 2000 TR Front Panel RJ-45 Ports in Chapter 1 for more information.

From the Switch 2000 TR>Unit Id # LCD banner, proceed as follows:

1. Press [Enter].

   Switch 2000 TR >Unit appears.

2. Press [Down Arrow] until Switch 2000 TR >Port appears.
3. Press [Enter].
4. Press [Down Arrow] until Port # >Personality appears.
5. Press [Enter].
6. Press [Down Arrow] to select the state. Choices on ports 1 through 4 only:
   - **Adapter**—Ports on the Switch 2000 TR are designed to act as adapters and therefore, attempt to join a ring according to Token Ring specifications. In this mode the Switch 2000 TR must be connected to a Token Ring hub or MAU.
   - **Hub**—The Switch 2000 TR can also act like a Token Ring hub port and provides a direct station attachment on ports 1 through 4. This feature is especially useful for direct attachment of servers.

NOTE: *Ports 5 through 12 are permanent Adapter ports and cannot be changed. If you try to change the personality of ports 5 through 12, you will be warned that your selection is invalid.*

7. Press [Enter] to confirm the personality on the port.

I/O Module Configuration

The console provides a quick method for viewing information regarding the FDDI, ATM, and TR-in-FE optional modules. Refer to Chapter 3 for more information on navigating the LCD console.

You can display the following using the LCD console:

- Module Type
- Module State
- Hardware Version #
- Software Version #
- Boot Software Version #

To view I/O module status, proceed as follows from the top LCD menu, which displays the Switch 2000 TR banner. See Figure 5-2.

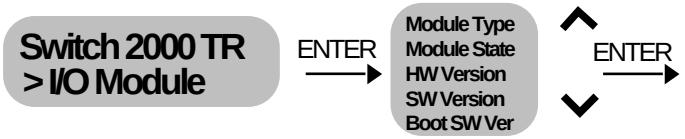

Figure 5-2 I/O Module LCD Menus

1. To view the next level, press [Enter].
2. Press the [Down Arrow] until **Switch 2000 TR > Module** appears.
3. Press [Enter]. **STATUS > Module Type** appears.
4. Press [Down Arrow] to scroll down through the I/O Module menus.
5. Press [Enter] at any one of the following fields to view the information described below. Press [Down Arrow] to move through the circular menus.
   - **Module Type**—One of three module types:
     - FDDI
     - ATM
     - TR-in-FE
   - **Module State**—The current status of the module (UP or DOWN).
   - **HW Version**—The current version of the hardware PROM code.
   - **SW Version**—The current version of the software code. (Not applicable for the TR-in-FE module.)
   - **Boot SW Version**—The current Boot software version. (Not applicable for the TR-in-FE module.)

For more information about setting up the modules refer to the documentation that came with them:

- SuperStack II Switch 2000 TR ATM OC-3 Module User Guide (Part Number #99041)
- SuperStack II Switch 2000 TR FDDI Module User Guide (Part Number #99048)
- SuperStack II Switch 2000 TR TR-in-FE Module User Guide (Part Number #99045)

6 MONITORING THE SWITCH 2000 TR

This chapter provides information on viewing the current operating status of the Switch 2000 TR, displaying errors using the fault log, and carrying out a remote poll (PING).

Regularly viewing statistics allows you to be sure that your network and Switch 2000 TR devices are operating properly. By viewing the performance and statistical data recorded by the Switch 2000 TR, you will begin to see performance patterns develop which can be used to eliminate problems before they impair the operation of your network.

This chapter includes information on the following fields:

- Locating Statistics
- Unit Statistics
- Port Statistics
- Stack Status
- Status
- Fault Log
- Remote Polling (PING)
- LCD Status

Locating Statistics

See Figure 6-1 to locate specific status, statistics, and polling information. Refer to "LCD Status" for information on retrieving LCD statistics.

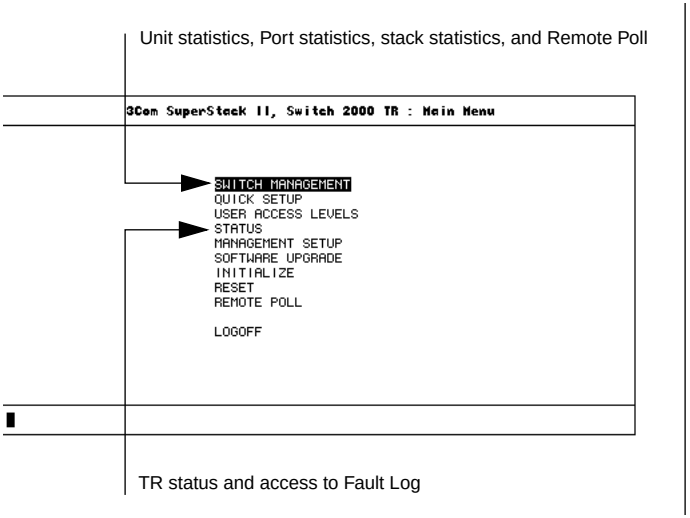

Figure 6-1 Locating Statistic Information and Status

Unit Statistics

NOTE:*The Unit Statistics screen provides an easy method for viewing per-port performance. It displays port traffic activity for each active port. Values are refreshed approximately every two seconds. The counters are reset after the values reach approximately 4.2 billion. See Figure 6-2.*

To view the Unit Statistics screen, take these steps from the Switch 2000 TR Main Menu:

1. Select Switch Management.

   The TR Management screen appears.
2. Press [Space Bar] until Unit appears.
3. Press [Down Arrow] until Statistics highlights.
4. Press [Return].

   The Unit Statistics screen appears.
5. Select statistic category and view.

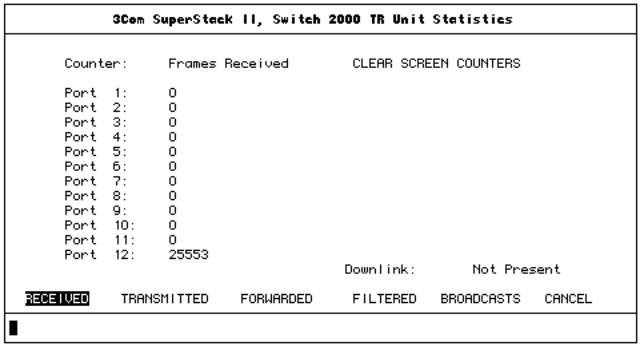

Figure 6-2 Unit Statistics Screen

The Unit Statistics screen displays these buttons:

RECEIVED—The total number of frames that have been received by the port including frames with errors.

TRANSMITTED—The total number of frames transmitted by the port, including frames with errors.

FORWARDED—The total number of frames received and then forwarded by the port.

FILTERED—The total number of frames filtered by this port. Frames are filtered because the destination station was on the same segment as the source station.

