TigerSwitch 16

Intelligent bandwidth acceleration for workgroups

Ethernet and Fast Ethernet Workgroup Switches

- Three models, each with 16 10BASE-T ports plus:
  - Two 100BASE-TX ports
  - Two 100BASE-FX ports
  - One 100BASE-TX port and one 100BASE-FX port
- Manageable in-band via SNMP, RMON and Telnet

SMC®

User Guide

USER GUIDE FOR SMC'S TIGERSWITCH 16 FAMILY

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CHAPTER 1
QUICK START

Introduction

SMC's TigerSwitch™ 16 family consists of a set of three manageable Ethernet switches with Fast Ethernet connection capability. Each switch provides sixteen 10BASE-T ports for connection to Ethernet hubs, servers and workstations. Each switch also includes two ports for connection to Fast Ethernet devices. The switch, depending on the model chosen, will contain either two 100BASE-TX ports, two 100BASE-FX ports or one 100BASE-TX port and one 100BASE-FX port. The Fast Ethernet port types found on each model are listed below:

- Model SMC6516TT
  - two 100BASE-TX ports with Auto-Negotiation
- Model SMC6516FF
  - two 100BASE-FX ports
- Model SMC6516TF
  - one 100BASE-TX port with Auto-Negotiation
  - one 100BASE-FX port

This chapter provides a set of instructions designed to help you get up and running quickly and without excessive details. The steps in each of the two sections refer to other locations in the manual where further information may be found.

The first section, "Connecting the Switch," provides a list of instructions for powering up the switch and making network connections, and also for setting up a PC to configure and monitor the switch out-of-band.

The second section, "Configuring the Switch for SNMP and Telnet Management," discusses the steps required to set up the switch for in-band management.

Connecting the Switch

1. Power up the PC to be used to configure and monitor the switch out-of-band. After loading this PC with communications software, set your terminal or communications program to the following parameters: 9600, n, 8, 1 (9600 baud, no parity, 8 data bits, 1 stop bit). (See Appendix C for the Windows Terminal program parameter settings.)

2. Plug the female end of a DB-9 standard null-modem cable into the Console connector on the front panel of the switch. Attach the other end of the cable to the serial connector on the PC (typically COM1 or COM2). (See "Connecting to the Console Port" in Chapter 4.)

3. Connect one end of the 3-pin AC power cord supplied with the switch to the power receptacle on the rear of the chassis, and the other end to a grounded power outlet. (See "Connecting to a Power Source" in Chapter 4.) Make note of the diagnostic test results that appear on the PC attached to the Console port.

4. If you have purchased a Redundant Power Unit (RPU), plug the 14-pin connector from the RPU cable into the mating connector on the rear panel of the switch. (See the guide supplied with the RPU.)

5. Connect the front-panel 10BASE-T ports to hubs, servers and power users. Once a valid connection has been made, the green LED above the port will light. (See "Making Network Connections" in Chapter 4.)

6. Connect each front-panel 100BASE-TX and 100BASE-FX port to a Fast Ethernet power user, server, workgroup or backbone. When a valid connection has been made, the green LED for that port will light. (See "Making Network Connections" in Chapter 4.)

7. Press the Esc key on the terminal or PC. The Main Menu will appear on the screen.

```
>>>>    Main Menu    <<<<
1. Switch Configuration Menu
2. Port Configuration Menu
3. Statistics Menu
4. Utilities Menu
5. Exit Menus (Password Protect)

Enter Selection:
```

Figure 1-1. Main Menu

You may now set a variety of configuration options, such as full-duplex mode on the 10BASE-T ports, a password for the Console interface, and Spanning Tree and Address Aging parameters. You may also select various options for monitoring the performance of the unit out-of-band. These are described in Chapter 5.

To set up the unit for in-band management via SNMP or Telnet, continue with Step 8.

Configuring the Switch for SNMP and Telnet Management

8. To assign an IP address, or to have one assigned automatically, select "Switch Configuration Menu" from the Main Menu. The Switch Configuration Menu will appear.

```
>>>>   Switch Configuration Menu    <<<<
1. Configuration Summary
2. IP Configuration
3. SNMP Configuration
4. Spanning Tree Configuration
5. Address Aging Configuration
6. Port Mirroring Configuration

<ESC> To Exit Menu
Enter Selection:
```

Figure 1-2. Switch Configuration Menu

9. DHCP is enabled by default. If you have a DHCP server, an IP address and Subnet Mask are assigned automatically. Make a note of the IP address and skip to Step 12. Otherwise, select "IP Configuration" from the menu. The IP Configuration Menu will appear (see Figure 1-3).

10. To manually enter the IP address of the switch, you must first disable DHCP. Then, select "Switch IP Address" from the menu and enter the address to be assigned to the switch. This should be an administratively assigned address. (See "Configuring the IP Address" in Chapter 5.)

11. Select "Subnet Mask" from the menu and enter the subnet mask for the IP address entered in Step 10. If applicable, also enter the Gateway IP address.

```
>>>>  IP Configuration Menu    <<<<

1. Automatic Selection of IP Address (DHCP).. [  ON]
2. Switch IP Address.. .............  [ 170.129. 78. 28 ]
3. Default SNMP Manager IP Address..  [ 170.129. 78.208 ]
4. Default Gateway IP Address.......  [ 170.129. 78.  1 ]
5. Subnet Mask......................  [ 255.255.255.  0 ]
6. SLIP Enable......................  [        Disabled ]
7. SLIP IP Address..................  [   0.  0.  0.  0 ]
8. SLIP Subnet Mask..... ...........  [ 255.  0.  0.  0 ]

<ESC> To Exit Menu
Enter Selection:
```

Figure 1-3. IP Configuration Menu

12. **For Telnet Management:** Connect to the IP address assigned in Step 10. Installation is complete.

13. **For SNMP Management:** Check to be sure the management console and the switch use the same SNMP read-only and write community names. For the switch, both names are factory-set to "public." If the name "public" is also used for both management console names, connect to the IP address assigned in Step 10 and then skip to Step 15. Otherwise, continue with Step 14.

14. If the community names need to be changed, press the Esc key to return to the Switch Configuration Menu (see Figure 1-2). Then select "SNMP Configuration" to display the SNMP Configuration Menu (see Figure 1-4).

15. Select "SNMP Get Community Name" from the menu and enter the new read-only access community name (up to 10 alphanumeric characters). Then, select "SNMP Set Community Name" and enter the new write access commu-

nity name (up to 10 alphanumeric characters).

```
>>>>  SNMP Configuration Menu    <<<<
1. SNMP Get Community Name ( 10 characters max ).....[   public ]
2. SNMP Set Community Name ( 10 characters max ).....[   public ]
3. System Location ( 24 characters max ).. [                    ]
4. System Name ( 24 characters max )..... [                     ]
5. System Contact ( 24 characters max )... [                    ]

<ESC> To Exit Menu
Enter Selection:
```

Figure 1-4. SNMP Configuration Menu

16. Compile the MIB file into the SNMP network management platform. This file, supplied with the switch on a 3.5 inch floppy diskette, provides access to the private MIB extensions for the switch. Installation is complete.

CHAPTER 2
ABOUT THE SWITCHES

Overview

SMC's TigerSwitch 16 is a family of intelligent Ethernet work-group switches that offers both an increase in network performance plus an economical solution for anyone planning to integrate Fast Ethernet into their Ethernet LAN. In addition to sixteen 10BASE-T ports, these switches provide two Fast Ethernet ports. Depending on the model chosen, the switch will include either two 100BASE-TX ports with Auto-Negotiation, two 100BASE-FX ports or one 100BASE-TX port with Auto-Negotiation and one 100BASE-FX port.

The three TigerSwitch 16 models are shown below:

Figure 2-1. TigerSwitch 16 Model SMC6516TT with two 100BASE-TX Ports

Figure 2-2. TigerSwitch 16 Model SMC6516FF with two 100BASE-FX Ports

Figure 2-3. TigerSwitch 16 Model SMC6516TF with one 100BASE-TX Port and one 100BASE-FX Port

The Fast Ethernet ports on each switch are contained in a single, dual-port replaceable module.* This modular design allows you the option of installing different types of Fast Ethernet ports, according to your changing network needs.

The available slide-in replacement modules are listed below:

Slide-in Fast Ethernet Modules		
Model	**Ports**	
	100BASE-TX	**100BASE-FX**
SMC6016TT	**2**	**0**
SMC6016FF	**0**	**2**
SMC6016TF	**1**	**1**

All the switches employ a buffered "store-and-forward" architecture that performs error checking to prevent bad packets from being propagated throughout the network. Their non-blocking design allows simultaneous wire-speed transport of multiple packets at consistently low latency on all ports. And, they feature full-duplex operation to double the bandwidth of those desktop and switch connections.

In addition to "at-a-glance" LEDs, these switches feature an integrated scalable management set that includes out-of-band management via an RS-232 console port, in-band management via Telnet or any SNMP-based manager, support for 4-group RMON, and Port Mirroring for full RMON support with an external probe or for traffic analysis via any network lanalyzer. This enables you to choose the level of management that's right for you.

The TigerSwitch 16 family also supports an optional Redundant Power Unit to minimize downtime in the event of an internal power supply or AC circuit failure.

* **Note:** The switch will not POST (Power On Self-Test) without a module installed.

Ports and Status LEDs

10BASE-T Ports

The sixteen 10BASE-T ports are located on the front panel of each switch. These ports are labeled with an "x" to indicate that they have a built-in crossover.*

If a 10BASE-T port is connected directly to an Ethernet server, power user or another switch, it will provide the device with a dedicated bandwidth—20 Mbps in full-duplex mode or 10 Mbps in half-duplex mode. If the port is connected to an Ethernet hub, it will provide the hub with a 10 Mbps bandwidth that can be shared by multiple users.

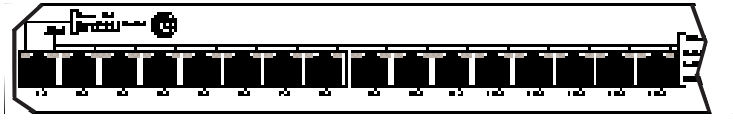

Figure 2-4. 10BASE-T Ports

100BASE-TX Port(s)

Models SMC6516TT and SMC6516TF are equipped with at least one 100BASE-TX port (port 18). Port 17 on model SMC6516TT is another 100BASE-TX port.

Like the 10BASE-T ports, each 100BASE-TX port is labeled with an "x" to indicate that it has a built-in crossover.* In addition, the 100BASE-TX ports support Auto-Negotiation, so the optimum operating mode—half or full duplex and 10 or 100 Mbps—is selected automatically.

* Workstations and servers can be connected to these ports with straight-through cable. When connecting hubs and other switches to these ports, a crossover cable will probably be necessary. Please see Appendix A for cabling information.

When connected to a 10BASE-T device, the port will operate at 10 Mbps, providing each switch with an additional Ethernet port (two ports on the SMC6516TT). When connected to a 100BASE-TX device, the port will operate at the higher data rate, allowing for the easy integration of Fast Ethernet into an Ethernet LAN.

If a 100BASE-TX port is connected directly to a Fast Ethernet server, power user or another switch, it will provide the device with a dedicated bandwidth—200 Mbps in full-duplex mode or 100 Mbps in half-duplex mode. If the port is connected to a Fast Ethernet hub, it will provide the hub with a 100 Mbps bandwidth that can be shared by multiple users.

100BASE-FX Port(s)

Ports 17 and 18 on TigerSwitch 16 model SMC6516FF and port 17 on model SMC6516TF are 100BASE-FX ports with SC connectors. In full-duplex mode, these ports can be connected to a corporate backbone or central site with up to 2 km of fiber cable.

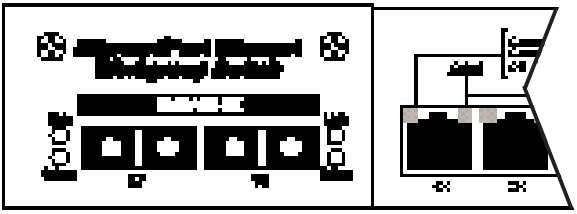

Figure 2-5. SMC6516FF with 100BASE-FX Ports

Link and Select LEDs

Each of the RJ-45 connectors on the 10BASE-T and 100BASE-TX ports has dual integrated LEDs. The left LED displays the port's Link status. If this LED is lit (green), it indicates that the connection between the port and the attached device is good. The right LED, when lit (yellow), indicates that the full status of the port (Receive, Collision, Full Duplex and 100 Mbps data rate) is displayed by the shared vertical LED array (see "Shared Vertical LED Array and Port Select Button" on the next page).

