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## TigerSwitch 10/100/1000

### Gigabit Ethernet Switch

- ◆ 12 auto-MDI/MDI-X 10/100/1000BASE-T ports
- ◆ 4 ports shared with 4 SFP transceiver slots
- ◆ Non-blocking switching architecture
- ◆ Support for a redundant power unit
- ◆ Spanning Tree Protocol
- ◆ Up to six LACP or static 4-port trunks
- ◆ Layer 2/3/4 CoS support through four priority queues
- ◆ Full support for VLANs with GVRP
- ◆ IGMP multicast filtering and snooping
- ◆ Support for jumbo frames up to 9 KB
- ◆ Manageable via console, Web, SNMP/RMON

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**Installation Guide**  
*SMC8612T*



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**Manual abstract:**

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It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart B of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference. You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment. You may use unshielded twisted-pair (UTP) cable for RJ-45 connections--Category 3 or greater for 10 Mbps connections, Category 5 for 100 Mbps connections, and Category 5, 5e, or 6 for 1000 Mbps. Use 50/125 or 62.

5/125 micron multimode fiber optic cable, or 9/125 micron single-mode fiber optic cable, for SC or ST-type connections. Warnings: 1. Wear an anti-static wrist strap or take other suitable measures to prevent electrostatic discharge when handling this equipment. 2. When connecting this switch to a power outlet, connect the field ground lead on the tri-pole power plug to a valid earth ground line to prevent electrical hazards.



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Industry Canada - Class A This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of the Department of Communications. Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques," NMB-003 édictée par le ministère des Communications. iii COMPLIANCES EC Conformance Declaration - Class A SMC contact for these products in Europe is: SMC Networks Europe, Edificio Conata II, Calle Fructuós Gelabert 6-8, 2o, 4a, 08970 - Sant Joan Despí, Barcelona, Spain. This information technology equipment complies with the requirements of the Council Directive 89/336/EEC on the Approximation of the laws of the Member States relating to Electromagnetic Compatibility and 73/23/EEC for electrical equipment used within certain voltage limits and the Amendment Directive 93/68/EEC. For the evaluation of the compliance with these Directives, the following standards were applied: RFI Emission: · Limit class A according to EN 55022:1998 · Limit class A for harmonic current emission according to EN 61000-3-2/1995 · Limitation of voltage fluctuation and flicker in low-voltage supply system according to EN 61000-3-3/1995 Immunity: · Product family standard according to EN 55024:1998 · Electrostatic Discharge according to EN 61000-4-2:1995 (Contact Discharge: ±4 kV, Air Discharge: ±8 kV) · Radio-frequency electromagnetic field according to EN 61000-4-3:1996 (80 - 1000 MHz with 1 kHz AM 80% Modulation: 3 V/m) · Electrical fast transient/burst according to EN 61000-4-4:1995 (AC/ DC power supply: ±1 kV, Data/Signal lines: ±0.

5 kV) · Surge immunity test according to EN 61000-4-5:1995 (AC/DC Line to Line: ±1 kV, AC/DC Line to Earth: ±2 kV) · Immunity to conducted disturbances, Induced by radio-frequency fields: EN 61000-4-6:1996 (0.15 - 80 MHz with 1 kHz AM 80% Modulation: 3 V/m) · Power frequency magnetic field immunity test according to EN 61000-4-8:1993 (1 A/m at frequency 50 Hz) · Voltage dips, short interruptions and voltage variations immunity test according to EN 61000-4-11:1994 (>95% Reduction @10 ms, 30% Reduction @500 ms, >95% Reduction @5000 ms) LVD: · EN 60950 (A1/1992; A2/1993; A3/1993; A4/1995; A11/1997) Warning: Do not plug a phone jack connector in the RJ-45 port. This may damage this device. Les raccordeurs ne sont pas utilisés pour le système téléphonique! iv COMPLIANCES Japan VCCI Class A Taiwan BSMI Class A Australia AS/NZS 3548 (1995) - Class A SMC contact for products in Australia is: SMC Communications Pty. Ltd. Suite 18, 12 Tryon Road, Lindfield NSW2070, Phone: 61-2-94160437 Fax: 61-2-94160474 v COMPLIANCES Safety Compliance Warning: Fiber Optic Port Safety CLASS I LASER DEVICE When using a fiber optic port, never look at the transmit laser while it is powered on. Also, never look directly at the fiber TX port and fiber cable ends when they are powered on. Avertissement: Ports pour fibres optiques - sécurité sur le plan optique DISPOSITIF LASER DE CLASSE I Ne regardez jamais le laser tant qu'il est sous tension. Ne regardez jamais directement le port TX (Transmission) à fibres optiques et les embouts de câbles à fibres optiques tant qu'ils sont sous tension. Warnhinweis: Faseroptikanschlüsse - Optische Sicherheit LASERGERÄT DER KLASSE I Niemals ein Übertragungslaser betrachten, während dieses eingeschaltet ist. Niemals direkt auf den Faser-TX-Anschluß und auf die Faserkabelenden schauen, während diese eingeschaltet sind. Underwriters Laboratories Compliance Statement Important! Before making connections, make sure you have the correct cord set. Check it (read the label on the cable) against the following: Operating Voltage 120 Volts Cord Set Specifications UL Listed/CSA Certified Cord Set Minimum 18 AWG Type SVT or SJT three conductor cord Maximum length of 15 feet Parallel blade, grounding type attachment plug rated 15 A, 125 V 240 Volts (Europe only) Cord Set with H05VV-F cord having three conductors with minimum diameter of 0.75 mm2 IEC-320 receptacle Male plug rated 10 A, 250 V The unit automatically matches the connected input voltage. Therefore, no additional adjustments are necessary when connecting it to any input voltage within the range marked on the r.