BROADCASTS—The total number of broadcast frames seen by the port.

CLEAR SCREEN COUNTERS—Use this button to set screen counters back to zero. This clears only counters displayed in the Unit Statistics screen. It does not affect the counters on the device. This prevents remote SNMP stations from seeing network anomalies.

Port Statistics

The TR Port Statistics screen provides an easy method for viewing individual port performance. See Figure 6-3. TR Port Statistics provide more detailed information on individual ports. This screen also provides access to the Traffic Statistics screen.

To view the TR Port Statistics screen, take these steps from the Switch 2000 TR Main Menu:

1. Select Switch Management.

   The TR Management screen appears.

2. Press [Space Bar] until Port appears.
3. Press [Down Arrow] until Statistics highlights.
4. Press [Return].

   The TR Port Statistics screen appears.

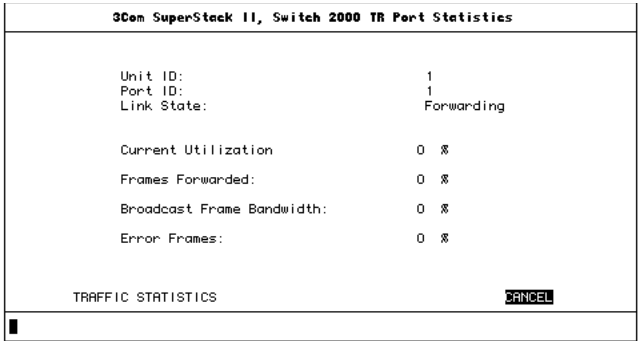

Figure 6-3 TR Port Statistics Screen

The TR Port Statistics screen displays this information:

Unit ID—The number of the unit with which the port is associated.

Port ID—The number of the port you are viewing.

Link State—The current state of the port you are viewing. The port states are:

- **Listening**—The state in which all ports are placed while Spanning Tree configures the network topology. Ports remain in this state until the root bridge is selected. This period should be long enough for a port to hear from all other ports on the switch.
- **Learning**—The state in which ports receive data on the topology of the network for the purpose of learning the stations that are attached to the port. If the port receives no information that would force it into the blocking state, then it moves on to the forwarding state.
- **Forwarding**—This state allows the port to perform standard switching and bridging functions. Packets are received and the port either forwards or discards them based on the address of the packet and the switch's address table.
- **Blocking**—In this state, the port continues to receive data on the status of the network topology but does not transmit them. The port also receives no packets nor learns the addresses of stations for forwarding or receiving.
- **Disabled**—The state in which Spanning Tree has been turned off. Port is disabled by management.

Current Utilization—The percentage of bandwidth usage for the port you are currently viewing. This value indicates the general traffic level on the individual port. Ideally, this figure should be below 60%, which indicates that the port is responsible for a reasonable amount of traffic relative to the entire ring.

High utilization values suggest that you should adjust the network topology by reducing load on that port by segmentation.

Frames Forwarded—A running average of the proportion of the received frames that are forwarded. This value is expressed as a percentage of all received frames, based on a sampling interval of 20 seconds.

Broadcast Frame Bandwidth—A running average of the broadcast frame bandwidth. This value is expressed as a percentage of theoretical maximum bandwidth availability, based on a sampling interval of 20 seconds.

Error Frames—This field displays a running average of the percentage of error frames with CRC errors and is based on a sampling interval of 20 seconds.

Traffic Statistics—Select this category to view the Port Statistics (Traffic) screen. See the next section.

Port Statistics (Traffic)

The TR Port Statistics (Traffic) screen provides a more detailed display of statistics for the port you are viewing. A typical TR Port Statistics (Traffic) screen appears in Figure 6-4.

```
3Com SuperStack II, Switch 2000 TR Port Statistics (Traffic)

  Unit ID:              6
  Port ID:              1
  Frames Received:      0               Octets Received:      0
  Frames Transmitted:   0               Octets Transmitted:   0
  Multicasts Received:  0               Line Errors:          0
  Broadcasts Received:  0               Frames Forwarded:     0


  Cut-thrus Received:   0               Errors:               0
                                        Lost Frames:          0
                                        Abort Frames:         0
Frame Size Analysis.
   18 to 63 Octets:     0   %          64 to 127 Octets:     0   %
   128 to 255 Octets:   0   %          256 to 511 Octets:    0   %
   512 to 1023 Octets:  0   %          1024 to 2047 Octets:  0   %
   2048 to 4095 Octets: 0   %          GT 4095 Octets:       0   %

                CLEAR SCREEN COUNTERS          CANCEL
```

Figure 6-4 Sample TR Port Statistics (Traffic) Screen

The TR Port Statistics (Traffic) screen displays this information:

Unit ID—The identifying number of the unit you are viewing.

Port ID—The identifying number of the port you are viewing.

Frames Received—The total number of frames that have been received by the port including frames with errors.

Frames Transmitted—The total number of frames transmitted by the port, including frames with errors.

Multicasts Received—The number of frames successfully received with a multicast destination address. This number does not include frames

directed to a broadcast address or frames received with errors.

Broadcasts Received—The number of frames received that have a broadcast destination address. This number does not include frames with errors.

Octets Received—The number of octets received by the port, including the MAC header and CRC. Octet counters are accurate to the nearest 256-byte boundary.

Octets Transmitted—The number of octets transmitted by the port, including the MAC header and CRC. Octet counters are accurate to the nearest 256-byte boundary.

Line Errors—The total number of CRC errors that have occurred on the port.

Frames Forwarded—The total number of frames received by this port and then forwarded to their destination address.

Cut-thrus Received—The total number of cut-thru packets received on the port.

Errors—Total of both line errors (CRCs) and lost frames.

Lost Frames—Frame transmitted by the Switch 2000 TR which failed to make the return trip.

Abort Frames—Frames transmitted by the Switch 2000 TR that need to be aborted by transmitting an abort delimiter.

Frame Size Analysis—A series of counters that represent the composition of the traffic on the Switch 2000 TR. The counters display the percentage of packets that are categorized by received length as represented by the following octet parameters:

- 18 to 63 octets
- 64 to 127 octets
- 128 to 255 octets
- 256 to 511 octets
- 512 to 1023 octets
- 1024 to 2047 octets
- 2048 to 4095 octets
- Packets greater than 4095 octets

Stack Status

The Stack Status screen provides easy access to the vital statistics associated with a stack. Units and their status, the software version currently running on each unit and the MAC address of each unit displays.

To view the Stack Status screen, perform these steps using the Switch 2000 TR Main Menu:

1. Select Switch Management.

   The TR Management Screen appears.

2. Press [Space Bar] until Stack appears.
3. Press [Down Arrow] until Statistics highlights
4. Press [Return].

   The Stack Status screen appears.