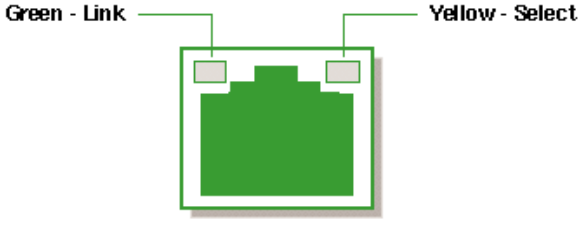

Figure 2-6. RJ-45 Integrated LEDs

The 100BASE-FX ports have individual Link and Select LEDs that perform the same functions.

The Link and Select LEDs are described in the following table:

Link and Select LEDs		
Function	**Condition**	**Description**
Link	Off	Port is not in use, attached device is not powered on, or port has been disabled via SNMP or Console port
	Blinking*	Connection between port on switch and attached device is bad
	Green	Connection between port on switch and attached device is good
Select	Yellow	Port is selected to drive the vertical LED array

***Note:** The Link LEDs on unconnected ports will blink approximately once every 5 seconds. This blinking reflects background diagnostics run automatically by the switch and is not indicative of any error.

Shared Vertical LED Array and Port Select Button

At power-up, the shared vertical LED array displays the status of port 1. To display the status of port 2, press the Port Select button located to the right of the array. Repeated depressions of this button will cycle through all eighteen ports.

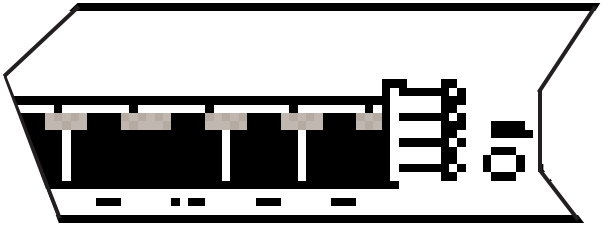

Figure 2-7. Vertical LED Array and Port Select Button

The vertical LED array is described in the following table:

Vertical LED Array		
Function	**Condition**	**Description**
Receive	Green	Data is being received
Collision	Yellow	Two or more devices on the segment are transmitting at the same time
Full Duplex	Yellow	Port configured for full-duplex operation (available on all ports)
100 Mbs	Yellow	Port is operating at 100 Mbps data rate
	Off	Port is operating at 10 Mbps data rate

Console Port

Each switch contains a Console port on the front panel. This is an RS-232 serial port with a DB-9 connector. When connected to a PC, this port can be used to configure the switch and to monitor the switch out-of-band and in-band via Telnet.

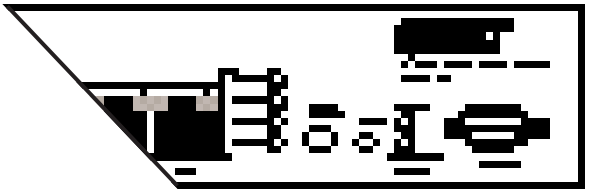

Figure 2-8. Console Port and Reset Button

Reset Button

The front panel of each switch contains a Reset button. This button is used to restart the switch. It has almost the same effect as powering the switch off and on again. The only difference is that the internal diagnostics which are initiated at power up are not executed on reset.

Optional Redundant Power Unit

SMC's Redundant Power Units (RPUs) are separate devices and each has its own own power cord. These devices can supply power to the switch in the event of a failure of the internal power supply. Contact your reseller for advice regarding the appropriate RPU for your specific application.

Power Supply Receptacles and Status LEDs

There are two power receptacles on the rear of each switch. The standard receptacle labeled “Power” is for the AC power cord. The 14-pin receptacle labeled “DC Input” is for the optional Redundant Power Unit (RPU).

Figure 2-9. Power Supply Receptacles

Power and RPU LEDs located on the front panel of each switch indicate the status of both the internal and redundant power supplies. These LEDs are described on the following page.

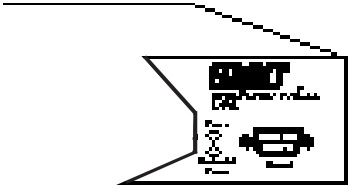

Figure 2-10. Power Supply LEDs

Power Supply Status LEDs		
LED Condition		**Status**
Power	**Redundant Power**	
Off	Off	No AC power
Green	Off	Internal power supply is operating properly; redundant power supply is not present or has been disconnected
Green	Green	Both internal and redundant power supplies are operating properly
Red	Green	Internal power supply has failed; device is being powered by redundant power supply
Red	Off	Redundant power supply has failed; device is being powered by internal power supply

Features and Benefits

- IEEE 802.3 and 802.3u compliance ensures compatibility with standards-based hubs, adapters and switches from any vendor
- Non-blocking architecture allows multiple simultaneous switching paths for increased throughput
- Filters and forwards at line-rate speed on all ports for high performance
- "Store-and-forward" switch design increases reliability of transmission by checking each packet for validity before forwarding it to its destination
- Automatic address learning with user-defined aging eliminates need to configure addresses manually
- 8,192 entry address table can store addresses for moderate to large size networks
- SNMP agent for management by SMC's EliteView™ or any other SNMP-based application
- RS-232 Console port simplifies switch configuration and allows switch to be managed out-of-band
- 4-group RMON support - Event, Alarm, Statistics and History groups - for pro-active management
- Port Mirroring for full RMON support with external probe or for traffic analysis with network lanalyzer
- Spanning Tree Protocol adds fault tolerance by allowing redundant paths to be created between LAN segments
- Software downloads to Flash ROM via TFTP or Console port
- Optional Redundant Power Unit (attached to a separate circuit) minimizes downtime in the event of an internal power supply failure
- Replaceable dual-port Fast Ethernet modules for added flexibility

Switch Architecture

Buffered Switching

Each TigerSwitch 16 unit is a “store-and-forward” device. Every packet it receives is stored in a buffer so it can be checked for validity before being forwarded to another port. In addition, the switches feature a non-blocking design that allows simultaneous wire-speed transport of multiple packets at consistently low latency.

Automatic Address Learning

An aggregate address table that can hold 8,192 entries is provided for learning, filtering and forwarding. Addresses are automatically learned by each TigerSwitch 16 unit and maintained in the address table to enable the switch to perform filtering and forwarding at line-rate speeds. When a packet containing a destination address that does not appear in the table is encountered, the packet is broadcast to all segments.

Packets are filtered if their destination address is on the same segment as their source address. By confining network traffic to its respective collision domain, filtering reduces the overall traffic on the network.

Spanning Tree Protocol

The TigerSwitch 16 family supports the IEEE 802.1d Spanning Tree Protocol. This protocol adds a level of fault tolerance by allowing two or more redundant connections to be created between a pair of LAN segments. When there are multiple physical paths between segments, the protocol can choose a single path at any given time and disable all others. This prevents network traffic from circulating in an endless loop. However, if the chosen path fails for any reason, an alternate path will be activated to maintain the connection.

*The default factory setting for Spanning Tree Protocol is "**enabled**."* This protocol can be configured (enabled and disabled) out-of-band via the serial console interface or in-band via SNMP or Telnet.

Switch Operation

Diagnostic Tests

Diagnostic tests are performed whenever the switch is powered up or reset. Upon power-up, the test results are displayed on the PC attached to the Console port. During the test sequence, the switch detects whether or not the software is loaded. If it is, the Main Menu is displayed. Otherwise, the Boot Loader Menu is displayed so that new software can be downloaded.

Note: Diagnostics are not displayed when the Reset Button is pressed.

Software Downloads

Software is downloaded into a single 256 KB Flash ROM on the switch. The software can be downloaded in-band via TFTP or out-of-band via the RS-232 Console port. (See "Downloading New Software" in Chapter 5.)

Non-volatile Parameter Storage

Important operating parameters, such as IP address, Spanning Tree configuration, and management security parameters, are stored in non-volatile Flash memory and retain their values during a power failure.

Note: Since RMON parameter settings and learned addresses are not stored in non-volatile RAM, these values are not retained during a power failure. They are cleared whenever the switch is reset.

Management Options

The TigerSwitch 16 family can be managed using any one of the following three methods:

- out-of-band via the RS-232 console interface
- in-band via Telnet
- in-band via any SNMP-based network manager

Serial Console Interface

The switches can be managed out-of-band via the RS-232 console port. This requires a PC running a terminal application such as Windows Terminal. An RS-232 standard null-modem cable with a DB-9 connector is used to connect the device to the Console port on the switch. (See "Connecting to the Console Port" in Chapter 4 for detailed instructions.)

This interface operates at 9600 (default value) or 19,200 baud and can be password-protected. (See Chapter 5, "Configuring and Monitoring," for information on out-of-band management.)

Telnet

The switches can also be managed in-band via a Telnet connection using TCP/IP protocol. The Telnet user interface is menu-driven and the switch's operating parameters can be password-protected. (See Chapter 5, "Configuring and Monitoring," for information on in-band management via Telnet.)

SNMP

In addition, the switches can be managed in-band from a workstation using EliteView or any other SNMP-based manager.

Simple Network Management Protocol (SNMP), the most popular management protocol in use today, defines the structure of information maintained on a device being managed, and the operations used to access the information. SNMP provides two levels of management security protection based on community names. The SNMP Get community name provides read-only access to the information, while the SNMP Set community name enables you to modify the information. See Chapter 6, "Managing Via SNMP" for information on in-band SNMP management.

CHAPTER 3
PLANNING

Benefits of Switching

Ethernet is traditionally a shared technology. Its media (network cable) is shared, so only one transmission can take place at a time. Its 10 Mbps bandwidth is shared too, so as more users are added to the network, there is less available bandwidth for each user. In addition to increased traffic, Ethernet performance is also impacted by server bottlenecks, and by the requirements of high-performance workstations and high-bandwidth applications, such as those supporting multi-media and workgroup collaboration. The result is decreased network performance.

Network congestion can be relieved by microsegmentation. This technique divides the network into individual segments (collision domains). With fewer users on a segment competing for the same 10 Mbps bandwidth, there is more bandwidth available for each user. However, these segments must be interconnected in order to communicate with one another.

Switches are the preferred method of interconnecting these separate segments. They are more economical than bridges and routers. They also offer higher performance, since the packet latency of switches is considerably lower than that of bridges and routers. And, the network upgrade is easier, faster and less disruptive. Switches require at most only minimal reconfiguration, so there is less network downtime. Switches also isolate network traffic, so problems on one segment, such as faulty wiring and jabbering nodes, will not affect the rest of the network.

Switched Ethernet — Multiple Simultaneous Data Streams

Switches have multiple ports that are capable of transmitting and receiving information simultaneously at full wire speed. They integrate and build upon multi-port bridging functionality, creating an engine powerful enough to microsegment the LAN

into multiple collision domains, yet cost-effective enough to allow users to dedicate bandwidth to workstations, file servers and print servers.

At the desktop level, switches can replace Ethernet hubs. By providing servers and high-performance workstations with dedicated 10 Mbps LAN connections, switches boost the throughput and performance of bandwidth intensive applications, such as imaging, CAD/CAM and relational database access.

At the workgroup level, switches can coexist with Ethernet hubs. Cascading the hubs to switches, rather than to each other, reduces the number of users on each segment. This boosts network performance and increases the bandwidth per user.

Switched Fast Ethernet — High-Speed Data Pipes

Further bandwidth gains can be attained through the use of Fast Ethernet technology, which provides a 10-fold increase in the data rate per segment. Switching technology enables the seamless integration of Ethernet and Fast Ethernet LANs, while preserving the basic network operation and frame format. By adjusting the mix of shared and switched Ethernet and Fast Ethernet ports, a truly scalable plan can be developed for every LAN configuration — one that is capable of providing the necessary amount of bandwidth to each location.

Switching — an Evolutionary Step

The introduction of switching technology into Ethernet networks is an evolutionary step. Ethernet switches allow companies to preserve their investment in the current network infrastructure. They increase the bandwidth and performance of the network without requiring costly changes to LAN cabling or replacement of network cards, applications and the network operating system.

Segmenting the Network

Each port on a switch is a separate segment, so when implementing switching, you must decide how to segment the network. For desktop switching, the decision is easy, as each PC is on a separate segment. For segment switching, it is a good idea to investigate the traffic flow on the network and the interactions of the applications being used. Keep in mind that since a switch allows conversations between pairs of ports to take place concurrently, it is most effective when packet exchanges are distributed over multiple switch ports.