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. D-1 Glossary Index ix TABLE OF CONTENTS x CHAPTER 1 ABOUT THE TIGERSWITCH 10/100/1000 Overview SMC's TigerSwitch 10/100/1000 (SMC8612T) has 12 10/100/ 1000BASE-T ports, four of which are combo ports that are shared with four Small Form Factor Pluggable (SFP) transceiver slots. 10/100/1000 Mbps RJ-45 Ports 1 3 5 7 9 11 1000BASE-T/SFP Ports System Indicators 9 10 11 12 2 4 6 8 10 12 Port Status Indicators Console Port Redundant Power Socket Power Socket Figure 1-1. SMC8612T Front and Rear Panels Switch Architecture The switch employs a wire-speed, non-blocking switching fabric. This permits simultaneous wire-speed transport of multiple packets at low latency on all ports. This switch also features full-duplex capability on all ports, which effectively doubles the bandwidth of each connection. 1-1 ABOUT THE TIGERSWITCH 10/100/1000 Switching Method The switch uses store-and-forward switching to ensure maximum data integrity. With store-and-forward switching, the entire packet must be received into a buffer and checked for validity before being forwarded. This prevents errors from being propagated throughout the network. Management Options This switch contains a comprehensive array of LEDs for "at-a- glance" monitoring of network and port status.

It also includes a built-in network management agent that allows the switch to be managed in-band using SNMP or RMON (Groups 1, 2, 3 and 9) protocols, with a Web browser, or remotely via Telnet. It provides an RS-232 serial port (DB-9 connector) on the front panel for out-of-band management. A PC may be connected to this port for configuration and monitoring out-of band via a null-modem cable. (See Appendix B: for wiring options.) This switch provides a wide range of advanced performance-enhancing features.

Port-based and tagged VLANs, plus support for automatic GVRP VLAN registration and IGMP multicast filtering, providing traffic security and efficient use of network bandwidth. QoS priority queueing ensures the minimum delay for moving real-time multimedia data across the network. Flow control eliminates the loss of packets due to bottlenecks caused by port saturation. Broadcast storm control prevents broadcast traffic storms from engulfing the network. For a detailed description of the advanced features, refer to the Management Guide.

1-2 DESCRIPTION OF HARDWARE Description of Hardware 1000BASE-T Ports These ports are RJ-45 ports that operate at 10 Mbps or 100 Mbps, half or full duplex, or at 1000 Mbps, full duplex. Because all ports on this switch support automatic MDI/MDI-X operation, you can use straight-through cables for all network connections to PCs or servers, or to other switches or hubs. (See "1000BASE-T Pin Assignments" on page B-3.) Each of these ports support auto-negotiation, so the optimum transmission mode (half or full duplex), and data rate (10, 100, 1000 Mbps) can be selected automatically. If a device connected to one of these ports does not support auto-negotiation, the communication mode of that port can be configured manually. Each port also supports IEEE 802.3x auto-negotiation of flow control, so the switch can automatically prevent port buffers from becoming saturated. SFP Slots The Small Form Factor Pluggable (SFP) transceiver slots are shared with four of the RJ-45 ports (Ports 9~12). If an SFP transceiver (purchased separately) is installed in a slot and has a valid link on its port, the associated RJ-45 port is disabled and cannot be used. 1-3 ABOUT THE TIGERSWITCH 10/100/1000 Ports Status LEDs The LEDs, which are located on the front panel for easy viewing, are shown below and described in the following table.

Figure 1-2. Port and System LEDs Port and Status LEDs LED Condition Status Gigabit Ethernet Ports (Ports 1~12) Link/Act On/Flashing Amber Port has established a valid 10/100 Mbps network connection. Flashing indicates activity. Port has established a valid 1000 Mbps network connection. Flashing indicates activity. There is no valid link on the port. On/Flashing Green Off SFP Transceivers Slots (Ports 9~12) On Green Off Port has established a valid 100 Mbps network connection. An SFP transceiver port has no valid link or there is no transceiver installed in the slot. The associated RJ-45 port is enabled. Port is operating in full-duplex mode.

Port is operating in half-duplex mode. FDX (all ports) On Green Off 1-4 DESCRIPTION OF HARDWARE System Status LEDs LED Power Condition On Green On Red Off RPU On Green On Red Off Diag On Green Flashing Green On Amber Status The unit's internal power supply is operating normally. The unit's internal power supply has failed. The unit has no power connected. The redundant power supply is operating normally.

The redundant power supply has failed. No redundant power supply is connected. The system diagnostic test has completed successfully. The system diagnostic test is in progress. The system diagnostic test has detected a fault.



*Optional Redundant Power Unit The switch supports an optional Redundant Power Unit (RPU), that can supply power to the switch in the event of failure of the internal power supply. Power Supply Receptacles There are two power receptacles on the rear panel of the switch. The standard power receptacle is for the AC power cord. The receptacle labeled "RPU" is for the optional Redundant Power Unit (RPU). Figure 1-3. Power Supply Receptacles 1-5 ABOUT THE TIGERSWITCH 10/100/1000 Features and Benefits Connectivity 12 10/100/100BASE-T ports for easy Ethernet integration and for protection of your investment in legacy LAN equipment Four Small Form Factor Pluggable (SFP) transceiver slots that are shared with four of the 10/100/1000BASE-T Gigabit Ethernet ports Auto-negotiation enables each RJ-45 port to automatically select the optimum communication mode (half or full duplex) if this feature is supported by the attached device; otherwise the port can be configured manually Independent RJ-45 10/100/1000BASE-T ports with auto MDI/ MDI-X pinout selection.*



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Unshielded (UTP) cable supported on all RJ-45 ports: Category 3 or better for 10 Mbps connections, Category 5 or better for 100 Mbps connections, and Category 5, 5e, or 6 for 1000 Mbps connections IEEE 802.3 Ethernet, 802.3u Fast Ethernet, 802.3z and 802.