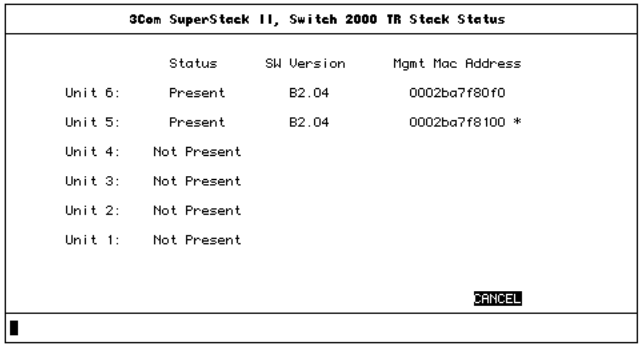

Figure 6-5 TR Stack Status Screen

The Stack Status screen displays this information:

Status—Displays the unit number and the current status and position in the stack.

SW Version—Displays the current resident software version for each unit.

Mgmt MAC Address—Displays the management MAC address for each unit. An asterisk (*) next to a MAC address indicates that the unit is the head unit.

Status

The Status screen provides read-only information about the Switch 2000 TR. Information provided on this screen is especially useful for troubleshooting and monitoring system history.

You can view some Status information using the LCD console on the front panel of the Switch 2000 TR. Refer to "LCD Status" for more information.

To view the Status screen, perform these steps using the Switch 2000 TR Main Menu:

1 Select STATUS and press [Return].

The Status screen appears, as shown in Figure 6-6.

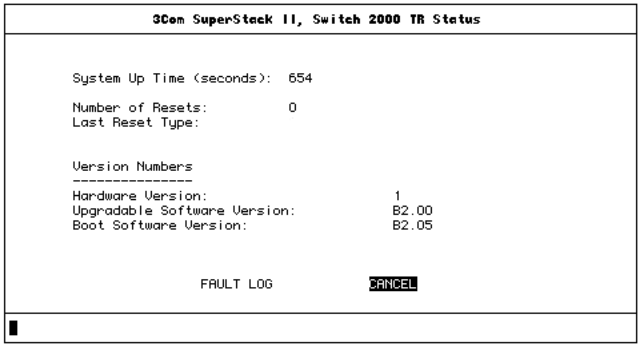

Figure 6-6 Status Screen

The Status screen displays the following information:

System Up Time—The elapsed time in seconds since the Switch 2000 TR was last reset.

Number of Resets—The total number of resets since the Switch 2000 TR was first installed or initialized, by manual power-up, manual reset, or watchdog time-out expiry.

Last Reset Type—The type or cause of the most recent reset on the Switch 2000 TR. Resets may be caused by management command, watchdog time-out, power failure or interruption, a manual reset, or system error. If you experience a problem, give this information to your technical support representative.

Hardware Version—The current hardware version of the Switch 2000 TR. Give this number when you request technical support.

Upgradeable Software Version—The version of the software image stored in Flash EPROM. This version is automatically updated when you download new software. Give this version when you request technical support.

Boot Software Version—The version number of the Boot software stored on the Switch 2000 TR. This number is useful when requesting technical support.

FAULT LOG—Select this button to display the Switch 2000 TR Fault Log. Refer to "Fault Log," next.

Fault Log

The Fault Log displays read-only information about the Switch 2000 TR. The Fault Log updates whenever an abnormal condition occurs. This information is for internal 3Com use only. Your supplier may ask you to quote the Area and Fault Number if you report a problem.

To view the Fault Log, take these steps from the Switch 2000 TR Main Menu:

1 Select STATUS and press [Return].

The TR Status screen appears.

2 Select FAULT LOG and press [Return].

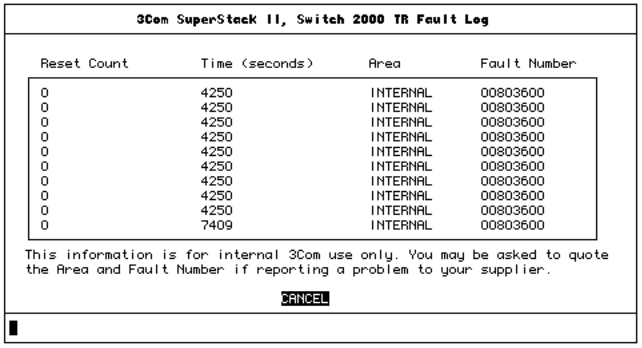

Figure 6-7 TR Fault Log Screen

The TR Fault Log screen appears and the screen displays the following:

Reset Count—The number of resets recorded at the time of the fault.

Time (seconds)—The time elapsed between the last reset when the fault occurred.

Area—Information useful for fault diagnosis by technical support.

Fault Number—A hexadecimal number indicating the type of fault. Give this number to your technical support representative.

Remote Polling (PING)

The Remote Poll screen allows you to send a single frame to a remote device. Use this feature to verify if a remote device is active and responding. It can help locate network problems and is also referred to as PING.

To use the Remote Poll feature, take these steps from the Switch 2000 TR Main Men:

1 From the Switch 2000 TR Main Menu, select ***Remote Poll***.

The TR Remote Poll screen appears.

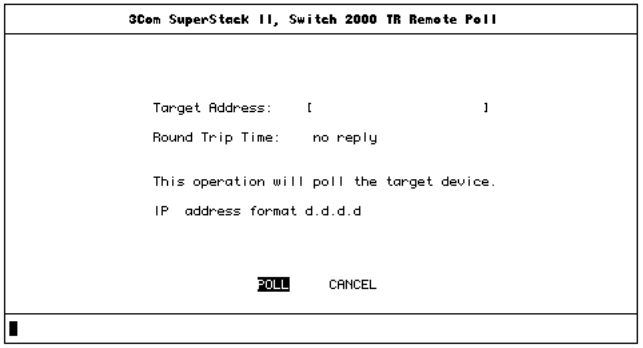

Figure 6-8 TR Remote Poll Screen

2 Enter the IP address of the device you want to poll in the Target Address field.

Follow the address notation conventions as illustrated on the Remote Poll screen.

3 Select ***Poll***.

When the poll is complete, the Round Trip Time displays the interval in milliseconds between sending the frame to the target device and receiving a response at the Switch 2000 TR. If the target device does not respond within approximately 10 seconds, the field displays ***no reply.***

LCD Status

The LCD console located on the front panel of the Switch 2000 TR provides useful hardware, software, and system version information. Refer to Chapter 5 for more information.