Client/Server

On a Client/Server network, all conversations take place between a user and a server. If there is one server on the network, only one conversation can take place at a time, so the server will still be a bottleneck. Connecting this server directly to the switch will improve response time. And, adding more servers will increase the number of simultaneous conversations that can take place.

Backbone Connections

A switch can be used in a collapsed backbone application to interconnect network segments and provide access to file servers and other switches. Workgroup hubs, connecting multiple stations and/or other hubs, are provided with a single switch connection, while servers are given their own dedicated switch port. Routers and other networking devices can also be connected to the collapsed backbone.

Full-Duplex Operation

Full duplex is a transmission method that allows a network device to transmit and receive concurrently. This mode is supported by some 10BASE-T and 100BASE-TX switches and network cards, but not by hubs or by 100BASE-T4 devices.

Connecting a pair of devices that can operate in full-duplex mode eliminates collisions and effectively doubles the bandwidth of that segment. In addition, full-duplex operation can also be used to extend Fast Ethernet fiber cabling distances.

Sample Applications

Sample applications are provided below. They show how switching technology can increase the performance of a shared Ethernet Client/Server LAN without extensive network reconfiguration and changes to the infrastructure.

Shared Ethernet LAN

In the traditional Client/Server LAN, all the workstations and servers are connected to stackable and/or standalone hubs. As additional workgroups are added to the LAN, hubs are added to accommodate them. The 10 Mbps bandwidth is shared by all.

The following figure represents a single-segment LAN. Servers and workstations with SMC's EtherEZ™ ISA network cards are connected to a stack of SMC's TigerStack™ hubs.

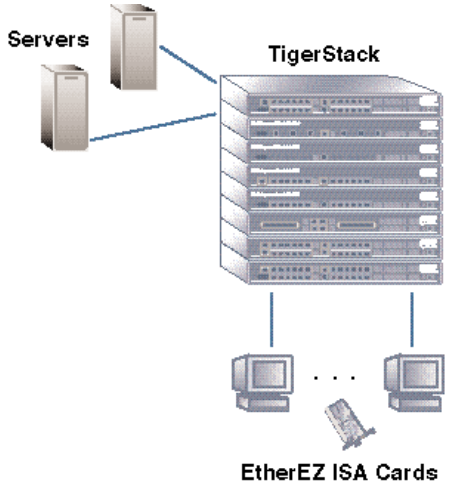

Figure 3-1. Single-Segment LAN

Segmented Ethernet LAN

To reduce contention, the network is segmented into separate repeater groups. This enables the workstations on each segment to share the 10 Mbps bandwidth of that segment. Reducing the number of stations on each segment decreases the amount of collisions that occur as a matter of course on a conventional shared Ethernet LAN when traffic is heavy. Note that stations on the same segment can communicate only with one another; there is no communication between segments.

Since each SMC Tigerstack hub can be segmented into two to four repeater groups, the stack of eight TigerStack hubs shown below can be subdivided into as many as 32 independent LAN segments (separate 10 Mbps collision domains) with an aggregate bandwidth potential of 320 Mbps.

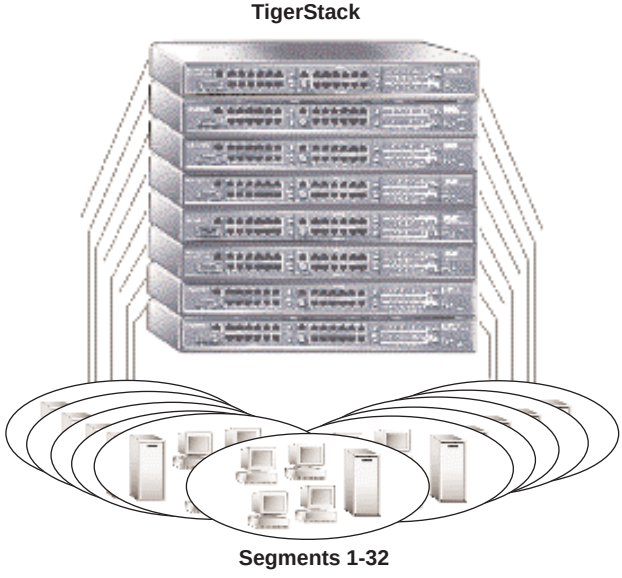

Figure 3-2. Microsegmented LAN

Switched Ethernet LAN

To enable the segments to communicate with one another, they are interconnected through a switch. Switches, like hubs, can be cascaded to interconnect additional segments.

In the figure shown below, six TigerStack segments are interconnected via an 8-port Ethernet switch. The remaining two 10BASE-T ports on the switch are configured for full-duplex operation. This provides them both with 20 Mbps of bandwidth. One of these ports is connected directly to a server and the other, to another Ethernet switch to provide additional ports for the stack segments.

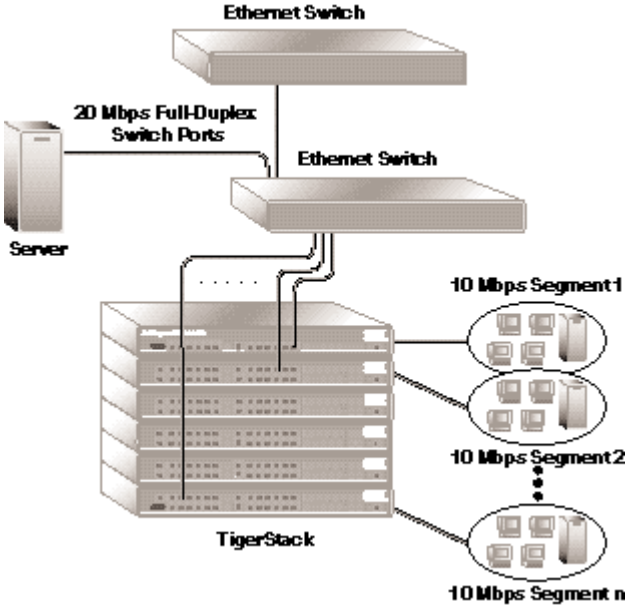

Figure 3-3. Switched LAN

Integrating Ethernet and Fast Ethernet

Some Ethernet switches also have one or two Fast Ethernet ports. These ports can be used to integrate Fast Ethernet into an Ethernet network.

TigerSwitch 16 Model SMC6516TT

This TigerSwitch 16 model contains two 100BASE-TX ports. Each Fast Ethernet port can be connected to a Fast Ethernet hub, to a server containing a Fast Ethernet network card such as SMC's EtherPower™ II 10/100 PCI card, or to a 100BASE-TX port on another switch. For desktop and switch connections, the ports can be configured for full-duplex operation.

In the following figure, one 100BASE-TX port is connected to SMC's TigerSwitch 100 (an 8-port Fast Ethernet switch) and the other 100BASE-TX port to a server. Note that two PCs are connected directly to 10BASE-T ports on the TigerSwitch 16, providing each power user with 20 Mbps of aggregate bandwidth in full-duplex mode. The aggregate bandwidth of the entire network is 580 Mbps.

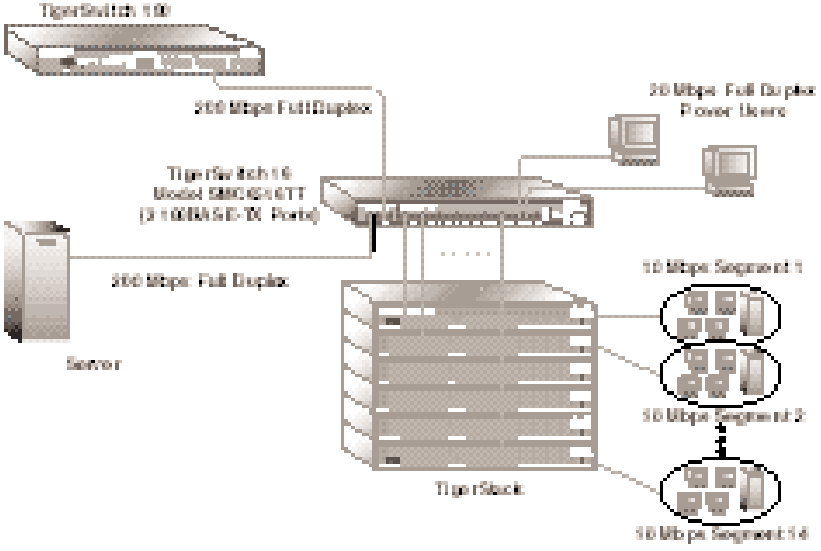

Figure 3-4. Sample Application with Model SMC6516TT

TigerSwitch 16 Model SMC6516TF

This model contains one 100BASE-TX port and one 100BASE-FX port. The 100BASE-FX port can be used to connect the switch to a 100BASE-FX port on another switch or hub, making it part of a high-speed fiber backbone. The longer allowable run distance for fiber cable also makes the 100BASE-FX port useful for connecting to remote devices. The 100BASE-TX port can be used to provide a dedicated bandwidth (200 Mbps in full-duplex mode) to a server or power user that is close to the switch.
In the following figure, the 100BASE-FX port is connected to a remote central site and the 100BASE-TX port, to a server. The aggregate bandwidth of this network is 580 Mbps.

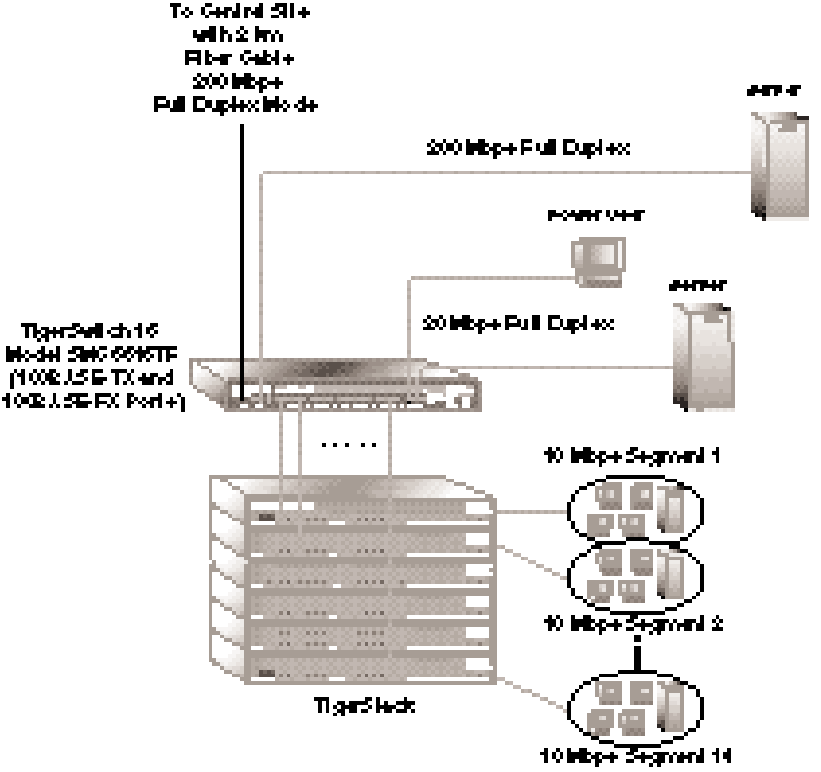

Figure 3-5. Sample Application with Model SMC6516TF

TigerSwitch 16 Model SMC6516FF

This model contains two 100BASE-FX ports. When configured for full-duplex operation, these 100BASE-FX ports can be connected to other devices with up to 2 km of fiber cable. This allows the user to take advantage of a significantly higher maximum cable run distance than that available for other media.

The following figure shows the 100BASE-FX ports on an SMC6516FF switch connected to the 100BASE-FX ports on other TigerSwitch units, making it the central link in a 200 Mbps network backbone. The 100BASE-TX ports on the other switches, also configured in full duplex mode, are dedicated to servers. The aggregate bandwidth of the network is 1.28 Gbps.