3ab Gigabit Ethernet compliance ensures compatibility with standards-based hubs, network cards and switches from any vendor. Performance Transparent bridging Aggregate bandwidth of up to 24 Gbps Switching table with a total of 8K MAC address entries Store-and-Forward switching Flow control, using back pressure for half duplex and IEEE 802.3x for full duplex 1-6 FEATURES AND BENEFITS Broadcast storm control Includes support for an optional Redundant Power Unit Desktop or rack-mountable Management "At-a-glance" LEDs for easy troubleshooting Management agent: . . . . . Manages switch in-band or out-of-band Supports Telnet, SNMP/RMON and Web-based interface Simple network management protocol (SNMP)-based network management via an SNMP management console application Command line management through four in-band Telnet sessions, and an out-of-band RS-232 console port (VT100) RADIUS and TACACS+ access control Software upload via TFTP Supports BOOTP and DHCP for IP address assignment 1-7 ABOUT THE TIGERSWITCH 10/100/1000 1-8 CHAPTER 2 NETWORK PLANNING Introduction to Switching A network switch allows simultaneous transmission of multiple packets via non-crossbar switching. This means that it can partition a network more efficiently than bridges or routers. The switch has, therefore, been recognized as one of the most important building blocks for today's networking technology. When performance bottlenecks are caused by congestion at the network access point (such as the network card for a high-volume file server), the device experiencing congestion (server, power user or hub) can be attached directly to a switched port. And, by using full-duplex mode, the bandwidth of the dedicated segment can be doubled to maximize throughput. When networks are based on repeater (hub) technology, the maximum distance between end stations is limited. For Ethernet, there may be up to four hubs between any pair of stations; for Fast Ethernet, the maximum is two. This is known as the hop count.

However, a switch turns the hop count back to zero, so subdividing the network into smaller and more manageable segments, and linking them to the larger network by means of a switch, removes this limitation. A switch can be easily configured in any Ethernet network to significantly boost bandwidth while using conventional cabling and network cards. 2-1 NETWORK PLANNING Application Examples The TigerSwitch 10/100/1000 is not only designed to segment your network, but also to provide a wide range of options in setting up network connections. Some typical applications are described below. Collapsed Backbone This switch is an excellent choice for mixed Ethernet, Fast Ethernet or Gigabit Ethernet installations where significant growth is expected in the near future.

In a basic stand-alone configuration, it can provide direct full-duplex connections for up to 12 workstations or servers. When the time comes for further network expansion, you can easily build on this basic configuration by adding Fast Ethernet or Gigabit Ethernet links directly to one or more workgroup switches. In the figure below, this switch is operating as a collapsed backbone for a small LAN. It is providing dedicated 20 Mbps full-duplex connections to workstations, 200 Mbps full-duplex connections to power users, and 2 Gbps full-duplex connections to servers. 1 3 5 7 9 11 9 10 11 12 2 4 6 8 10 12 . . . Servers 2 Gbps Full Duplex . . . Workstations 200 Mbps Full Duplex . . . Workstations 20 Mbps Full Duplex Figure 2-1. Collapsed Backbone 2-2 APPLICATION EXAMPLES Central Wiring Closet With 12 parallel bridging ports (i.

e., 12 distinct collision domains), this switch can collapse a complex network down into a single efficient bridged node, increasing overall bandwidth and throughput. In the figure below, the 1000BASE-T RJ-45 ports on the switch are providing 2 Gbps full-duplex connections for up to 12 local segments. In addition, the switch is also connecting remote servers over fiber optic cable at 2 Gbps. 10/100/1000 Switch 1 3 5 7 9 11 9 10 11 12 2 4 6 8 10 12 Server Farm 10/100 Mbps Segments . . . .

Figure 2-2. Central Wiring Closet 2-3 NETWORK PLANNING Remote Connection with Fiber Cable Fiber optic technology allows for longer cabling than any other media type. A 1000BASE-LX SFP transceiver link can connect to a site up to 5 km away. This allows the Gigabit Ethernet switch to serve as a collapsed backbone, providing direct connectivity for a widespread LAN. A Gigabit SFP transceiver can also be used for a high-speed connection between floors in the same building, or to connect to other buildings in a campus setting.

The figure below illustrates a Gigabit Ethernet switch connecting multiple segments with fiber cable.. Headquarters 1 3 5 7 9 11 9 10 11 12 2 4 6 8 10 12 1000BASE-SX MMF (500 m) Server Farm Remote Switch 25 26 1 2 3 4 5 6 13 14 15 16 17 18 Link Act Console Power 7 8 9 Self Test 10 11 12 Fan Status 19 20 21 22 23 24 Link Act 25 26 1 2 3 4 5 6 13 14 15 16 17 18 Link Act 1000BASE-LX SMF (5 kilometers) Remote Switch 1 25 26 2 3 4 5 6 13 14 15 16 17 18 1 25 26 2 3 4 5 6 13 14 15 16 17 18 7 8 9 10 11 12 19 20 21 22 23 24 Power Console 7 8 9 Self Test 10 11 12 Fan Status 19 20 21 22 23 24 Link Act Fault Reset Clear Fault Reset Clear 7 8 9 10 11 12 19 20 21 22 23 24 10/100 Mbps Segments . . .