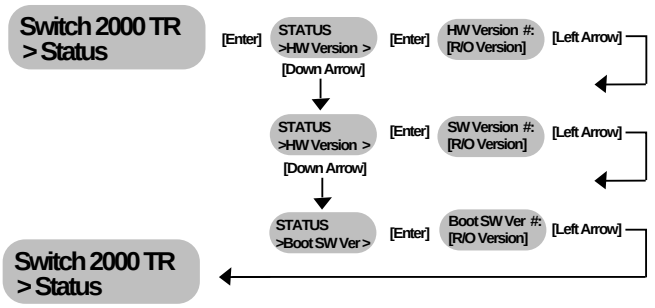

Figure 6-9 LCD Console Status Chart

To view the LCD status, take these steps from the Switch 2000 TR>Unit Id banner:

1. Press [Down Arrow] until Switch 2000 TR>Status> appears.
2. Press [Enter].

   STATUS>HW Version appears.
3. Press [Enter].

   HW Version#: appears and displays the hardware version of the Switch 2000 TR.
4. Press [Left Arrow] to return to the STATUS >HW Version> display.
5. Press [Down Arrow].

   STATUS >SW Version> appears.
6. Press [Enter].

   SW Version #> appears and displays the Boot software version stored on the Switch 2000 TR.
7. Press [Left Arrow] to return to STATUS > SW Version>.
8. Press [Down Arrow].

   STATUS >BOOT SW Ver> appears.
9. Press [Enter].

   Boot SW Ver #: displays the software version stored in the EPROM of the Switch 2000 TR. This version number is automatically updated when you download new software.
10. Use [Left Arrow] to scroll back up through the menus.

7 VIRTUAL LANS

This chapter provides information on Virtual Local Area Networks (VLANs). Definitions, benefits, sample configurations and concepts of VLANs are described here, including:

- What are VLANs?
- Benefits of VLANs
- VLANs and the Switch 2000 TR

Setting up Virtual Local Area Networks (VLANs) on the Switch 2000 TR provides you with less time-consuming network administration and more efficient network operation.

The following sections explain more about the concept of VLANs and explain how they can be implemented on the Switch 2000 TR.

What are VLANs?

A VLAN is defined as a group of location- and topology- independent devices that communicate as though they were on the same physical LAN. This means that LAN segments are not restricted by the hardware that physically connects them; the segments are defined by flexible user groups that you create using software.

With VLANs, you can define your network according to:

- Departmental Groups—For example, you can have one VLAN for the Marketing department, another for the Finance department, and another for the Development department.
- Hierarchical Groups—For example, you can have one VLAN for Directors, another for Managers, and another for general staff.
- Usage Groups—For example, you can have one VLAN for users of email, and another for users of multimedia.

Benefits of VLANs

Implementing VLANs on your network has three main advantages:

- It eases the change and movement of devices on networks.
- It helps to control broadcast traffic.
- It provides extra security.

How VLANs Ease Change and Movement

With traditional IP networks, network administrators spend much of their time dealing with moves and changes. If users move to a different IP subnet, the IP addresses of each endstation must be updated manually.

With a VLAN setup, if an endstation in VLAN 1 is moved to a port in another part of the network, you only need to specify that the new port is in VLAN 1, and this is something that can be done remotely if you have 3Com's Transcend Enterprise Manager for Windows (v6.0 and above).

How VLANs Control Broadcast Traffic

With traditional networks, congestion can be caused by broadcast traffic that is directed to all network devices whether they require it or not. VLANs increase the efficiency of your network because each VLAN can be set up to contain only those devices that need to communicate with each other.

How VLANs Provide Extra Security

Devices within each VLAN can only communicate with devices in the same VLAN. If a device in VLAN 1 needs to communicate with devices in VLAN 2, the traffic must cross a router. Routers have filtering and security features to block unauthorized access.

Figure 7-1 shows a network configured with three VLANs—one for each of the departments that access the network. The membership of VLAN 1 is restricted to ports 1, 2, 3, 4 and 5 of Switch A; membership of VLAN 2 is restricted to ports 4, 5, 6, 7 and 8 of Switch B while VLAN 3 spans both Switches containing ports 6, 7, 8 of Switch A and 1, 2, 3 of Switch B.

In this simple example, each of these VLANs can be seen as a 'broadcast domain'—physical LAN segments that are not constrained by their physical location.

Specific configurations using the Switch are shown later in this chapter.

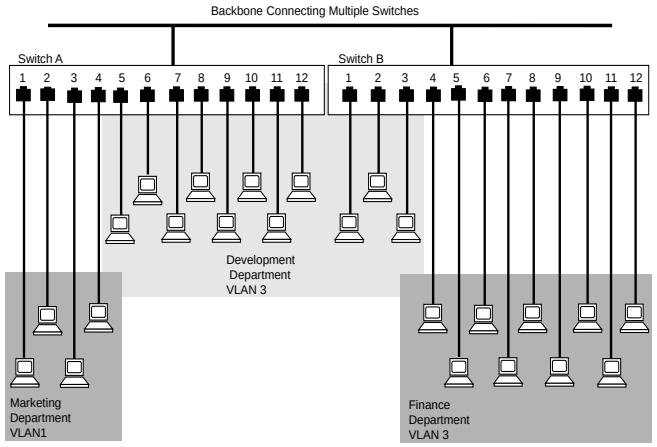

Figure 7-1 The concept of VLANs

VLANs and the Switch 2000 TR

The Switch 2000 TR supports VLANs which consist of a set of switch ports. Each switch port can only belong to one VLAN at a time, regardless of the device to which it is attached.

Each Switch 2000 TR can support up to 16 VLANs. However, you can have more than 16 VLANs in your entire network by connecting the 16 switched VLANs to other VLANs using a router.

The Default VLAN and Moving Ports From the Default VLAN

On each Switch, VLAN 1 is the default. It has two properties:

- It contains all the ports on a new or initialized Switch.
- It is the only VLAN which allows an SNMP Network Manager to access the management agent of the unit.

By default, if a device is attached to a port in the Default VLAN and you want to move the device into another VLAN, you need to use the VLAN Setup screen to place the port in that VLAN.

Connecting VLANs to a Router

If the devices in a VLAN need to talk to devices in a different VLAN, each VLAN requires a connection to a router. Communication between VLANs can only take place if they are all connected to the router. A VLAN not connected to a router is isolated.

Connecting Common VLANs Between Switch Units

In the Switch 2000 TR, you typically connect VLANs to other Switch 2000 TRs and units using ***backbone ports.*** This allows the Switch to forward all frames with an unknown address to the rest of the network, and it also stops the Switch Database from becoming full if there are more than 500 addresses in the network. Note that you normally require one backbone port per VLAN.

In addition, to make the Switch-to-Switch connections more cost-effective, the Switch 2000 TR allows you to specify that one port forms part of a Virtual LAN Trunk (VLT). A VLT is a connection that carries traffic for multiple VLANs between Switch units. If you configure both ends of a Switch-to-Switch connection as part of a VLT, you only need that one connection for all the VLANs.