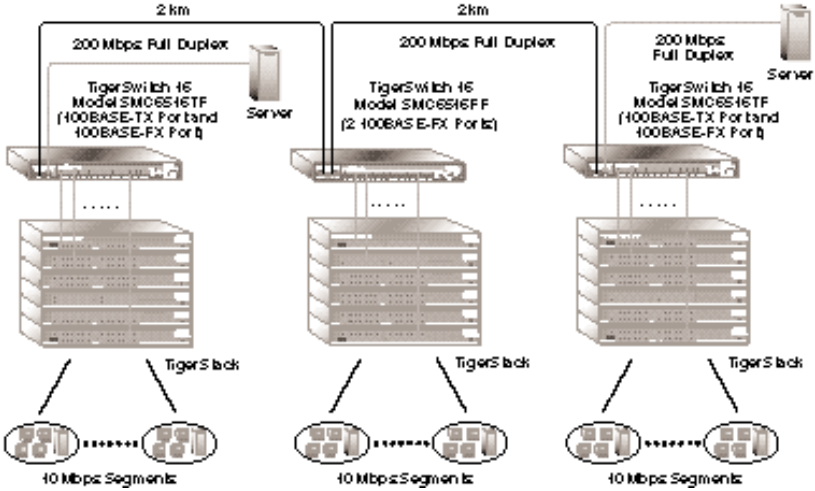

Figure 3-6. Sample Application with Model SMC6516FF

CHAPTER 4
INSTALLING

Selecting a Site

The TigerSwitch 16 family can be installed in a standard 19-inch equipment rack or on a desktop or shelf. Be sure to follow the guidelines below when choosing a location.

- The switch site should:
  - be able to maintain its temperature within 0° to 50° C and its humidity within 10% to 90%, non-condensing
  - provide adequate space (approximately two inches) on all sides for an air flow of 10 cubic feet/minute minimum
  - be accessible for installing, cabling and maintaining the switch
  - allow the status LEDs to be clearly visible
- Make sure twisted-pair cable is always routed away from power lines, fluorescent lighting fixtures and other sources of electrical interference, such as radios, transmitters, etc.
- Make sure that a separate grounded power outlet that provides 120 to 240 VAC, 50 to 60 Hz, is within 8 feet (2.44 m) of the hub. As with any equipment, using a filter or surge suppressor is recommended.

Equipment Checklist

After unpacking your switch, check the contents of the box against the packing list below to be sure you've received all the components.

Package Contents

In addition to this user guide, the package should contain:

- One TigerSwitch 16 switch
- Bracket Mounting Kit containing two brackets and four screws for attaching the brackets to the switch
- Four adhesive feet
- Appropriate power cord(s)
- 3.5-inch disk containing the TigerSwitch 16 MIB
- SMC Warranty Registration Card — be sure to complete and return this card within 90 days

Required Rack-Mounting Equipment

Be sure to have the following equipment available when mounting your switch in a rack:

- Four rack-mounting screws with nuts — these are not provided with the switch
- A screwdriver (Phillips-head or flathead, depending on type of screws used)

Mounting

A TigerSwitch 16 unit can be mounted in a standard 19-inch equipment rack or on a desktop or shelf. Mounting instructions for each type of site follow.

Rack Mounting

Before rack mounting the switch, pay particular attention to the following factors:

- **Temperature:** Since the temperature within a rack assembly may be higher than the ambient room temperature, check that the rack-environment temperature is within the specified operating temperature range.
- **Mechanical Loading:** Do not place any equipment on top of a rack-mounted unit
- **Circuit Overloading:** Be sure that the supply circuit to the rack assembly is not overloaded.
- **Grounding:** Rack-mounted equipment should be properly grounded. Particular attention should be given to supply connections other than direct connections to the AC power mains.

To rack mount a switch:

1. Attach the brackets to the device using the screws provided in the Bracket Mounting Kit.

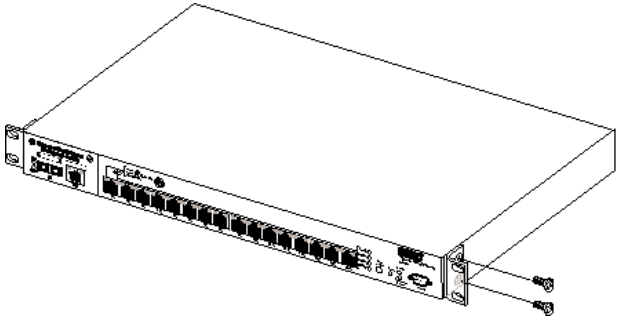

Figure 4-1. Attaching the Brackets

2. Mount the device in the rack, using four rack-mounting screws and nuts (not provided).

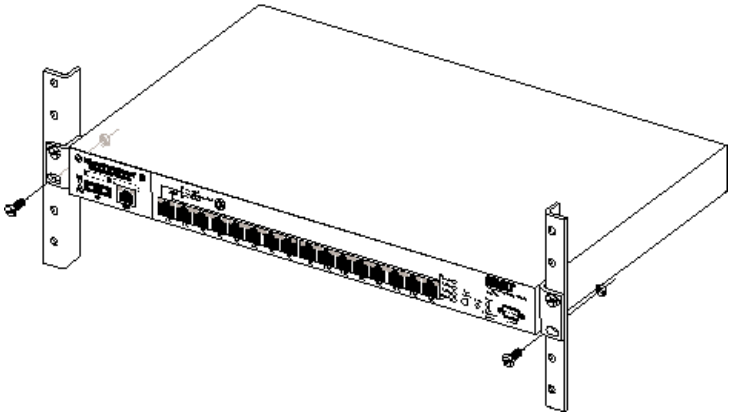

Figure 4-2. Installing the Switch in a Rack

3. Turn to the section, “Connecting to the Console Port.”

Desktop or Shelf Mounting

1. Attach the four adhesive feet to the bottom of the switch.

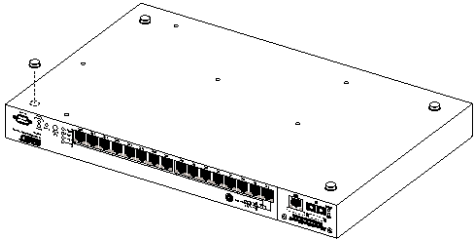

Figure 4-3. Attaching the Adhesive Feet

2. Set the switch on a flat surface near an AC power source, making sure there are at least two inches of space on all sides for proper air flow.

3. Turn to the next section, “Connecting to the Console Port.”

Connecting to the Console Port

Each TigerSwitch 16 model contains a Console port on the front panel. This is an RS-232 serial port with a male DB-9 connector. When connected to a PC, this port can be used to:

- Monitor the switch out-of-band
- Change the default configuration settings for specific applications, for example:
  - Assign an IP address for Telnet and SNMP management
  - Set passwords for security reasons

Note: Access rights default to read/write. This means that unauthorized users are able to make changes to the configuration unless password protection is enabled.

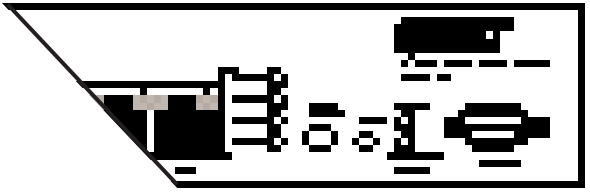

Figure 4-4. Console Port

To make the connection:

1. Plug the female end of a standard RS-232 null-modem cable into the switch connector labeled Console. Plug the other end of the cable into the serial connector on the PC (typically COM1 or COM2). See Appendix A for Console connector pin assignments.

2. Power up the device and set the communications program to the following parameters: 9600, n, 8, 1 (9600 baud, no parity, 8 bits, 1 stop bit).

   If you are using the Windows Terminal program on a PC, see Appendix C for a detailed description of the configuration parameters.

Connecting to a Power Source

1. Plug one end of the appropriate power cable (see below) into the back of the switch, and the other end into a grounded, 3-pin socket.

   For North American Use: Each switch is shipped with one standard AC line cord for North America that is UL and CSA approved.

   For International Use: The International version of the switch is shipped with AC line cords for Continental Europe and the UK. If you need to change the line cord, you must use a line cord set that has been approved for the receptacle type in your country. Any cord used must be HAR-Certified, and must have HAR stamped on the outside of the cord jacket to comply with the CENELEC Harmonized Document HD-21. The female receptacle must meet CEE-22 requirements and IEC 320-030 specifications.

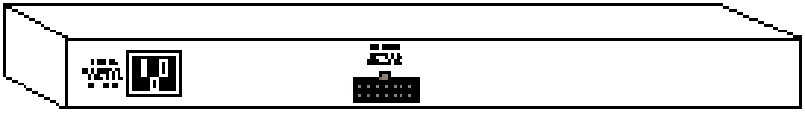

Figure 4-5. Power Receptacles

2. If you have purchased a Redundant Power Unit (RPU), plug the 14-pin connector from the RPU into the mating connector on the rear panel of the switch (see the guide supplied with the RPU).

3. The front-panel Power LED should be lit. If it isn't, check to make sure the power cable is plugged in correctly. For an explanation of the Power and Redundant Power LEDs, refer to "Power Supply Receptacles and Status LEDs" in Chapter 2.

Diagnostic Self-Tests

When the switch is powered up, diagnostic tests are performed, and the test results are displayed on the PC attached to the Console port.

```
                SMC TigerSwitch 16
ROM Checksum  . . . . . . . . . . . . . .PASSED

Local RAM Test (Byte) . . . . . . . . . .PASSED

Local RAM Test (Quad Word)  . . . . . . .PASSED
```

Figure 4-6. Diagnostics Display

During the test sequence, the switch detects whether the software is loaded. If it is, the Main Menu is displayed (see "Main Menu" in Chapter 5). Otherwise, the Boot Loader Menu is displayed so that new software can be downloaded (see "Downloading New Software" in Chapter 5).

Making Network Connections

Switches are designed to interconnect multiple segments, or collision domains. Each segment may contain a single server or workstation, or multiple workstations that are connected to a hub. An overview of the rules for both Ethernet and Fast Ethernet collision domains is provided below.

10 Mbps Ethernet Collision Domain

SMC 5 - 4 - 3 Rule

Between any two PCs or other stations in the same 10 Mbps collision domain, there may be:

- up to 5 cable segments in series,
- up to 4 repeaters (hubs),
- up to 3 populated cable segments, that is, segments attached to two or more PCs (coax networks only).*

* The remaining two segments are unpopulated; these are known as inter-repeater links or IRLs. This distinction between populated and unpopulated segments is significant for coax networks only.

Maximum Cable Lengths

Cable Type	Maximum Length
Twisted Pair, Categories 3, 4, 5	100 m (328 ft.)
Fiber (FOIRL)	1.0 km (0.62 mi.)
Fiber (10BASE-FL)	2.0 km (1.28 mi.)
Thin Coax	185 m (607 ft.)
Thick Coax	500 m (1,640 ft.)
AUI	50 m (165 ft.)

100 Mbps Fast Ethernet Collision Domain

SMC 3 - 2 Rule for Class (II) Repeaters

Between any two PCs or other stations in the same 100BASE-T collision domain, there may be:

- up to 3 link segments and
- up to 2 Class (II) repeaters (hubs)

SMC 2 - 1 Rule for Class (I) and Class (II) Repeaters

Between any two PCs or other stations in the same 100BASE-T collision domain, there may be:

- up to 2 link segments and
- up to 1 Class (I) or Class (II) repeater (hub)

Maximum 100BASE-T Network Diameter*

Repeater Type and Number	Twisted Pair	Twisted Pair/Fiber	
	100BASE-TX/T4	100BASE-T4/FX	100BASE-TX/FX
1 Class (I)	200 m (656 ft.)	231 m (757.7 ft.)	260.8 m (855.4ft.)
1 Class (II)	200 m (656 ft.)	304 m (997.1 ft.)	308.8 m (1012.9 ft.)
2 Class (II)	205 m (672.4 ft.)	236.3 m (775.1 ft.)	216.2 m (709.1 ft.)

Maximum 100BASE-T Cable Distance

Cable Type	Connecting	Max. Distance
Twisted Pair	Any two devices	100 m (328 ft.)
Fiber	Switch to Switch, Server or PC	
	Half duplex	412 m (1,351.4 ft.)
	Full duplex	2 km (1.24 mi.)
MII	Any two devices	0.5 m (1.6 ft.)

*Note: Network Diameter is defined as the wire distance between two end stations in the same collision domain.

Twisted-Pair Devices

Each 10BASE-T and 100BASE-TX device requires an unshielded twisted-pair (UTP) cable with RJ-45 connectors at both ends. For 10BASE-TX connections, two pairs of Category 3, 4 or 5 cable are required. 100BASE-TX connections require two pairs of certified Category 5 cable.

Cabling Guidelines

Every twisted-pair connection must have a wiring crossover to transmit and receive data. For convenience, the crossover is built into all ports that are labeled with an "x"—these are called fixed crossover ports. Since network cards *do not* have a built-in crossover, PCs can be connected to these ports with straight-through cable. See Appendix A for cabling pinouts.