... Figure 2-3. Remote Connection with Fiber Cable 2-4 APPLICATION EXAMPLES Making VLAN Connections VLANs can be based on port groups, or each data frame can be explicitly tagged to identify the VLAN group it belongs to. When using port-based VLANs, ports can be assigned to one or more groups. Port-based VLANs are suitable for small networks. A single switch can be easily configured to support several VLAN groups for various organizational entities (such as Finance and Marketing). When you expand port-based VLANs across several switches, you need to make a separate connection for each VLAN group. This approach is, however, inconsistent with the Spanning Tree Protocol, which can easily segregate ports that belong to the same VLAN.

When VLANs cross separate switches, you need to use VLAN tagging. This allows you to assign multiple VLAN groups to the "trunk" ports (that is, tagged ports) connecting different switches. R&D VLAN 1 Tagged Ports Untagged Ports VLAN unaware switch R&D 1 3 5 7 9 11 9 10 11 12 2 4 6 8 10 12 Tagged Port VLAN aware switch Finance VLAN 2 Testing Marketing Finance Testing VLAN 3 VLAN 4 VLAN 3 VLAN 1 VLAN 2 Figure 2-4.



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*Making VLAN Connections Note: When connecting to a switch that does not support IEEE 802.1Q VLAN tags, use untagged ports. 2-5 NETWORK PLANNING Connectivity Rules When adding hubs (repeaters) to your network, please follow the connectivity rules listed below for these products. However, note that because switches break up the path for connected devices into separate collision domains, you should not include the switch or connected cabling in your calculations for cascade length involving other devices. 1000 Mbps Gigabit Ethernet Collision Domain Maximum Fiber Optic Cable Distance for 1000BASE-SX Fiber Size 62.5/125 micron 50/125 micron Fiber Bandwidth 160 MHz/km 200 MHz/km 400 MHz/km 500 MHz/km Maximum Cable Length 2-220 m (7-722 ft) 2-275 m (7-902 ft) 2-500 m (7-1641 ft) 2-550 m (7-1805 ft) Maximum Fiber Optic Cable Distance for 1000BASE-LX Fiber Size 9/125 micron Fiber Bandwidth N/A Maximum Cable Length 2 m - 10 km (7 - 32808 ft) Maximum Cable Distance for 1000BASE-T Type Cat. 5, 5e, or 6 100-ohm UTP Connector RJ-45 Maximum Cable Length 100 m (328 ft) Maximum 1000BASE-ZX Fiber Optic Cable Distance Fiber Diameter Fiber Bandwidth Cable Length Range 70\* - 100 km (43.*

*5 - 62.1 miles) 9/125 micron single-mode N/A fiber (SMF) \* For link spans exceeding 70 km, you may need to use premium single mode fiber or dispersion shifted single mode fiber. 2-6 CONNECTIVITY RULES 10/100 Mbps Ethernet Collision Domain Maximum 10/100 Mbps Ethernet Cable Distance Type 10BASE-T Cable Type Twisted Pair, Category 3 or better Max. @@@@2. @@@@3.*

*@@@@4. @@@@@Be sure to follow the guidelines below when choosing a location. @@@@@@@@@@@@@@@@@@Grounding: Rack-mounted equipment should be properly grounded. @@@@@Attaching the Brackets 2. @@@Installing the Switch in a Rack 3-4 MOUNTING 3.*

*@@@@4. @@@5. @@@@@Attaching the Adhesive Feet 2. Set the device 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. If installing a single switch only, go to "Connecting to a Power Source" at the end of this chapter. 4. If installing multiple switches, attach four adhesive feet to each one. Place each device squarely on top of the one below, in any order. 5.*

*If also installing RPUs, place them close to the stack. 2 1 3 4 6 5 8 7 10 9 12 11 9 10 11 12 3-5 INSTALLING THE SWITCH Connecting to a Power Source To connect a device to a power source: 1. Insert the power cable plug directly into the receptacle located at the back of the device. Figure 3-4. Power Receptacle 2. Plug the other end of the cable into a grounded, 3-pin socket. Note: For International use, you may need to change the AC line cord. You must use a line cord set that has been approved for the receptacle type in your country. 3. Check the front-panel LEDs as the device is powered on to be sure the Power LED is lit.*

*If not, check that the power cable is correctly plugged in. 4. If you have purchased a Redundant Power Unit, connect it to the device and to an AC power source now, following the instructions included with the package. 3-6 CHAPTER 4 MAKING NETWORK CONNECTIONS Connecting Network Devices The TigerSwitch 10/100/1000 is designed to interconnect multiple segments (or collision domains). It may be connected to network cards in PCs and servers, as well as to hubs, switches or routers.*

*It may also be connected to devices using 1000BASE-SX, 1000BASE-LX, or 1000BASE-LH SFP transceivers. Twisted-Pair Devices Each device requires an unshielded twisted-pair (UTP) cable with RJ-45 connectors at both ends. For 1000BASE-T connections, Category 5, 5e or 6 (recommended) cable is required with all four wire pairs connected. You should also test the cable installation for IEEE 802.3ab compliance.*