NOTE: *VLTs can only be used for links between SuperStack II Switch 2000 TR units. You cannot use VLTs for Switch-router links.*

If you specify that a backbone port on one VLAN is part of a VLT, that backbone port becomes a backbone port for all the VLANs on the Switch, even if they had no backbone port before. If you subsequently disable the VLT function on that port, the port becomes the backbone port for the Default VLAN (VLAN 1) and all other VLANs lose their backbone ports.

Using Non-routable Protocols

If you are running non-routable protocols on your network (for example, DEC LAT or NETBIOS), devices within one VLAN will not be able to communicate with devices in a different VLAN.

Using Unique MAC Addresses

If you connect a server with multiple network adapters to the Switch, we recommend that you configure each network adapter with a unique MAC address.

Extending VLANs into an ATM Network

If the Switch has an ATM OC-3c Module installed, you can extend the VLANs you have defined in your existing network into an ATM network. For more information, see the ***SuperStack II Switch ATM OC-3c Module User Guide.***

Example 1

The example shown in Figure 7-2 illustrates a simple VLAN configuration with a single Switch 2000 TR whose ports are divided between two VLANs. VLAN 1 is able to talk to VLAN 2 using the connection between each VLAN and the router.

To set up this configuration:

1. Use the VT100 screens or VLAN Server database to:
   - **a** Place ports 1-6 in VLAN 1.
   - **b** Place ports 7-12 in VLAN 2.
2. Connect a port in VLAN 1 to the router.
3. Repeat steps 2 and 3 for VLAN 2.

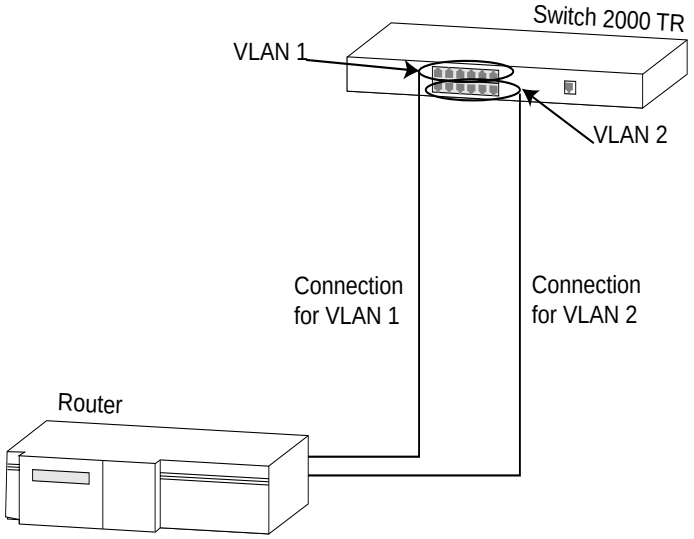

Figure 7-2 VLAN configuration with a single Switch 2000 TR unit

A SOFTWARE UPGRADE UTILITY

The SuperStack II Switch 2000 TR has a back-up Software Upgrade Utility that allows you to:

- Download a new software image if the operational image has been damaged. This feature should be used for emergency situations only!
- Download a new software image for new revisions.

The Software Upgrade Utility is also available through the Switch 2000 TR Main Menu under SOFTWARE UPGRADE. It is easier to access this utility through the Main menu, when it is available. Refer to "Upgrading Software" in Chapter 3 for more instructions.

This appendix provides information on configuring the Software Upgrade Utility:

- **Software Upgrade Command Utility Set**—Keyboard commands for using the Software Upgrade Utility.
- **Using the Software Upgrade Utility**—Procedures for configuring parameters. Downloads are initiated in-band or from another unit in stack using the high-speed cascade connection.

Software Upgrade Utility Command Set

At the > prompt you can enter commands followed by a [Return]. The commands are not case-sensitive.

`A (ip-address)`

Sets the IP address of the Switch 2000 TR. Enter the IP address in dotted decimal format. *For Example:* 192.192.1.1

`B`

Starts the download.

`B (address)`

Starts the download and loads the software from the server with the IP address entered.

`D (ip-address)`

Sets the IP address of the default router. You must set this parameter if the software image is kept on a server beyond a router.

`F (filename)`

Specifies the filename of the software image file. You must enter this value for a successful download. "UNIT# (1 through 8) is reserved for downloading from another unit in stack.

`G`

Re-starts the Switch 2000 TR without downloading a new software image. Use this command after using the command R.

L

Lists the current settings of the Switch 2000 TR and provides a status report for the previous download attempts. Use this command to check that you have entered all the parameters necessary for a successful download.

Figure A-1 represents the screen after using the command.

M (subnet mask)

Enter the subnet mask in dotted decimal format.

For Example: 255.255.0.0

R

Resets the Switch 2000 TR to the factory default values for the main software. Use the G command after using this command.

WARNING: *Resetting the Switch 2000 TR erases all configuration parameters, including IP addressing information.*

P

Allows you to set the personality (A for adapter, H for hub on ports 1 through 4 only) and speed (4 or 16).

For example: P 2 A for port 2 set to adapter or

P 11 16 for port 11 set for 16 Mbps

S (address)

Sets the IP address of the server that holds the new software image file. This command does not start the download. Use the B command to start the download.

Starting the Software Upgrade Utility

1. Connect a terminal to the serial port on the rear panel of the Switch 2000 TR. Refer to "Console Port" in Chapter 1.
2. Quickly (within 3 seconds) press the reset button on the rear panel twice. Refer to "Reset Button" in Chapter 1.

   All LEDs on the front panel light and the Software Upgrade Utility appears on the console. See Figure A-1.

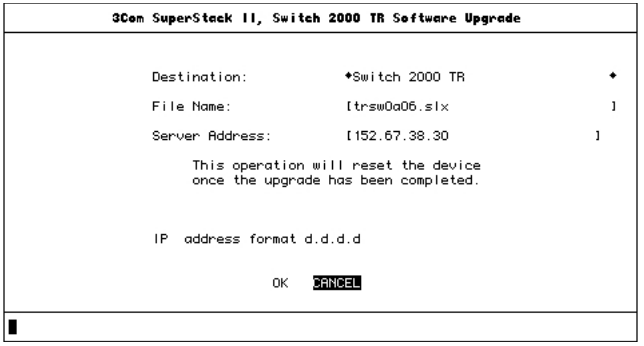

Figure A-1 Software Upgrade Utility Screen

Using the Commands

The following sections tell you how to use the Software Upgrade Utility screen.

If you enter the Software Upgrade Utility accidentally, enter the command G to quit. If you give no keyboard input for 30 seconds, the utility will time out.

Resetting to Factory Defaults

Enter command R and then command G if you do not want to download a new software image.

Downloading a New Software Image

1 Change the following parameters:

- IP address of the Switch 2000 TR to which you will be downloading the new software image (enter A).
- Subnet mask (enter M).
- Default router (enter D). This needs to be set only if the software image file is on a server that needs to be accessed over a gateway or router.
- IP address of the server (enter S).