Hubs (and other switches) may have either crossover or straight-through ports. For this reason, the type of cable used to connect these devices to a TigerSwitch 16 unit is determined by the port on the other device, as shown in the table below.

Crossover/Straight-Through Wiring Requirements		
The port on the TigerSwitch 16 is...	**If the hub or switch port is...**	**Then use...cable**
Crossover (x)	Crossover (x)	Crossover
Crossover (x)	Straight-through	Straight-through

Connecting Devices

Servers, workstations, hubs and other switches can be connected to the switch with a twisted-pair cable segment. This segment may be up to 100 m (328 feet) in length. Be sure to use the appropriate type of cable (either crossover or straight-through). Use only certified Category 5 cable for the 100BASE-TX connection.

Attach one end of the cable to an unused port on the switch, and the other end to the RJ-45 port on the other device. As each connection is made, the green LED above the port will light (after 2-3 seconds) to indicate that the connection is valid.

100BASE-FX Devices

The 100BASE-FX connection requires 62.5/125 micron multi-mode fiber optic cabling with an SC connector. Since SC connectors are keyed, the cable can be attached in only one manner.

Connecting Devices

Connect one end of the cable to the SC connector on the front panel of the switch (see illustration) and the other end to the other device.

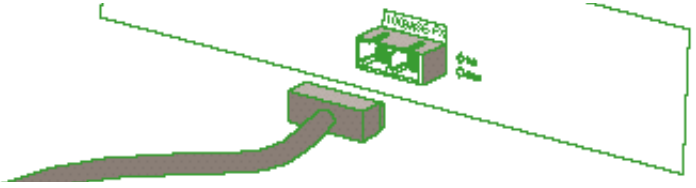

Figure 4-7. Connecting Fiber Cable

Default Settings

Each switch is set to operate as a transparent bridge using the default operating parameters. It will automatically learn the addresses of all active stations on each segment and appropriately switch traffic between its ports. To change the configuration of the switch, turn to Chapter 5.

CHAPTER 5
CONFIGURING AND MONITORING

The Console Interface

Once a PC has been connected to the Console port on the front panel of the switch, it can be used to reconfigure the switch and monitor its operation out-of-band.

If you have not already done so, power up the device and set the communications program to the following parameters: 9600, n, 8, 1 (9600 baud, no parity, 8 bits, 1 stop bit).

Note: This interface operates at either 9600 or 19,200 baud. The default value is 9600.

The console interface is menu-driven. A representation of the menus can be found in this chapter, along with a description of each menu selection.

Using the Console Interface

The console interface is an easy to use, menu-driven interface. The Main Menu provides the starting point from which you can choose other menus. When you are prompted to "Enter Selection," type in the number of the item you want. A new screen displays immediately; there is no need to press the Enter key.

Some screens are read-only. At the bottom of read-only screens you will be instructed to "Type any key to continue." This action returns you to the previous screen.

Other screens contain editable fields. The bottom of these screens include the "Enter Selection" prompt. When you type in a number, the system displays the current value in parenthesis and prompts you for a new value. After entering the new value, you must press Enter so it can take effect.

At any time, you may press Esc (if you are in an editable field, press Enter and then Esc) to return to the previous menu.

Main Menu

The Main Menu is shown below.

```
>>>>    Main Menu    <<<<
1. Switch Configuration Menu
2. Port Configuration Menu
3. Statistics Menu
4. Utilities Menu
5. Exit Menus (Password Protect)

Enter Selection:
```

Figure 5-1. Main Menu

Menu Selections

Switch Configuration Menu—Displays the Switch Configuration Menu (see Figure 5-2). This menu allows you to configure parameters which affect the operation of the switch.

Port Configuration Menu—Displays the Port Configuration Menu (see Figure 5-9). This menu allows you to view port settings and to select a port so you can change its settings.

Statistics Menu—Displays the Statistics Menu (see Figure 5-13). This menu allows you to display or clear various system, error and protocol statistics.

Utilities Menu—Displays the Switch Utilities Menu (see Figure 5-14). This menu allows you to select various utility functions, such as console configuration, password configuration, error log, software download, etc.

Exit Menus—Exits the menus. If the Console Interface has been password-protected, all menus are disabled until the password is entered.

Note: To disable password protection, set the password to "SMC."

Switch Configuration Menu

The Switch Configuration Menu is accessed from the Main Menu.

```
>>>> Switch Configuration Menu    <<<<
1. Configuration Summary
2. IP Configuration
3. SNMP Configuration
4. Spanning Tree Configuration
5. Address Aging Configuration
6. Port Mirroring Configuration

<ESC> To Exit Menu
Enter Selection:
```

Figure 5-2. Switch Configuration Menu

Menu Selections

Configuration Summary—Displays the Configuration Display Screen (see Figure 5-3). This screen contains information about the switch: community name, IP address, etc. Values on this menu are read-only.

IP Configuration—Displays the IP Configuration Menu (see Figure 5-4). This menu allows you to set IP values, such as IP address, subnet mask, etc.

SNMP Configuration—Displays the SNMP Configuration Menu (see Figure 5-5). This menu allows you to set SNMP configuration parameters.

Spanning Tree Configuration—Displays the Spanning Tree Configuration Menu (see Figure 5-6). This menu allows you to display or modify spanning tree parameters.

Address Aging Configuration—Displays the Address Aging Configuration Menu (see Figure 5-7). This menu allows you to turn address aging on and off, and to set the aging time.

Port Mirroring Configuration—Displays the Port Mirroring Configuration Menu (see Figure 5-8). This menu allows you to turn port mirroring on and off, and to select both the port to be mirrored and the port to be used for monitoring.

Configuration Display Screen

The Configuration Display Screen is accessed from the Switch Configuration Menu.

```
>>>>    Configuration Display    <<<<
Number of Ports.......................... [ 18 ]
Port 1 MAC Address.............. [ 00800F80000A ]
Switch IP Address.............. [   0.  0.  0.  0 ]
Default SNMP Manager IP Address [   0.  0.  0.  0 ]
Default Gateway IP Address..... [   0.  0.  0.  0 ]
Subnet Mask.................... [ 255.  0.  0.  0 ]
SLIP Enable.................... [        Disabled ]
SLIP IP Address................ [   0.  0.  0.  0 ]
SLIP Subnet Mask............... [ 255.  0.  0.  0 ]
SNMP Get Community Name............. [     public ]
SNMP Set Community Name............. [     public ]
Spanning Tree Protocol.............. [         On ]
Address Aging....................... [         On ]
Port Mirroring...................... [        Off ]
Dynamic Host Configuration Protocol. [         On ]
Error Logged............................. [ 0000 ]
Boot Firmware Version................... [ xx.xx ]
Software Load Version................... [ xx.xx ]

Type Any Key To Continue ...
```

Figure 5-3. Configuration Display Screen

Display Fields

Number of Ports—Displays the number of ports contained in the switch.

Port 1 MAC Address—Displays the MAC address of port 1.

Switch IP Address—Displays the IP address assigned to the switch..

Default SNMP Manager IP Address—Displays the address of the default SNMP manager.

Default Gateway IP Address—Displays the default gateway IP address to which the unit sends IP packets destined for a different subnet.

Subnet Mask—Displays the IP subnet mask that corresponds to the assigned IP address.

SLIP Enable—Indicates whether SLIP is enabled or disabled. SLIP is not enabled until after the switch has been reset.

SLIP IP Address—Displays the SLIP IP address.

SLIP Subnet Mask—Displays the SLIP subnet mask that corresponds to the assigned SLIP IP address.

SNMP Get Community Name—Displays the SNMP Get community name for read-only SNMP access.

SNMP Set Community Name—Displays the SNMP Set community name for write SNMP access.

Spanning Tree Protocol—Indicates whether Spanning Tree Protocol is on or off. The default setting is “on”.

Address Aging—Indicates whether address aging is on or off.

Port Mirroring—Indicates whether port mirroring is on or off.

Dynamic Host Configuration Protocol—Indicates whether DHCP is on or off.

Error Logged—Displays the error number of the first unrecoverable error that occurred. Please note this number and contact SMC if an error has been logged.

Boot Firmware Version—Displays the current version of the boot firmware.

Software Load Version—Displays the current version of the load software.

IP Configuration Menu

The IP Configuration Menu is accessed from the Switch Configuration Menu.

```
>>>> IP Configuration Menu    <<<<
1. Automatic Selection of IP address (DHCP).. [       ON]
2. Switch IP Address.......... ..... [ 170.129. 78. 28 ]
3. Default SNMP Manager IP Address... [ 170.129. 78.208 ]
4. Default Gateway IP Address........ [ 170.129. 78.  1 ]
5. Subnet Mask....................... [ 255.255.255.  0 ]
6. SLIP Enable....................... [        Disabled ]
7. SLIP IP Address................... [   0.  0.  0.  0 ]
8. SLIP Subnet Mask.................. [ 255.  0.  0.  0 ]

<ESC> To Exit Menu
Enter Selection:
```

Figure 5-4. IP Configuration Menu

Menu Selections

Automatic Selection of IP address (DHCP)—Allows you to turn the Dynamic Host Configuration Protocol (DHCP) on or off. The factory default is ON. If there is a DHCP server on your network *and* DHCP is on, the IP Address, Gateway IP address and Subnet Mask (menu selections 2, 4 and 5) for the TigerSwitch™ 16 are assigned automatically. If there is no DHCP server *or* if DHCP is off, you will have to enter these addresses manually. Note that when you reset or powerdown with DHCP on, you may or may not receive the same address assignments.

Switch IP Address—Allows you to enter the IP address assigned to the switch.

Default SNMP Manager IP Address—Allows you to enter the IP address of the default SNMP manager.

Default Gateway IP Address—Allows you to enter the IP address of the default gateway to which the switch sends IP

packets destined for a different subnet.

Subnet Mask—Allows you to enter the IP subnet mask that corresponds to the assigned IP address.

SLIP Enable—Allows you to enable or disable SLIP. After setting this field to “enable”, the swtich must be reset to actually enable SLIP.

SLIP IP Address—Allows you to enter the SLIP IP address. ***Note:*** This address must be different from the Switch IP address. The Host Address can be the same,.but the network number must be different.

SLIP Subnet Mask—Allows you to enter the SLIP subnet mask that corresponds to the assigned SLIP IP address.

SNMP Configuration Menu

The SNMP Configuration Menu is accessed from the Switch Configuration Menu.

```
>>>>    SNMP Configuration Menu    <<<<
1. SNMP Get Community Name ( 10 characters max ).. [     public ]
2. SNMP Set Community Name ( 10 characters max ).. [     public ]
3. System Location ( 24 characters max ).. [                    ]
4. System Name ( 24 characters max )..... [                     ]
5. System Contact ( 24 characters max )... [                    ]

<ESC> To Exit Menu
Enter Selection:
```

Figure 5-5. SNMP Configuration Menu

Menu Selections

SNMP Get Community Name—Allows you to enter the Get community name (up to 10 alphanumeric characters) for read-only SNMP access.

SNMP Set Community Name—Allows you to enter the Set community name (up to 10 alphanumeric characters) for write SNMP access.

System Location—Allows you to enter the physical location (up to 24 alphanumeric characters) assigned to the switch for SNMP management purposes.

System Name—Allows you to enter the administrative name (up to 24 alphanumeric characters) assigned to the switch for SNMP management purposes.

System Contact—Allows you to enter the name of a person to contact (up to 24 alphanumeric characters) regarding the operation of the switch, as used for SNMP management.

Spanning Tree Configuration Menu

The Spanning Tree Configuration Menu is accessed from the Switch Configuration Menu.

```
>>>>    Spanning Tree Configuration Menu    <<<<
1. Spanning Tree Protocol..................... [    On ]
2. Switch Priority (0-65535).................. [ 32768 ]
3. Switch Maximum Age (6-40 seconds).......... [    20 ]
4. Switch Hello Time (1-10 second)............ [     2 ]
5. Switch Forwarding Delay (4-30 seconds)..... [    15 ]

6. Display Current Spanning Tree Parameters In Use

<ESC> To Exit Menu
Enter Selection:
```

Figure 5-6. Spanning Tree Configuration Menu

Menu Selections

Spanning Tree Protocol—Allows you to turn Spanning Tree Protocol on or off.

Switch Priority—Allows you to enter the priority value (0 - 65535) for the switch.

Switch Maximum Age—Allows you to enter the amount of time (6 - 40 seconds) any port within the Spanning Tree network will wait before timing out its protocol information.