*See "1000BASE-T Cable Requirements" on page B-4. For 100BASE-TX connections, Category 5 or better cable is required; for 10BASE-T, Category 3 or better cable can be used. 4-1 MAKING NETWORK CONNECTIONS Cabling Guidelines The RJ-45 ports on the switch support automatic MDI/MDI-X operation, so you can use standard straight-through twisted-pair cables to connect to any other network device (PCs, servers, switches, routers, or hubs).*

*Note: If auto-negotiation is disabled for an RJ-45 port, the auto-MDI/MDI-X pin signal configuration is also disabled. See Appendix B for further information on cabling. Connecting to PCs, Servers, Hubs and Switches. Caution: Do not plug a phone jack connector into an RJ-45 port. This will damage the switch. Use only twisted-pair cables with RJ-45 connectors that conform to FCC standards. 1.*

*Attach one end of a twisted-pair cable segment to the device's RJ-45 connector. Figure 4-1. Making Twisted-Pair Connections 4-2 TWISTED-PAIR DEVICES 2. If the device is a network card and this switch is in the wiring closet, attach the other end of the cable segment to a modular wall outlet that is connected to the wiring closet (see "Wiring Closet Connections" on the next page). Otherwise, attach the other end to an available port on the switch. Make sure each twisted pair cable does not exceed 100 meters (328 ft) in length. Note: 1. When connected to a shared collision domain (such as a hub with multiple workstations), switch ports must be set to half-duplex mode. 2. @@@@3.*

*As each connection is made, the green Link LED (on the switch front panel) corresponding to each port will light to indicate that the connection is valid. 4-3 MAKING NETWORK CONNECTIONS Wiring Closet Connections Today, the punch-down block is an integral part of many of the newer equipment racks. It is actually part of the patch panel. Instructions for making connections in the wiring closet with this type of equipment follows. 1.*

*Attach one end of a patch cable to an available port on the switch, and the other end to the patch panel. 2. If not already in place, attach one end of a cable segment to the back of the patch panel where the punch-down block is located, and the other end to a modular wall outlet. 3. Label the cables to simplify future troubleshooting.*

*SMC Switch Equipment Rack (side view) 1 3 5 7 9 11 T i g e r S w i t c h 10 / 1 0 0 6724L 3 9 10 11 12 2 4 6 8 10 12 Punch-Down Block Patch Panel Wall Figure 4-2. Wiring Closet Connections 4-4 FIBER OPTIC DEVICES Fiber Optic Devices A Small Form-Factor Pluggable (SFP) transceiver (1000BASE-SX, 1000BASE-LX or 1000BASE-LH) may also be used for backbone and long distance connections. Multimode fiber optic ports require 50/125 or 62.5/125 micron multimode fiber optic cabling with an LC connectors (for SFPs) at both ends. Single-mode fiber ports require 9/125 micron single-mode fiber optic cable with an LC connectors (for SFPs) at both ends. Caution: Fiber optic SPF transceivers use lasers to transmit signals over fiber optic cable. You should never look directly at a transmit port when it is powered on. 1. Check that the fiber terminators are clean.*



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You can clean the cable plugs by wiping them gently with a clean tissue or cotton ball moistened with a little ethanol.

Dirty fiber terminators on fiber cables will impair the quality of the light transmitted through the cable and lead to degraded performance on the port. 2. Connect one end of the cable to the LC port on the switch and the other end to the LC port on the other device. Since LC connectors are keyed, the cable can be attached in only one orientation. 3. As a connection is made, check the green Link LED on the switch corresponding to the port to be sure that the connection is valid. 4-5 MAKING NETWORK CONNECTIONS 4-6 APPENDIX A TROUBLESHOOTING Diagnosing Switch Indicators Troubleshooting Chart Symptom PWR LED is Off Action · · Power LED is Red Link LED is Off · · · · Internal power supply has failed or is disconnected. Check connections between the switch, the power cord, and the wall outlet. Internal power supply has failed. Contact SMC Technical Support.

Verify that the switch and attached device is powered on. Be sure the cable is plugged into both the switch and corresponding device. Verify that the proper cable type is used and its length does not exceed specified limits. Check the adapter on the attached device and cable connections for possible defects. Replace the defective adapter or cable if necessary.

A-1 TROUBLESHOOTING Power and Cooling Problems If the power indicator does not turn on when the power cord is plugged in, you may have a problem with the power outlet, power cord, or internal power supply. However, if the unit powers off after running for a while, check for loose power connections, power losses or surges at the power outlet, and verify that the fans on the unit are unobstructed and running prior to shutdown. If you still cannot isolate the problem, then the internal power supply may be defective. Installation Verify that all system components have been properly installed. If one or more components appear to be malfunctioning (such as the power cord or network cabling), test them in an alternate environment where you are sure that all the other components are functioning properly.

In-Band Access You can access the management agent in the switch from anywhere within the attached network using Telnet, a Web browser, or other network management software such as EliteView. However, you must first configure the switch with a valid IP address, subnet mask, and default gateway. If you have trouble establishing a link to the management agent, check to see if you have a valid network connection. Then verify that you entered the correct IP address. Also, be sure the port through which you are connecting to the switch has not been disabled. If it has not been disabled, then check the network cabling that runs between your remote location and the switch. Note: The management agent accepts up to four simultaneous Telnet sessions. If the maximum number of sessions already exists, an additional Telnet connection will not be able to log into the system. A-2 APPENDIX B CABLES Specifications Cable Types and Specifications Cable 10BASE-T 100BASE-TX 1000BASE-SX 1000BASE-LX 1000BASE-ZX 1000BASE-T Type Cat. 3 or better 100-ohm UTP Cat 5 or better 100-ohm UTP Max.