2 When you have made any necessary parameter changes, Press command B.

The following message appears:

```
Starting Software Upgrade
```

The utility displays a series of dots on the screen as the download proceeds. After approximately two minutes, this message appears:

```
Software Upgrade Complete
```

3 Reset the device. Refer to "After the Download"" and "Resetting the Switch 2000 TR" in Chapter 3.

Refer to "Status Messages" for more information.

After the Download

When you have successfully downloaded the new software image, the Switch 2000 TR resets automatically. After a successful download the Switch 2000 TR retains the following configuration data:

- Serial port configuration
- TCP/IP interface configuration (including IP address)
- Unit and port setup
- SNMP interface data (for example, the community string)
- User and security data (for example, user names and passwords)

This saved data allows you to manage immediately after the download.The following configuration values are reset to the factory defaults:

- Alarm Table
- Fault Log

Status Messages

The Software Upgrade utility reports the status of the last download attempt. It reports error messages if the download was unsuccessful.

The status messages are described below:

Messages 1 through 7 are standard TFTP errors as detailed in IFC 783. These errors generally indicate that you do not have access privileges to access the software image. Check with your system administrator.

1—File not found. Check that you have entered the correct file name.

2—Access Violation.

4—Illegal Operation.

5—Unknown transfer identifier.

7—No such user.

8—No response from the load server. ***Check that you have entered the correct address for the server where the software image file is stored and that server is switched on***.

Messages 9 through 12 indicate that the file is corrupted. It may have been corrupted during transmission. Attempt the download again.

9—No resources.

10—Record length mismatch.

11—Invalid record type.

12—Checksum error.

Message 13 and 14 indicate that you are trying to load the wrong type of software image file.

13—File is for the wrong device type.

14—File is for the wrong hardware version.

Messages 15 through 17 indicate that the file is corrupted. It may have been corrupted during transmission. Attempt the download again.

15—File header record is missing from file.

16—Byte count error.

17—Load address in file was outside memory.

Messages 18 and 19 indicate a hardware failure on the Switch 2000 TR. Consult your supplier for further advice.

18—Failed to erase Flash EPROM.

19—Flash EPROM programming failed.

Messages 20 through 22 show that system load is underway or has successfully completed.

20—System load pending.

21—System load active.

22—System load successful.

B Screen Access Rights

The table in this appendix specifies which level of users can view and usually edit (write). Access rights allow users to view and/or edit the Switch 2000 TR VT100 management screens.

All access rights are read-and-write except where noted as read-only.

Access Rights Table

Screen	Accessible to . . .
Logon	Monitor Manager Security
Main Menu	Monitor Manager Security
Switch 2000 TR Management	Monitor Manager Security
Port Statistics	Monitor Manager Security
Port Statistics (Traffic)	Monitor Manager Security
Port Statistics (Error)	Monitor Manager Security
Unit Traffic	Monitor Manager Security
Switch Database View	Monitor Manager Security
Unit Setup	Monitor *read-only* Manager Security
Port Setup	Monitor *read-only* Manager Security
Remote Poll	Manager Security
Security Menu	Monitor Manager Security
Create User	Security
Delete User	Security
Local Security	Security
Change User	Monitor Manager Security

Screen	Accessible to . . .
Status	Monitor Manager Security
Fault Log	Monitor Manager Security
Setup	Monitor *read-only* Manager Security
Serial Port Setup	Monitor *read-only* Manager Security
Trap Setup	Monitor *read-only* Manager Security
Software Upgrade	Security
Initialize	Security
Reset	Manager Security

C SERIAL PORT CABLE PIN-OUTS

Null Modem Cable

9 pin to RS-232 25 pin. Pin numbers that are underlined are different. All other pin designations are straight through.

Table 0-1 Null Modem Serial Cable Pin Outs

DB9 Female	DB9 Female
1	1
2	**3**
3	**2**
4	4
5	5
6	6
7	7
8	8
9	9

Cabling for Module Options

If you have an ATM, FDDI, or TR-in-FE module, see the following manuals for special cabling specifications:

- SuperStack II Switch 2000 TR ATM OC-3 Module User Guide (Part Number #99041)
- SuperStack II Switch 2000 TR FDDI Module User Guide (Part Number #99048)
- SuperStack II Switch 2000 TR TR-in-FE Module User Guide (Part Number #99045)

D TROUBLESHOOTING

Troubleshooting Procedures

This appendix lists potential problems you might see when managing the Switch 2000 TR and includes suggested actions to take. If you experience a problem not listed here or that you cannot solve, please contact your local technical support representative.

The initial Main Banner screen does not display:

Check that your terminal or terminal emulator is correctly configured to operate as a VT100 terminal.

For serial port access, try pressing [Return] several times before the Main Banner appears.

Check the settings on your terminal or emulator.

Refer to "Setting Up the VT100 Console" in Chapter 3.

Screens are incorrectly displayed:

Check that your terminal or terminal emulator is correctly configured to operate as a VT100 terminal.

Check the settings on your terminal or emulator.

Refer to "Setting Up the VT100 Console" in Chapter 3.

The SNMP manager cannot access the device:

Check that the device's IP address, subnet mask, and default router are correctly configured, and that the device has been reset. Check that the device's IP address is correctly recorded by the SNMP manager.

Refer to "Setting Up the VT100 Console" in Chapter 3.

The Telnet workstation cannot access the device:

Check that the device's IP address, subnet mask and default router are correctly configured, and that the device has been reset.

Be sure that you enter the IP address correctly when invoking the Telnet facility.

Refer to "Setting Up the VT100 Console" in Chapter 3.

Traps are not received by the SNMP manager:

Check that the SNMP manager's IP address and the community string are correctly configured.

Refer to "Setting Up the VT100 Console" in Chapter 3.

The SNMP manager or Telnet workstation can no longer access the device:

Check that Remote Telnet access or Community-SNMP access is enabled.

Check that the port through which you are accessing the device has not been disabled, see "Port Configuration" in Chapter 4. If it is enabled, check the connections and network cabling at the port.

Try accessing the device through a different port. If you can now access the device, a problem with the original port is indicated. Re-examine the connections and cabling.

A network problem can prevent you from accessing the device over the network. Try accessing the device through the serial port. Refer to "Setting Up the VT100 Console" in Chapter 3.

You forget your password and cannot log in:

If you are not one of the default users (monitor, manager or security), another user having security access level can log in, delete your user name, and create a new user name for you, with a new password.

Another user having 'security' access level can log in and initialize the device. This action returns all configuration information, including passwords, to the factory default values.

If no one user knows a password for a security level user, contact your supplier.

If Power LED is Yellow. . .