Switch Hello Time—Allows you to enter the rate (1 - 10 seconds) at which hello frames are to be generated.

Switch Forwarding Delay—Allows you to enter the amount of time (4 - 30 seconds) a switch port spends in the listening and learning states.

Display Current Spanning Tree Parameters In Use—Displays the Spanning Tree Parameters that are currently in use.

Address Aging Configuration Menu

The Address Aging Configuration Menu is accessed from the Switch Configuration Menu.

```
>>>>    Address Aging Configuration Menu    <<<<
1. Address Aging..................... [     On ]
2. Address Aging Time (120-1000000 sec). [    300 ]

<ESC> To Exit Menu
Enter Selection:
```

Figure 5-7. Address Aging Configuration Menu

Menu Selections

Address Aging—Allows you to turn address aging on and off.

Address Aging Time—Allows you to enter the amount of time (120 - 1000000 seconds) that an address is to remain in the address table before being deleted (unless it is relearned).

Port Mirroring Configuration Menu

The Port Mirroring Configuration Menu is accessed from the Switch Configuration Menu.

```
>>>>    Port Mirroring Configuration Menu    <<<<
1. Port Mirroring.............................. [  Off ]
2. Mirror Port................................. [    2 ]
3. Monitor Port................................ [    1 ]

<ESC> To Exit Menu
Enter Selection:
```

Figure 5-8. Port Mirroring Configuration Menu

Menu Selections

Port Mirroring—Allows you to turn port mirroring on and off.

Mirror Port—Allows you to enter the number of the port that is to be mirrored.

Monitor Port—Allows you to enter the number of the port that is to be used for monitoring.

Note: You cannot use a 10 Mbps port for monitoring while mirroring a 100 Mbps port.

Port Configuration Menu

The Port Configuration Menu is accessed from the Main Menu.

```
>>>>    Port Configuration Menu    <<<<
1. Port Summary
2. Address Tables
3. Port Settings

<ESC> To Exit Menu
Enter Selection:
```

Figure 5-9. Port Configuration Menu

Menu Selections

Port Summary—Displays the Port Summary Display Screen (see Figure 5-10). This screen allows you to view the current port settings. These read-only values include port type, MAC address, state and priority.

Address Tables—Displays the address table for the selected port. Values include MAC address and associated port number.

Port Settings—Displays the Port Summary Configuration Menu (see Figure 5-11). This menu displays the settings for all the ports and allows you to select a port and change its state, cost, priority, operating mode and MAC address.

Port Summary Display Screen

The Port Summary Display Screen is accessed from the Port Configuration Menu by selecting "Port Summary." All the fields on this screen are read-only.

```
>>>>    Port Summary Display    <<<<
Port Port Type  MAC Address    Port State   Priority  Address Cnt
 1  [  10BaseT] [00800F800014] [Forwarding] [    128] [      0]
 2  [  10BaseT] [00800F800015] [Forwarding] [    128] [      0]
 3  [  10BaseT] [00800F800016] [Forwarding] [    128] [      0]
 4  [  10BaseT] [00800F800017] [Forwarding] [    128] [      0]
 5  [  10BaseT] [00800F800018] [Forwarding] [    128] [      0]
 6  [  10BaseT] [00800F800019] [Forwarding] [    128] [    185]
 7  [  10BaseT] [00800F80001A] [Forwarding] [    128] [      0]
 8  [  10BaseT] [00800F80001B] [Forwarding] [    128] [      0]
 9  [  10BaseT] [00800F80001C] [Forwarding] [    128] [      0]
 10 [  10BaseT] [00800F80001D] [Forwarding] [    128] [      0]
 .
 .
 17 [100BaseFX] [00800F800024] [Forwarding] [    128] [      0]
 18 [100BaseTX] [00800F800025] [Forwarding] [    128] [      0]
Type Any Key To Continue ...
```

Figure 5-10. Port Summary Display Screen

Display Fields

Port—Displays the number of the port to which the summary applies.

Port Type—Displays the type of port.

MAC Address—Displays the MAC address assigned to the port.

Port State—Displays the current state of the port. This determines the action a port takes when a packet is received.

Priority—Displays the priority of the port in relation to other ports.

Address Cnt—Displays the number of learned addresses acquired by the port since the last power-off or reset.

Port Summary Configuration Menu

The Port Summary Configuration Menu is accessed from the Port Configuration Menu by selecting "Port Settings." In addition to displaying the settings for all ports, the menu allows you to change the settings for a particular port (see Figure 5-12).

```
>>>>    Port Summary Configuration Menu    <<<<
Port Port State  Path Cost  Priority  Speed/Dplx   MAC Address
1   [Forwarding]  [   100]  [  128]    [  10/H]  [ 00800F80003C ]
2   [Forwarding]  [   100]  [  128]    [  10/H]  [ 00800F80003D ]
3   [Forwarding]  [   100]  [  128]    [  10/H]  [ 00800F80003E ]
4   [Forwarding]  [   100]  [  128]    [  10/H]  [ 00800F80003F ]
5   [Forwarding]  [   100]  [  128]    [  10/H]  [ 00800F800040 ]
6   [Forwarding]  [   100]  [  128]    [  10/H]  [ 00800F800041 ]
7   [Forwarding]  [   100]  [  128]    [  10/H]  [ 00800F800042 ]
8   [Forwarding]  [   100]  [  128]    [  10/H]  [ 00800F800043 ]
9   [Forwarding]  [   100]  [  128]    [  10/H]  [ 00800F800044 ]
10  [Forwarding]  [   100]  [  128]    [  10/H]  [ 00800F800045 ]
.
.
17  [Forwarding]  [    10]  [  128]    [ 100/H]  [ 00800F80004C ]
18  [Forwarding]  [    10]  [  128]    [ 100/H]  [ 00800F80004D ]
<ESC> To Exit Menu, or Type Port Selection To Edit
Enter Selection:
```

Figure 5-11. Port Summary Configuration Menu

Display Fields

Port State—Displays the port Spanning Tree state (Listening, Learning, Forwarding or Blocking).

Port Path Cost—Displays the port path cost (1 - 65535), a Spanning Tree Protocol parameter. The default value for 10 Mbps is 100. The default value for 100 Mbps is 10.

Port Priority—Displays the priority (0 - 255) of the port relative to other ports The default value is 128.

Speed/Dplx—Displays the speed of the port (10 or 100 Mbps)

Port [x] Configuration Menu

The Port [x] Configuration Menu is accessed from the Port Summary Configuration Menu by entering the number of a port whose settings are to be edited.

```
_____________________________________________________>>>>
Port [x] Configuration Menu    <<<<
1. Port Status.............................. [  Enabled ]
2. Port Path Cost........................... [      100 ]
3. Port Priority............................ [      128 ]
4. Port Duplex Mode......................... [     Auto ]
5. Auto-Negotiation Mode ................... [       On ]
6. Port Speed .............................. [     Auto ]

<ESC> To Exit Menu
Enter Selection:

_____________________________________________________
```

Figure 5-12. Port [x] Configuration Menu

Menu Selections*

Port Status—Allows you to enable or disable the port. When a port is disabled, it is not included in the Spanning Tree Algorithm.

Port Path Cost—Allows you to enter the port path cost (1 - 65535), a Spanning Tree Protocol parameter. The default value is 100.

Port Priority—Allows you to enter the priority (0 - 255) of the port relative to other ports The default value is 128.

Port Duplex Mode—Allows you to select either half- or full-duplex operation. If Auto-Negotiation is enabled, this menu item is automatically set.

Auto-Negotiation Mode—Allows you to turn Auto-Negotiation for the 100BASE-TX ports on and off.

Port Speed—Allows you to select the line speed for the 100BASE-TX ports. If Auto-Negotiation is enabled, this menu item is automatically set.

* **Note:** Menu selections 1-4 apply to all ports. Selections 5 and 6 only apply to 100BASE-TX ports.

Statistics Menu

The Statistics Menu is accessed from the Main Menu. The selections on this menu are standard MIB II read-only statistics (refer to RFC 1213).

```
>>>>    Statistics Menu    <<<<
1. Display System Statistics
2. Display IF Statistics
3. Display IP AT Table
4. Display IP Statistics
5. Display ICMP Statistics
6. Display UDP Statistics
7. Display SNMP Statistics

<ESC> To Exit Menu
Enter Selection:
```

Figure 5-13. Statistics Menu

Menu Selections

Display System Statistics—Displays system statistics, such as description, object ID, up time, contact, name, location, etc.

Display IF Statistics—Displays IF protocol statistics for the selected port.

Display IP AT Table—Displays the IP address translation table which lists all the stations on the network that are in communication with the SNMP agent.

Display IP Statistics—Displays IP protocol statistics.

Display ICMP Statistics—Displays ICMP protocol statistics.

Display UDP Statistics—Displays UDP protocol statistics.

Display SNMP Statistics—Displays SNMP protocol statistics.

Utilities Menu

The Utilities Menu is accessed from the Main Menu.

```
_____________________________________________________

>>>>    Utilities Menu    <<<<
1. Console Configuration
2. Display/Clear Error Log
3. Password Configuration
4. Reset To Factory Defaults
5. Initiate Software Download
6. Establish Telnet Session
7. Initialize Modem

<ESC> To Exit Menu
Enter Selection:

_____________________________________________________
```

Figure 5-14. Utilities Menu

Menu Selections

Console Configuration—Displays the Console Configuration Menu (see Figure 5-15). This menu displays and allows you to change the current transmission baud rate for the out-of-band management terminal or PC.

Display/Clear Error Log—Displays the error log, and allows you to clear it with the prompt: “Type C to Clear.”

Password Configuration—Allows you to change the password. You are prompted with the message: ‘Enter New Password.” You are then asked to reenter your password for verification.

Caution: You must remember the password. If a password is set and then forgotten, you must call SMC Tech Support to regain access to your system.

Reset To Factory Defaults—Allows you to reset the system to factory defaults. This procedure only resets the switch parameters. You are prompted with the message: "Reset to factory defaults ? (Y/N)."

Initiate Software Download—Displays the Boot Menu (see Figure 5-16). This menu allows you to initiate a software download. (See page 5-29 of this guide for a fully detailed discussion of this option.)

Establish Telnet Session—Displays the Telnet Menu (see Figure 5-17). This menu allows you to initiate a Telnet session.

Initialize Modem—Initialize modem selection sends initialize modem string to the front panel console port.

Console Configuration Menu

The Console Configuration Menu is accessed from the Utilities Menu by selecting "Console Configuration."

```
>>>> Console Configuration Menu    <<<<
1. Baud Rate.............................[ 9600 ]
2. Accept New Settings

<ESC> To Exit Menu
Enter Selection:
```

Figure 5-15. Console Configuration Menu

Menu Selections

Baud Rate—Allows you to enter the baud rate (9600 or 19200 bps) for out-of-band management. Be sure to press the Enter key after you have made the change. The default baud rate is 9600 bps.

Accept New Settings—Accepts the new baud rate. Note that if you enter a new baud rate, you must select this option to enable the change.

Boot Menu

The Boot Menu is accessed from the Utilities Menu by selecting "Initiate Software Download."

```
>>>> TigerSwitch 16 Boot Menu    <<<<
                  Boot Code Version XX.XX
1. Software Download via RS-232 Interface
2. Software Download via TFTP
3. Start System

<ESC> To Exit Menu
Enter Selection:
```

Figure 5-16. Boot Menu

Menu Selections

Software Download via RS-232 Interface—Allows you to start a boot code download via the RS-232 interface.

Software Download via TFTP—Allows you to start a boot code download via TFTP.

Start System—Allows you to restart the system after downloading software. This selection may also be used to return to the Main menu instead of downloading.

Note: *During any download operation, network connectivity will be halted!*

Telnet Menu

The Telnet Menu is accessed from the Utilities Menu by selecting "Establish Telnet Session."

```
>>>> Telnet Menu    <<<<
1. Configure Telnet Server IP Address.[ 0. 0. 0. 0]
2. Initiate Telnet Session

<ESC> To Exit Menu
Enter Selection:
```

Figure 5-17. Telnet Menu

Menu Selections

Configure Telnet Server IP Address—Allows you to enter the IP address of the remote unit with which you want to communicate. You must use numbers; domain names are not supported.

Initiate Telnet Session—Allows you to initiate the Telnet session once an IP address has been entered.

Typical Configuration Operations

Instructions for performing some typical configuration operations via the console interface are provided below.