Length 100 m (328 ft) 100 m (328 ft) Connector RJ-45 RJ-45 LC LC LC RJ-45 50/125 or 62.5/125 micron See the following core MMF table 9/125 micron SMF 9/125 micron SMF Cat. 5, 5e 100-ohm UTP 10 km (6.2 miles) 70 - 100 km (43.5 62.1 miles) 100 m (328 ft) 1000BASE-SX Fiber Specifications Fiber Diameter 62.5/125 micron MMF 50/125 micron MMF Fiber Bandwidth 160 MHz/km 200 MHz/km 400 MHz/km 500 MHz/km Maximum Cable Length 2-220 m (7-722 ft) 2-275 m (7-902 ft) 2-500 m (7-1641 ft) 2-550 m (7-1805 ft) 1000BASE-LX Fiber Specifications Fiber Size 9/125 micron Fiber Bandwidth N/A Maximum Cable Length 2 m - 10 km (7 - 32808 ft) B-1 CABLES 1000BASE-ZX Fiber Specifications Fiber Diameter Fiber Bandwidth Cable Length Range 70\* - 100 km (43.5 - 62.1 miles) 9/125 micron single-mode N/A fiber (SMF) \* For link spans exceeding 70 km, you may need to use premium single mode fiber or dispersion shifted single mode fiber. Twisted-Pair Cable and Pin Assignments Caution: DO NOT plug a phone jack connector into any RJ-45 port. Use only twisted-pair cables with RJ-45 connectors that conform with FCC standards. For 1000BASE-T connections, a twisted-pair cable must have four pairs of wires. Each wire pair is identified by two different colors. For example, one wire might be red and the other, red with white stripes. Also, an RJ-45 connector must be attached to both ends of the cable.

Caution: Each wire pair must be attached to the RJ-45 connectors in a specific orientation. (See "Cabling Guidelines" on page 4-2 for an explanation.) Figure B-1 illustrates how the pins on the RJ-45 connector are numbered. Be sure to hold the connectors in the same orientation when attaching the wires to the pins. 1 8 1 Figure B-1.

RJ-45 Connector Pin Numbers B-2 TWISTED-PAIR CABLE AND PIN ASSIGNMENTS 1000BASE-T Pin Assignments 1000BASE-T ports switch support automatic MDI/MDI-X operation, so you can use straight-through cables for all network connections to PCs or servers, or to other switches or hubs. In straight-through cable, pins 1 to 8 at one end of the cable are connected straight through to pins 1 to 8 at the other end of the cable. The table below shows the 1000BASE-T MDI and MDI-X port pinouts. These ports require that all four pairs of wires be connected. Note that for 1000BASE-T operation, all four pairs of wires are used for both transmit and receive. Use 100-ohm Category 5 or 5e unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for 1000BASE-T connections. Also be sure that the length of any twisted-pair connection does not exceed 100 meters (328 feet). Pin 1 2 3 4 5 6 7 8 MDI Bi-directional Data One Plus (BI\_D1+) Bi-directional Data One Minus (BI\_D1-) BI\_D2+ ...

. etc. BI\_D3+ .... etc. BI\_D3- ...

. etc. BI\_D2- ...

. etc. BI\_D4+ ...

. etc. BI\_D4- .... etc. MDI-X Bi-directional Data Two Plus (BI\_D2+) Bi-directional Data Two Minus (BI\_D2-) BI\_D1+ ...

. etc. BI\_D4+ .... etc. BI\_D4- ...

. etc. BI\_D1- ...

. etc. BI\_D3+ ...

. etc. BI\_D3- .... etc. B-3 CABLES 1000BASE-T Cable Requirements All Category 5 UTP cables that are used for 100BASE-TX connections should also work for 1000BASE-T, providing that all four wire pairs are connected. However, it is recommended that for all critical connections, or any new cable installations, Category 5e (enhanced Category 5) or 6 cable should be used. The Category 5e and 6 specifications include test parameters that are only recommendations for Category 5.

Therefore, the first step in preparing existing Category 5 cabling for running 1000BASE-T is a simple test of the cable installation to be sure that it complies with the IEEE 802.3ab standards. Cable Testing for Existing Category 5 Cable Installed Category 5 cabling must pass tests for Attenuation, Near-End Crosstalk (NEXT), and Far-End Crosstalk (FEXT).



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This cable testing information is specified in the ANSI/TIA/EIA-TSB-67 standard. Additionally, cables must also pass test parameters for Return Loss and Equal-Level Far-End Crosstalk (ELFEXT). These tests are specified in the ANSI/TIA/EIA-TSB-95 Bulletin, "The Additional Transmission Performance Guidelines for 100 Ohm 4-Pair Category 5 Cabling." Note: When testing your cable installation, be sure to include all patch cables between switches and end devices. Adjusting Existing Category 5 Cabling If your existing Category 5 installation does not meet one of the test parameters for 1000BASE-T, there are basically three measures that can be applied to try to correct the problem: 1. Replace any Category 5 patch cables with high-performance Category 5e or 6 cables. 2.

Reduce the number of connectors used in the link. 3. Reconnect some of the connectors in the link. B-4 CONSOLE PORT PIN ASSIGNMENTS Console Port Pin Assignments The DB-9 serial port on the switch's front panel is used to connect to the switch for out-of-band console configuration. The on-board menu-driven configuration program can be accessed from a terminal or a PC running a terminal emulation program.