Unit failed self-test. Return to supplier.

If port fails to join ring . . .

Check ring speed and cable. Check personality of port.

If server fails to attach to ports 1 through 4. . .

Check personality and cable connection.

If Source Route traffic is not forwarded...

Check Bridge Type, Ring Number initialized and matches other bridges on ring. Make sure ring/bridge/ring numbers are unique.

Broadcast storms. . .

Check to see if Spanning Tree is enabled. If yes, make sure the type and address match the rest of the network.

If Transparent traffic not forwarded. . .

Check Bridge Type and verify if it is Source Route Transparent or Transparent.

SWITCH 2000 TR
TECHNICAL SPECIFICATIONS

Physical Dimensions	Height: 2.75 inches (7.0 cm) x Width: 17.25 inches (44cm) x Depth 12 inches (30.5 cm) Weight: 4.4kg (9.7lbs)	
Environmental Requirements		
Operating Temperature	32˚ to 120˚F (0˚ to 50˚ C)	
Operating Humidity	10 to 95% relative humidity, non-condensing	
Safety		
Agency Certifications	UL 1950, EN60950 (TUV), CSA 22.2 No. 950	
AC Protection	5A Time Delay Fuse	
Electromagnetic Emissions (Agency Certification)	EN55022 Class A, FCC Part 15 Class A EN50082-1 (IEC801 Parts 2-5)	
Heat Dissipation	100 watts maximum (341 BTU/hour maximum)	
Power Supply		
AC Line Frequency	50/60 Hz	
Input Voltage Options	100-120/200-240 VAC	
Current Rating	100 VAC at 3 amps (maximum)/200 VAC at 2 amps (maximum)	
Standards Supported	**SNMP** ■ SNMP protocol (RFC 1157) ■ MIB-II (RFC 1213) ■ Bridge MIB (RFC 1493) ■ Source Route Bridge MIB (RFC 1525) ■ RMON MIB (RFC 1271) ■ Token Ring Extension to RMON MIB (RFC 1513) ■ BootP (RFC 951)	**Terminal Emulation** ■ telnet (RFC 854) **Protocols Used for Administration** ■ UDP (RFC 768) ■ IP (RFC 791) ■ ICMP (RFC 792) ■ TCP (RFC 793) ■ ARP (RFC 826) ■ TFTP (RFC 783)

Specifications for Module Options

If you have an ATM, FDDI, or TR-in-FE module, see the following manuals for technical specifications:

- SuperStack II Switch 2000 TR ATM OC-3 Module User Guide (Part Number #99041)
- SuperStack II Switch 2000 TR FDDI Module User Guide (Part Number #99048)
- SuperStack II Switch 2000 TR TR-in-FE Module User Guide (Part Number #99045)

F TECHNICAL SUPPORT

3Com provides easy access to technical support information through a variety of services. This appendix describes these services.

Information contained in this appendix is correct at time of publication. For the very latest, we recommend that you access 3Com Corporation's World Wide Web site.

Online Technical Services

3Com offers worldwide product support 24 hours a day, 7 days a week, through the following online systems:

- World Wide Web site
- 3Com Bulletin Board Service (3ComBBS)
- 3ComFacts℠ automated fax service
- 3ComForum on CompuServe online service

World Wide Web Site

Access the latest networking information on 3Com Corporation's World Wide Web site by entering our URL into your Internet browser:

http://www.3com.com/

This service features the latest information about 3Com solutions and technologies, customer service and support, news about the company, *Net Age*® Magazine, and more.

3Com Bulletin Board Service

3ComBBS contains patches, software, and drivers for all 3Com products, as well as technical articles. This service is available through analog modem or digital modem (ISDN) 24 hours a day, 7 days a week.

Access by Analog Modem

To reach the service by modem, set your modem to 8 data bits, no parity, and 1 stop bit. Call the telephone number nearest you:

Country	Data Rate	Telephone Number
Australia	up to 14400 bps	61 2 9955 2073
Brazil	up to 14400 bps	55 11 547 9666
France	up to 14400 bps	33 1 6986 6954
Germany	up to 28800 bps	4989 62732 188
Hong Kong	up to 14400 bps	852 2537 5608
Italy (fee required)	up to 14400 bps	39 2 27300680
Japan	up to 14400 bps	81 3 3345 7266
Mexico	up to 28800 bps	52 5 520 7853
P.R. of China	up to 14400 bps	86 10 684 92351
Singapore	up to 14400 bps	65 534 5693

(continued)

Country	Data Rate	Telephone Number
Taiwan, R.O.C.	up to 14400 bps	886 2 377 5840
U.K.	up to 28800 bps	44 1442 438278
U.S.A.	up to 28800 bps	1 408 980 8204

Access by Digital Modem

ISDN users can dial in to 3ComBBS using a digital modem for fast access up to 56 Kbps. To access 3ComBBS using ISDN, use one of the following numbers:

408 654 2706 or **408 654 2703**

3ComFacts Automated Fax Service

3Com Corporation's interactive fax service, 3ComFacts, provides data sheets, technical articles, diagrams, and troubleshooting instructions on 3Com products 24 hours a day, 7 days a week.

Call 3ComFacts using your Touch-Tone telephone using one of these international access numbers:

Country	Telephone Number
U.K.	44 1442 438279
U.S.A.	1 408 727 7021

Local access numbers are available within the following countries:

Country	Telephone Number
Australia	1800 678 515
Belgium	0800 71279
Denmark	800 17319
Finland	98 001 4444
France	05 90 81 58
Germany	0130 81 80 63
Hong Kong	800 933 486
Italy	1678 99085
Malaysia	1800 801 777
Netherlands	06 0228049
New Zealand	0800 446 398
Norway	800 11062
Portugal	0505 442 607
Russia (Moscow only)	956 0815
Singapore	800 6161 463
Spain	900 964 445
Sweden	020 792954
U.K.	0800 626403

3ComForum on CompuServe Online Service

3ComForum contains patches, software, drivers, and technical articles about all 3Com products, as well as a messaging section for peer support. To use 3ComForum, you need a CompuServe account.

To use 3ComForum:

1. Log on to your CompuServe account.
2. Type **`go threecom`**
3. Press [Return] to see the 3ComForum main menu.

Support from Your Network Supplier

If additional assistance is required, contact your network supplier. Many suppliers are authorized 3Com service partners who are qualified to provide a variety of services, including network planning, installation, hardware maintenance, application training, and support services.

When you contact your network supplier for assistance, have the following information ready:

- A list of system hardware and software, including revision levels
- Diagnostic error messages
- Details about recent configuration changes, if applicable

If you are unable to contact your network supplier, see the following section on how to contact 3Com.

Support from 3Com

If you are unable to receive support from your network supplier, technical support contracts are available from 3Com.