Setting the Password

Setting a password prevents unauthorized users from reconfiguring the switch. At the factory, the password is not enabled so that you may access the console interface and set the first password.

To set (or change) a password for the Console port or for inbound Telnet:

1. At the Main Menu, type 4 to display the Utilities Menu.
2. At the Utilities Menu, type 3. The system prompts: "Enter New Password."
3. Type in your new password (1 to 9 alphanumeric characters - not "SMC". This is the factory default).
4. The system prompts: "Re-enter New Password." Type the password a second time.

Once a password is set, it is applicable to both Telnet and the Console port (RS-232, out-of-band). After a password has been assigned, you must use the Exit Menu selection on the Main Menu to disable all menus until the password is entered. *If you set the password, but do not use the Exit Menu selection on the Main Menu, the console interface* ***will not*** *be password protected.*

Caution: You must remember the password. If a password is set and then forgotten, you must call SMC Tech Support to regain access to your system.

Disabling the Password

To disable password protection for the Console port or for inbound Telnet:

1. At the Main Menu, type 4 to display the Utilities Menu.
2. At the Utilities Menu, type 3. The system prompts: “Enter New Password.”
3. Type in “SMC.”
4. The system prompts: “Re-enter New Password.” Type the “SMC” password a second time.

Configuring the IP Address

To assign an IP address to the switch:

1. At the Main Menu, type 1 to display the Switch Configuration Menu.
2. At the Switch Configuration Menu, type 2 to display the IP Configuration Menu.
3. Type 1 to select “Switch IP Address,” and then enter the IP address assigned to the switch.
4. The system then asks you to confirm the address by prompting: “Confirm Switch IP Address (Y/N).” If the address is correct, type Y to confirm.

Note: The same procedure can be used to set SNMP Manager and Gateway IP Addresses.

Changing the Port Settings

To change any of the port settings on the switch:

1. At the Main Menu, type 2 to display the Port Configuration Menu.
2. At the Port Configuration Menu, type 3 to display the Port Summary Configuration Menu.
3. Type the number of the port whose settings you wish to change. The Port [x] Configuration Menu is displayed.
4. Type the number of the parameter you wish to change.
5. The system then prompts you to enter the new value and to confirm your change.

Configuring Address Aging

You can turn Address Aging on and off, and set the amount of time (in seconds) you want addresses to remain in the address table before being deleted. Addresses relearned within the time configured have their aging timer reset.

To configure address aging:

1. At the Main Menu, type 1 to display the Switch Configuration Menu.
2. At the Switch Configuration Menu, type 5 to display the Address Aging Configuration Menu.
3. Type 1 to toggle Address Aging on and off. Type 2 and enter the amount of time you want addresses to remain in the table before being deleted.

Configuring Spanning Tree Protocol

The Spanning Tree Algorithm requires certain parameter settings The default settings should be acceptable in most networks. If you need to change the defaults, proceed as follows:

1. At the Main Menu, type 1 to display the Switch Configuration Menu.
2. At the Switch Configuration Menu, type 4 to display the Spanning Tree Configuration Menu.
3. Type the number of the parameter you want to change. The system prompts you to enter the new value.
4. Repeat Step 3 until all necessary changes are made.

Returning to Factory Settings

To return your system to factory-set defaults:

1. At the Main Menu, type 4 to display the Utilities Menu.
2. At the Utilities Menu, type 4. The system prompts: “Reset to factory defaults? (Y/N).”
3. Type Y and the system automatically resets the switch parameters and restarts the unit.

Downloading New Software

New software may be downloaded to the switch via TFTP or the RS-232 Console port. Downloading via TFTP is substantially faster. Serial downloading (via the Console port) may take in excess of half an hour or more.

When downloading via the RS-232 port, the PC connected to the Console port must be running a terminal emulation application. Be sure that the ASCII transfer parameters are set for maximum throughput.

Downloading Software via TFTP

Configure the PC running TFTP as a TFTP server, and load the software to be downloaded onto this server before initiating the download.

1. Attach your terminal to the RS-232 port and access the Main Menu.
2. At the Main Menu, type 4 to display the Utilities Menu.
3. At the Utilities Menu, type 5 to initiate a software download. The system prompts with a warning and the message: "DO YOU WANT TO CONTINUE? (Y/N)."

   Note: If you type Y, all network traffic through the switch will be disabled.
4. Type Y, and the message: "BOARD RESET IN PROGRESS" appears, followed by the Boot Menu. At this point, the Link LEDs on all ports will be extinguished.
5. Type 2 to select "Software Download via TFTP" and the TFTP Loader Menu appears (see Figure 5-18).
6. Type 1, and you are prompted to enter the name of the file you want to download. Enter the filename (maximum 8 characters) followed by a period and the extension (maximum three characters).

   Note: The default filename is TG16xxxx.chx, where xxxx is the version number of the software.

7. Type 2, and you are prompted to enter the IP address of the server where the file is located. Enter the IP address.

8. Type 3, and you are prompted to enter the IP address of the switch. Enter the IP address.

9. If desired, you may select 7 to ping the server and test its status before beginning the download.

10. Type 6 to begin the TFTP download. A warning message is displayed followed by the prompt: "START TFTP DOWNLOAD? (Y/N)."

11. Type Y to start the download. Progress messages will appear, the last one being: "TFTP Download Successful."

12. Press any key to return to the TFTP Loader Menu.

13. Press Esc to return to the Boot Menu.

14. Type 3 to restart the system.

```
>>>>    TFTP Loader Menu    <<<<
1. Select TFTP File Name                  [  Not Configured ]
2. Configure TFTP Server IP Address       [  Not Configured ]
3. Configure Switch IP Address            [ 170.129. 78. 29 ]
4. Configure Default Gateway IP Address   [ 170.129. 78. 29 ]
5. Configure Subnet Mask                  [ 255.255.255.  0 ]
6. Start TFTP Download
7. PING TFTP Server

<ESC> To Exit Menu
Enter Selection:
```

Figure 5-18. TFTP Loader Menu

Downloading Software via RS-232 Port

1. Attach your terminal to the RS-232 port and access the Main Menu.
2. At the Main Menu, type 4 to display the Utilities Menu.
3. At the Utilities Menu, type 5 to display the Boot Menu.
4. Type 1 to initiate a software download. The system prompts with a warning and the message: "DO YOU WANT TO CONTINUE? (Y/N)."

   Note: If you type Y, all network traffic through the switch will be disabled.
5. Type 1 to begin the download. A warning message is displayed followed by the prompt: "START RS-232 DOWNLOAD? (Y/N)."
6. Type Y and a display similar to the following appears:
   "Erasing FLASH Memory"
   "Please Start ASCII Download of Operational Software...."
   The Link LEDs for all ports will also go out.
7. At this point, return to the terminal application. For example, if you were using Procomm Plus, you would press the Page Up key to bring up the Procomm screen. Then, select the upload protocol (ASCII) and you are prompted for a file name. Put your software diskette in the drive and enter the name of the file containing the new software.
8. After the new software has been transferred, the Boot Menu is displayed.
9. Type 3 to restart the system. Press Esc to return to the previous menu.

Typical Monitoring Operations

Instructions for performing some typical monitoring operations via the console interface are provided below.

Displaying the Current Configuration

To display information about the current configuration of the switch:

1. At the Main Menu, type 1 to display the Switch Configuration Menu.
2. At the Switch Configuration Menu, type 1 to display the Configuration Display Screen.
3. After viewing the information, press any key to return to the Switch Configuration Menu.

Displaying the Port Settings

To display the current port settings of the switch:

1. At the Main Menu, type 2 to display the Port Configuration Menu.
2. At the Port Configuration Menu, type 3 to display the Port Settings.
3. After viewing the information, press the Esc key to exit the menu.

Displaying Spanning Tree Parameters

To display the current Spanning Tree Parameters:

1. At the Main Menu, type 1 to display the Switch Configuration Menu.
2. At the Switch Configuration Menu, type 4 to display the Spanning Tree Configuration Menu.
3. At the Spanning Tree Configuration Menu, type 6 to display the current Spanning Tree Parameters.
4. After viewing the information, press any key to return to the Spanning Tree Configuration Menu.

Using Telnet

The console interface can also be used to configure and monitor the switch in band via Telnet. Telnet is a common terminal emulation application used in TCP/IP networks for remote terminal access to computer devices.

Before using Telnet, an IP address must be assigned to the switch. This IP address must be set out-of-band using the console interface. Once an IP address has been assigned, Telnet can be used to configure and monitor the switch using the menus and screens described in this chapter.

Telnet can also be used with the TigerSwitch 16 as the Client to initiate an outbound session to another Telnet device.

Using the TigerSwitch 16 as a Telnet Client

1. At the Main Menu, type 4 to display the Utilities Menu.
2. At the Utilities Menu type 6 to establish a Telnet session. The Telnet Menu is displayed.
3. Type 1. The system prompts you to enter the IP address of the remote unit with which you want to communicate. Enter numbers, as the system will not accept domain names.
4. When you are returned to the Telnet Menu, type 2 to initiate the Telnet session. A message will appear while the connection is being attempted.
5. The session will begin with whichever screen the remote unit last accessed. Press Esc or the Spacebar to refresh the display.

Note: If the Telnet connection is idle for 10 minutes, the connection will be terminated.

Using SLIP

SLIP (Serial Line Internet Protocol) is a simple protocol that is used solely for encapsulating and framing IP packets that are being transmitted over serial lines. To set up for out-of-band management via SNMP using SLIP, proceed as follows:

1. From the Main Menu, type 1 to select the Switch Configuration Menu.
2. From the Switch Configuration Menu, type 2 to select the IP Configuration Menu.

```
>>>> IP Configuration Menu    <<<<
1. Automatic Selection of IP address (DHCP).. [       ON]
2. Switch IP Address................. [ 170.129. 71.199 ]
3. Default SNMP Manager IP Address... [ 170.129. 71.170 ]
4. Default Gateway IP Address........ [ 170.129. 71.  1 ]
5. Subnet Mask....................... [ 255.255.255.  0 ]
6. SLIP Enable....................... [        Disabled ]
7. SLIP IP Address................... [ 179.129. 72.199 ]
8. SLIP Subnet Mask.................. [ 255.255.255.  0 ]

<ESC> To Exit Menu
Enter Selection:
```

Figure 5-19. IP Configuration Menu

3. From the IP Configuration Menu, enable SLIP. Then, enter the SLIP IP address followed by the SLIP subnet mask.
4. Reset the switch.

5. Connect one end of an RS-232 modem cable to the switch and the other end to a modem. Plug the modem into the phone jack. Also, be sure the modem is set to Auto-answer.
6. Configure the remote workstation to use the SLIP protocol.
7. Attach the remote workstation to a modem using an RS-232 modem cable. Plug the modem into the phone jack.
8. From the remote workstation, dial the phone number of the modem connected to the switch. Verify that you are able to auto-connect. Also, verify that you can ping the SLIP IP Address.

and the operating mode (half or full duplex).

CHAPTER 6
MANAGING VIA SNMP AND RMON

SNMP Protocol

SNMP (Simple Network Management Protocol) is a communication protocol designed specifically for the purpose of managing devices or other elements on a network. Network equipment commonly managed with SNMP includes hubs, switches, bridges, routers and host computers. SNMP is typically used to configure these devices for proper operation in a network environment, as well as monitor them to evaluate performance and detect potential problems.

Managed entities supporting SNMP typically contain software which runs locally on the device and is referred to as an agent. The agent monitors and allows control of the functionality of the device. A defined set of variables, referred to as objects, is maintained by the agent and used to manage the device. These objects are defined in a Management Information Base (MIB) which allows for a standard presentation of information controlled by the agent over the network.

The software used to access the information maintained by the SNMP agents is referred to as the manager. This software typically runs on a network-attached station and can manage a number of agents at once. The manager software uses a MIB specification, equivalent to that which the agent maintains, to read and write objects controlled by the agent for purposes of configuring and monitoring the device. SNMP defines the format of the MIB specifications and the protocol used to access this information.

There are three main operations defined in SNMP. Operations which read information from the managed device, such as may be used to obtain status or statistical data, are called GET operations. Operations that change a functional parameter on the device, such as may be used to configure security access to the device or to initiate a self test, are referred to as SET operations. GET and SET operations are initiated only by the manager soft-

ware, and result in a response by the agent. The third operation type, the TRAP, allows the agent to send an unsolicited message to the manager. This operation is typically used as an alert to a potential problem, or a change in device status.