The pin assignments used to connect to the serial port are provided in the following tables. Pin 1 Pin 9 Figure B-2. DB-9 Console Port Pin Numbers DB-9 Port Pin Assignments EIA CCITT Circuit Signal BB BA AB 104 103 102 Description RxD (Received Data) TxD (Transmitted Data) SGND (Signal Ground) Switch's DB9 DTE Pin # 2 3 5 PC DB9 DTE Pin # 2 3 5 No other pins are used. Console Port to 9-Pin DTE Port on PC Switch's 9-Pin Serial Port 2 RXD 3 TXD 5 SGND Null Modem <-----TXD -----RXD -----> -----SGND -----PC's 9-Pin DTE Port 3 TXD 2 RXD 5 SGND No other pins are used. B-5 CABLES Console Port to 25-Pin DTE Port on PC Switch's 9-Pin Serial Port 2 RXD 3 TXD 5 SGND Null Modem <-----TXD -----RXD -----> -----SGND -----PC's 25-Pin DTE Port 2 TXD 3 RXD 7 SGND No other pins are used.

B-6 APPENDIX C SPECIFICATIONS Physical Characteristics Base Unit Ports 8 10/100/1000BASE-T, with auto-negotiation 4 10/100/1000BASE-T shared with four SFP transceiver slots Network Interface Ports 1-12: RJ-45 connector, auto MDI/X 10BASE-T: RJ-45 (100-ohm, UTP cable; Categories 3 or better) 100BASE-TX: RJ-45 (100-ohm, UTP cable; Category 5 or better) 10/100/1000BASE-T: RJ-45 (100-ohm Category 5, 5e, or 6 UTP or STP cable) Buffer Architecture 32 Mbyte per system Switching Database 32K MAC address entries LEDs System: Power, Diag, RPU Port: Link/Act, FDX Weight 4.36 kg (9.6 lbs) Size 44.0 x 35.4 x 4.3 cm (17.37 x 13.9 x 1.7 in.) C-1 SPECIFICATIONS Temperature Operating: 0 to 50 °C (32 to 122 °F) Storage: -40 to 70 °C (-40 to 158 °F) Humidity Operating: 10% to 95% AC Input 100 to 240 V, 50 to 60 Hz Power Supply Internal, auto-ranging transformer: 90 to 260 VAC, 47 to 63 Hz External, supports connection for redundant DC power supply Power Consumption 48 Watts maximum Maximum Current 0.

39 A @ 115 VAC 0.21 A @ 230 VAC Switch Features Spanning Tree Protocol Forwarding Mode Store-and-forward Flow Control Full Duplex: IEEE 802.3x Half Duplex: Back pressure Broadcast Storm Suppression Traffic throttled above a critical threshold VLAN Support Up to 255 groups; port-based or with 802.1Q VLAN tagging, GVRP for automatic VLAN learning C-2 MANAGEMENT FEATURES Multicast Switching IGMP Snooping Quality of Service Supports four levels of priority and Weighted Round Robin Queueing Note: For detailed information on switch features, refer to the Management Guide. Management Features In-Band Management Telnet, Web-based HTTP, or SNMP manager (EliteView Network Management software provided free) Out-of-Band Management RS-232 DB-9 console port Software Loading TFTP or Web (HTTP) in-band, or XModem out-of-band MIB Support MIB II (RFC 1213), Bridge MIB (RFC 1493), Interfaces Evolution MIB (RFC 2863), Ethernet MIB (RFC 2665), Extended Bridge MIB (RFC 2674), RMON MIB (RFC 2819), Entity MIB (RFC 2737), RADIUS authentication client MIB (RFC 2618), SMC's private MIB RMON Support Groups 1, 2, 3, 9 (Statistics, History, Alarm, Event) Additional Features Port Trunks (static - Cisco EtherChannel compliant, dynamic - LACP), Port Mirroring, BOOTP/DHCP Client C-3 SPECIFICATIONS Standards IEEE 802.3 Ethernet, IEEE 802.3u Fast Ethernet, IEEE 802.3z Gigabit Ethernet, IEEE 802.3ab 1000BASE-T, IEEE 802.1D Spanning Tree Protocol and traffic priorities, IEEE 802.

Ip priority tags, IEEE 802.1Q VLAN, IEEE 802.3ac VLAN tagging, IEEE 802.ad Link Aggregation Control Protocol IEEE 802.3x full-duplex flow control (ISO/IEC 8802-3) SNMP (RFC 1157), RMON (RFC 1757 groups 1,2,3,9), RADIUS (RFC 2618) Compliances CE Mark Emissions FCC Class A Industry Canada Class A EN55022 (CISPR 22) Class A EN 61000-3-2/3 VCCI Class A C-Tick - AS/NZS 3548 (1995) Class A Immunity EN 61000-4-2/3/4/5/6/8/11 Safety CSA/NRTL (CSA 22.

2.950 & UL 1950) EN60950 (TÜV/GS) Warranty Limited Lifetime C-4 APPENDIX D ORDERING INFORMATION TigerSwitch 10/100/1000 Products and Accessories Product Number SMC8612T Description 12 auto-MDI/MDI-X 10/100/1000BASE-T ports with 4 ports shared with 4 SFP transceiver slots 1-Port 1000BASE-SX mini-GBIC transceiver 1-Port 1000BASE-LX mini-GBIC transceiver 1-Port 1000BASE-ZX mini-GBIC transceiver Redundant power unit with cables, supports one device SMCBGLCX1 SMCBGLLCX1 SMCBGLZCX1 SMCBGLZCX1 SMCBGLZCX1 SMCBGLZCX1 SMCBGLZCX1 SMCBGLZCX1 D-1 ORDERING INFORMATION D-2 GLOSSARY 10BASE-T IEEE 802.3 specification for 10 Mbps Ethernet over two pairs of Category 3, 4, or 5 UTP cable. 100BASE-TX IEEE 802.3u specification for 100 Mbps Fast Ethernet over two pairs of Category 5 UTP cable.