Contact your local 3Com sales office to find your authorized service provider using one of these numbers:

Regional Sales Office	Telephone Number
3Com Corporation	
P.O. Box 58145 5400 Bayfront Plaza Santa Clara, California 95052-8145 U.S.A.	800 NET 3Com *or* 1 408 764 5000 408 764 5001 (fax)
3Com Asia Limited	
Australia	61 2 9937 5000 (Sydney) 61 3 9866 8022 (Melbourne)
Hong Kong	852 2501 1111
India	91 11 644 3974
Indonesia	62 21 572 2088
Japan	81 6 536 3303 (Osaka) 81 3 3345 7251 (Tokyo)
Korea	82 2 319 4711
Malaysia	60 3 732 7910
New Zealand	64 9 366 9138
Philippines	632 892 4476
P.R. of China	8610 68492568 (Beijing) 86 21 63501581 (Shanghai)
Singapore	65 538 9368
Taiwan, R.O.C.	886 2 377 5850
Thailand	662 231 8151 5
3Com Benelux B.V.	
Belgium	32 2 725 0202
Netherlands	31 30 6029700

(continued)

Regional Sales Office	Telephone Number
3Com Canada	
Calgary	403 265 3266
Edmonton	403 423 3266
Montreal	514 683 3266
Ottawa	1 613 566 7055
Toronto	416 498 3266
Vancouver	604 434 3266
3Com France	33 1 69 86 68 00
3Com GmbH	
Austria	43 1 513 4323
Czech Republic/Slovak Republic	420 2 21845 800
Germany	49 30 34 98790 (Berlin)
(Central European HQ)	49 89 627320 (Munich)
Hungary	36 1 250 83 41
Poland	48 22 6451351
Switzerland	41 31 996 14 14
3Com Iberia	
Portugal	351 1 3404501
Spain	34 1 383 17 00
3Com Ireland	353 1 820 7077
3Com Latin America	
U.S. Headquarters	408 326 2093
Northern Latin America	305 261 3266 (Miami, Florida)
Argentina	541 312 3266
Brazil	55 11 5181 0869
Chile	562 633 8935
Colombia	571 629 4110
Mexico	52 5 520 7841/7847
Peru	51 1 221 5399
Venezuela	58 2 953 8122
3Com Mediterraneo	
Italy	39 2 253011 (Milan) 39 6 5279941 (Rome)
3Com Middle East	971 4 349049

Regional Sales Office	Telephone Number
3Com Nordic AB	
Denmark	45 39 27 85 00
Finland	358 0 435 420 67
Norway	47 22 58 47 00
Sweden	46 8 632 56 00
3Com Russia	007 095 258 09 40
3Com Southern Africa	27 11 807 4397
3Com UK Ltd.	44 131 240 2900 (Edinburgh) 44 161 873 7717 (Manchester) 44 162 889 7000 (Marlow)

Returning Products for Repair

Before you send a product directly to 3Com for repair, you must first obtain a Return Materials Authorization (RMA) number. Products sent to 3Com without RMA numbers will be returned to the sender unopened, at the sender's expense.

To obtain an RMA number, call or fax:

Country	Telephone Number	Fax Number
U.S.A. and Canada	1 800 876 3266, option 2	408 764 7120
Latin America	1 408 326 2927	408 764 7120
Europe, South Africa, and Middle East	44 1442 438125	44 1442 435822
Elsewhere	1 408 326 2926	1 408 764 7120

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3Com Corporation LIMITED WARRANTY

The duration of the warranty for the SuperStack II Switch 2000 TR, is n years.

HARDWARE

3Com warrants its hardware products to be free from defects in workmanship and materials, under normal use and service, for the following lengths of time from the date of purchase from 3Com or its Authorized Reseller:

Network interface cards	Lifetime
Other hardware products (unless otherwise specified in the warranty statement above)	1 year
Spare parts and spares kits	90 days

If a product does not operate as warranted above during the applicable warranty period, 3Com shall, at its option and expense, repair the defective product or part, deliver to Customer an equivalent product or part to replace the defective item, or refund to Customer the purchase price paid for the defective product. All products that are replaced will become the property of 3Com. Replacement products may be new or reconditioned. Any replaced or repaired product or part has a ninety (90) day warranty or the remainder of the initial warranty period, whichever is longer.

3Com shall not be responsible for any software, firmware, information, or memory data of Customer contained in, stored on, or integrated with any products returned to 3Com for repair, whether under warranty or not.

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3Com warrants that the software programs licensed from it will perform in substantial conformance to the program specifications therefor for a period of ninety (90) days from the date of purchase from 3Com or its Authorized Reseller. 3Com warrants the media containing software against failure during the warranty period. No updates are provided. The sole obligation of 3Com with respect to this express warranty shall be (at the discretion of 3Com) to refund the purchase price paid by Customer for any defective software products, or to replace any defective media with software which substantially conforms to applicable 3Com published specifications. Customer assumes responsibility for the selection of the appropriate applications program and associated reference materials. 3Com makes no warranty or representation that its software products will work in combination with any hardware or applications software products provided by third parties, that the operation of the software products will be uninterrupted or error free, or that all defects in the software products will be corrected. For any third-party products listed in the 3Com software product documentation or specifications as being compatible, 3Com will make reasonable efforts to provide compatibility, except where the noncompatibility is caused by a "bug" or defect in the third party's product.

STANDARD WARRANTY SERVICE

Standard warranty service for *hardware* products may be obtained by delivering the defective product, accompanied by a copy of the dated proof of purchase, to the 3Com Corporate Service Center or to an Authorized 3Com Service Center during the applicable warranty period. Standard warranty service for *software* products may be obtained by telephoning 3Com's Corporate Service Center or an Authorized 3Com Service Center, within the warranty period. Products returned to the 3Com Corporate Service Center must be preauthorized by 3Com with a Return Material Authorization (RMA) number marked on the outside of the package, and sent prepaid, insured, and packaged appropriately for safe shipment. The repaired or replaced item will be shipped to Customer, at the expense of 3Com, not later than thirty (30) days after receipt of the defective product by 3Com.

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IF A 3COM PRODUCT DOES NOT OPERATE AS WARRANTED ABOVE, CUSTOMER'S SOLE REMEDY FOR BREACH OF THAT WARRANTY SHALL BE REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE PAID, AT THE OPTION OF 3COM. TO THE FULL EXTENT ALLOWED BY LAW, THE FOREGOING WARRANTIES AND REMEDIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER WARRANTIES, TERMS, OR CONDITIONS, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES, TERMS, OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND SATISFACTORY QUALITY. 3COM NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE, OR USE OF ITS PRODUCTS.

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warranty gives you specific legal rights which may vary depending on local law.

3Com Corporation, 5400 Bayfront Plaza, Santa Clara, CA 95052-8145 (408) 764-5000

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