Using RMON

The switch offers an RMON subset contained within the basic system management. The objects supported are some of the most pertinent objects within RMON and include the Event, Alarm, Statistics and History groups.

The Event group controls the generation and notification of events from a device. An event can be the generation of an SNMP trap and/or an entry into an event log. The Alarm group takes periodic samples of variables, compares them to previously configured thresholds and generates an event if the threshold has been exceeded. In order to implement the Alarm group, the Event group must be activated.

The Statistics group provides counters for the traffic characteristics of each object. The History group maintains a historical representation of the Statistics counters for each object, based on user-defined sample intervals.

RMON, Remote (network) MONitoring, was developed by the Internet Engineering Task Force (IETF) and became a standard in 1992 as RFC Number 1271 (now RFC 1757).

MIB Objects

A number of different MIB specifications have been defined for managing network equipment; some are standard, others are proprietary. SNMP-compliant devices typically support one or more standard MIBs defined by the IETF, in the form of Request for Comments (RFC) documents. These allow for a common method of managing devices, such as bridges and hubs, and network interfaces, such as Ethernet and Token Ring.

The main standard MIB, referred to as MIB II, provides an overall view of the managed agent and is supported, at least in part, by all SNMP agents. In addition, proprietary MIB extensions are defined by commercial vendors for managing device-specific functions of their products.

The standards supported by the TigerSwitch 16 family are as follows:

- RFC 1757 - Bridge MIB
- RFC 1493 - Definitions of Managed Objects for Bridges
- RFC 1155 - Structure and Identification of Management Information for TCP/IP-based Internets
- RFC 1156 - Management Information Base for Network Management of TCP/IP-based Internets
- RFC 1213 - Simple Network Management Protocol (SNMP)
- RFC 1158 - Management Information Base for Network Management of TCP/IP-based Internets: MIB II
- RFC 783 - TCP Protocol

APPENDIX A
CABLES

Specifications

Twisted-Pair Cable			
Cable Type	**Technology**	**Category**	**Connector**
100 ohm UTP 22 - 26 AWG	10BASE-T	3, 4, 5	male 8-pin
0.4 - 0.6 mm	100BASE-TX	5 certified	RJ-45

Fiber Cable		
Cable Type	**Technology**	**Connector**
62.5 / 125 micron core	100BASE-FX	SC

10BASE-T/100BASE-TX Pin Assignments

Caution: Regulations regarding the connection of equipment to telephone networks vary from country to country. Check with your local telephone network supplier before using existing telephone wiring.

An Ethernet twisted-pair link segment requires two pairs of wires. Each wire pair is identified by two different colors. For example, one wire might be green and the other, green with white stripes.

Caution: Each wire pair must be attached to the RJ-45 connectors in a specific orientation (See "Cabling Guidelines" in Chapter 4 for an explanation.)

Each twisted-pair link segment must have an RJ-45 connector attached to both ends. According to the IEEE specifications, pins 1 and 2 are used for transmitting data, and pins 3 and 6 for receiving data.

RJ-45 Pin Assignments	
Pin Number	**Assignment***
1	Tx+
2	Tx-
3	Rx+
6	Rx-

* The "+" and "-" signs are used to represent the polarity of the wires that make up each wire pair.

Note how the pins are numbered. Be sure to hold the connectors in the same orientation when attaching the wires to the pins.

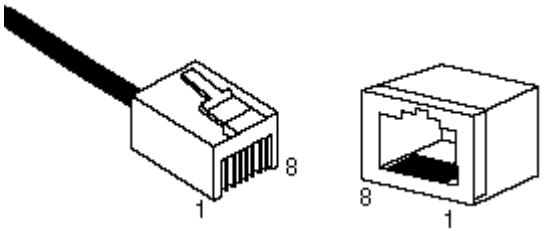

Figure A-1. RJ-45 Connector Pin Numbers

Straight-Through Wiring

If the twisted-pair link segment is to join two ports and only one of the ports has an internal crossover, the two pairs of wires must be straight-through.

Straight-Through RJ-45 Pin Assignments	
End 1	**End 2**
1 (Tx+)	1 (Tx+)
2 (Tx-)	2 (Tx-)
3 (Rx+)	3 (Rx+)
6 (Rx-)	6 (Rx-)

Crossover Wiring

If the twisted-pair link segment is to join two ports and either both ports are labeled with an “x” or neither port is labeled with an “x,” a crossover must be implemented in the wiring.

Crossover RJ-45 Pin Assignments	
End 1	**End 2**
1 (Tx+)	3 (Rx+)
2 (Tx-)	6 (Rx-)
3 (Rx+)	1 (Tx+)
6 (Rx-)	2 (Tx-)

Serial Console Port Pin Assignments

Any cable connected to the Console port must be shielded to comply with FCC emissions regulations and with requirements of other regulatory agencies in various parts of the world.

RS-232 Pin Assignments			
Signal	**Computer**		**TigerSwitch 16**
	DB9	**DB25**	
RXD	2	2	3
TXD	3	3	2
GND	5	7	5

APPENDIX B
SPECIFICATIONS

Specifications

All Models

Buffer Architecture
Central memory, dynamic allocation
3 Mbytes DRAM

Architecture
Bus

Latency
12 µs

MAC Addresses
8,192 total, dynamically allocated among all ports

Forwarding/Filtering/Learning Rates
Full line-rate for 10 Mbps ports
Full line-rate for 100 Mbps ports

In-band Management
Telnet or any SNMP manager

Out-of-band Management
RS-232 Console port

Software Loading
TFTP in-band
RS-232 out-of-band

Network Interface for 10BASE-T ports
RJ-45 connector, fixed crossover
UTP cable, EIA/TIA Categories 3, 4, 5

Network Interface for 100BASE-TX port
RJ-45 connector, fixed crossover
UTP cable, EIA/TIA certified Category 5

Network Interface for 100BASE-FX port
SC connector
Fiber cable, 62.5/125 micron

Full Duplex
All ports, software-selectable

LEDs
Power
Redundant Power
Port Status - 1 per port
Port Select - 1 per port
Shared vertical array
  Receive
  Collision
  Full Duplex
  100 Mbps

Buttons
Port Select
Reset

Size
16.9 in.W x 9.2 in. D x 1.7 in. H
(42.9 cm x 23.4 cm x 4.3 cm)

Temperature
Operating 32° to 131° F (0° to 50° C)
Storage -13° to 185° F (-25° to 85° C)

Humidity
10% to 90%, non-condensing

Power Supply
Universal AC input
120 to 240 VAC, 50 to 60 Hz

Power Consumption
84 W maximum

Standards
IEEE 802.3 Ethernet
IEEE 802.3u Fast Ethernet
IEEE 802.1d Spanning Tree
IEEE 802.1d Bridging
RFC 1757 (RMON)
RFC 1493 (MIB)
RFC 1213 (SNMP)
RFC 1158 (MIB II)
RFC 1155 (SNMP SMI)
RFC 1156 (MIB)
RFC 783 (TFTP)

Compliances

CE marking

Safety
UL 1950
CSA 22.2 No. 950
EN 60950

Immunity
IEC 801-2.3.4
EN 50082-1

Emissions
FCC Class A
CDOC Class A
EN 55022 (CISPR 22) Class A
VCCI Class 1

Warranty
Three years

Model SMC6516TT

Ports
16 10BASE-T
2 100BASE-TX with Auto-Negotiation

Weight
10.0 lbs. (4.54 kg)

Model SMC6516FF

Ports
16 10BASE-T
2 100BASE-FX with full-duplex support

Network Interface for 100BASE-FX ports
SC connector
Fiber cable, 62.5/125 micron

Weight
10.0 lbs. (4.54 kg)

Model SMC6516TF

Ports

16 10BASE-T
1 100BASE-TX with Auto-Negotiation
1 100BASE-FX with full-duplex support

Weight

10.0 lbs. (4.54 kg)

APPENDIX C
SAMPLE CONFIGURATION

Introduction

This appendix contains instructions for using the Windows Terminal communication application to connect to any one of the TigerSwitch 16 models via the out-of-band Console port.

Make sure that the ASCII transfer parameters are set as follows:

- 8 bits
- no parity
- 1 stop bit
- 9600 (default) or 19.2 baud
- no flow control

In addition, be sure that:

- All data flow control parameters are turned OFF.
- Any parameters that would add characters to the download file (such as line feeds) are turned OFF.
- The console speed of the switch corresponds to the terminal setting.

Setting the Console Speed

To set the console speed on the switch:

1. At the Main Menu, type 4 to display the Utilities Menu.
2. At the Utilities Menu, type 1 to display the Console Configuration Menu.
3. Type 1 and change the baud rate to the appropriate speed.
4. Type 2 to accept the new setting and make the change effective.
5. Change the Host data rate now.

Windows Terminal

If you are using the Windows program called Terminal, you can use the defaults except for the following:

Menu	**Parameter and Setting**
Settings - Terminal Emulation	TTY (Generic) - ON
Settings - Text Transfers	Line at a time - ON Delay Between Lines - 0 /10 Sec*
Settings - Communications	Data Bits - 8 Parity - None Stop Bits - 1
Settings - Terminal Preferences	Use Function, Arrow and CTRL keys for Windows - OFF (no x in the box)
Transfers - Send Text File	Append LF - OFF (no x in the box) Strip LF - ON (x in the box)

* If the menu screens start scrolling during the transfer, you may need to set Delay Between Lines to 1 and try the transfer again.

APPENDIX D
TROUBLESHOOTING

Troubleshooting Chart	
Symptom	**Action**
Power LED is Off	No AC power. Check connections between the switch, the power cord and the wall outlet. Contact SMC Tech Support.
Power LED is Red	Internal or redundant power supply has failed or is disconnected.
Power LED is Green, Redundant Power LED is Off	Internal power supply is operating properly; redundant power supply is not present or has been disconnected.
Power LED is Green, Redundant Power LED is Green	Both internal and redundant power supplies are operating properly.
Power LED is Red, Redundant Power LED is Green	Internal power supply has failed; device is being powered by redundant power supply.
Power LED is Red, Redundant Power LED is Off	Redundant power supply has failed; device is being powered by internal power supply.
Link LED is Off	Check connections between the network device and the port, including the wiring. Check to be sure that the device is powered on and functioning properly.

FOR TECHNICAL SUPPORT, CALL:

From U.S.A. and Canada (8:30 AM - 8:00 PM Eastern Time)
(800) SMC-4-YOU; (516) 435-6250; (516) 434-9314 (Fax)
From Europe (8:00 AM - 5:30 PM UK Greenwich Mean Time)
44 (0) 1344-420068; 44 (0) 1344-418835 (Fax)

Bulletin Board Services (BBS)

Modem settings: 9600,8,n,1
New York: (516) 434-3162 (connect speed up to 14,400)
Germany: 49 (0) (89) 92861-240
France: 33 (1) 39.73.57.00
United Kingdom: 44 (0) 1344 418838

INTERNET address is: techsupport@smc.com
Driver updates available from the Internet:
Host name info.smc.com (IP address: 170.129.51.1)
SMC Forum on CompuServe: at the prompt (!) type: GO SMC.
World Wide Web: http://www.smc.com/

FOR LITERATURE OR ADVERTISING RESPONSE CALL:

U.S.A. and Canada:	(800) SMC-4-YOU;	Fax (516) 273-1803
New York:	(516) 435-6000;	Fax (516) 273-1803
Latin America:	(630) 916-7007	(630) 916-6304
France:	33 (1) 30.87.42.42;	Fax 33 (1) 30.61.41.34
Europe:	44 (0) 1344 418800;	Fax 44 (0) 1344-418828
Northern Europe:	44 (0) 1344 418820;	Fax 44 (0) 1344-418826
Central Europe:	49 (0) 89 92861-0;	Fax 49 (0) 89 92861-230
Eastern Europe/Middle East:	49 (0) 89 92861-142;	Fax 49 (0) 89 9101934
Australia (Sydney):	61.2.9238.2206;	Fax 61.2.9238.2220
Australia (Melbourne):	61.3.9653.9461;	Fax 61.3.9653.9548
South Africa:	27 (0) 11 784-0414;	Fax 27 (0) 11 784-0363
Asia Pacific:	(65) 336 1800;	Fax (65) 336 3277
South Asia:	(65) 336 1800;	Fax (65) 336 3955
Japan:	81 (3) 57212271;	Fax 81 (3) 57212270

EliteFax (SMC's Fax-on-Demand System):
U.S.A. and Canada: (800) SMC-8329
Elsewhere: (516) 435-6107

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