1000BASE-SX IEEE 802.3z specification for Gigabit Ethernet over two strands of 50/125 or 62.5/125 micron core fiber cable. 1000BASE-LX IEEE 802.3z specification for Gigabit Ethernet over two strands of 9/125 micron core fiber cable. 1000BASE-T IEEE 802.3ab specification for Gigabit Ethernet over two pairs of Category 5, 5e, or 6 100-ohm UTP cable. Auto-Negotiation Signalling method allowing each node to select its optimum operational mode (e.g., 10, 100, or 1000 Mbps and half or full duplex) based on the capabilities of the node to which it is connected.

Bandwidth The difference between the highest and lowest frequencies available for network signals. Also synonymous with wire speed, the actual speed of the data transmission along the cable. Glossary-1 Collision A condition in which packets transmitted over the cable interfere with each other. Their interference makes both signals unintelligible. Collision Domain Single CSMA/CD LAN segment. CSMA/CD CSMA/CD (Carrier Sense Multiple Access/Collision Detect) is the communication method employed by Ethernet, Fast Ethernet, or Gigabit Ethernet. End Station A workstation, server, or other device that does not act as a network interconnection.



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@@@ Gigabit Ethernet A 1000 Mbps network communication system based on Ethernet and the CSMA/CD access method. IEEE 802.3 Defines carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications. IEEE 802.3ab Defines CSMA/CD access method and physical layer specifications for 1000BASE-T Gigabit Ethernet. IEEE 802.3u Defines CSMA/CD access method and physical layer specifications for 100BASE-TX and 100BASE-FX Fast Ethernet. IEEE 802.

3x Defines Ethernet frame start/stop requests and timers used for flow control on full-duplex links. IEEE 802.3z Defines CSMA/CD access method and physical layer specifications for 1000BASE Gigabit Ethernet. LAN Segment Separate LAN or collision domain. LED Light emitting diode used for monitoring a device or network condition.

Glossary-3 Link Segment Length of twisted-pair or fiber cable joining a pair of repeaters or a repeater and a PC. Local Area Network (LAN) A group of interconnected computer and support devices. Media Access Control (MAC) A portion of the networking protocol that governs access to the transmission medium, facilitating the exchange of data between network nodes. MIB An acronym for Management Information Base. It is a set of database objects that contains information about the device. MII Media Independent Interface, the standard interface for Fast Ethernet--similar to the AUI interface for traditional Ethernet. Network Diameter Wire distance between two end stations in the same collision domain. Redundant Power Unit (RPU) A backup power supply that automatically takes over in case the primary power supply should fail. RJ-45 Connector A connector for twisted-pair wiring. Glossary-4 Switched Ports that are on separate collision domains or LAN segments.

Transmission Control Protocol/Internet Protocol (TCP/IP) Protocol suite that includes TCP as the primary transport protocol, and IP as the network layer protocol. Transmission Control Protocol/Internet Protocol (TCP/IP) Protocol suite that includes TCP as the primary transport protocol, and IP as the network layer protocol. UTP Unshielded twisted-pair cable. Virtual LAN (VLAN) A Virtual LAN is a collection of network nodes that share the same collision domain regardless of their physical location or connection point in the network. A VLAN serves as a logical workgroup with no physical barriers, allowing users to share information and resources as though located on the same LAN. Glossary-5 Glossary-6 INDEX Numerics 10 Mbps connectivity rules 2-8 10/100 Mbps connectivity rules 2-7 1000 Mbps connectivity rules 2-6 1000BASE-LX connections 4-5 fiber cable lengths 2-6 1000BASE-SX connections 4-5 fiber cable lengths 2-6 1000BASE-T cable lengths 2-6 ports 1-3 100BASE-FX connections 4-5 100BASE-FX fiber cable lengths 2-7 100BASE-TX cable lengths 2-7 10BASE-T cable lengths 2-7 C cable lengths 2-6, 2-7 specifications B-1 compliances EMC C-4 Immunity C-4 safety C-4 connectivity rules 10 Mbps 2-8 10/100 Mbps 2-7 1000 Mbps 2-6 console port 1-2, B-5 contents of package 3-2 cooling problems A-2 cord sets, international 3-6 D DC input 1-5 desktop mounting 3-5 A accessories, ordering D-1 address table size C-1 adhesive feet, attaching 3-5 air flow requirements 3-1 application examples 2-2 applications 2-2 collapsed backbone 2-2 remote connections with fiber 2-4 VLAN connections 2-3 E electrical interference, avoiding 3-1 equipment checklist 3-2 Ethernet cable lengths 2-7 Ethernet connectivity rules 2-8 F features C-3 management 1-7 switch 1-6 fiber cables 4-5 flow control, IEEE 802.3x 1-3 front and rear panels of switch 1-1 full duplex connectivity 2-1 B brackets, attaching 3-4 Broadcast storm control 1-2 buffers, saturation of 1-3 Index-1 INDEX G Gigabit Ethernet cable lengths 2-6 grounding for racks 3-3 GVRP 1-2 I IEEE 802.3 Ethernet 1-6 IEEE 802.3u Fast Ethernet 1-6 IEEE 802.3x flow control 1-3 IEEE 802.

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