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**User manual SMC 8724ML3**  
**User guide SMC 8724ML3**  
**Operating instructions SMC 8724ML3**  
**Instructions for use SMC 8724ML3**  
**Instruction manual SMC 8724ML3**

## TigerStack 1000

### Gigabit Ethernet Switch

- ◆ 24/48 auto-MDI/MDI-X 10/100/1000BASE-T ports
- ◆ 4 RJ-45 ports shared with 4 SFP transceiver slots
- ◆ 1 10GBASE extender module slot
- ◆ Non-blocking switching architecture
- ◆ Support for a redundant power unit
- ◆ Spanning Tree Protocol, RSTP, and MSTP
- ◆ Up to 32 LACP or static 8-port trunks
- ◆ Layer 2/3/4 CoS support through eight priority queues
- ◆ Layer 3/4 traffic priority with IP Precedence and IP DSCP
- ◆ 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
- ◆ Security features: ACL, RADIUS, 802.1x
- ◆ Routing features: IP/RIP routing, OSPF, VRRP, CIDR

**SMC**<sup>®</sup>  
Networks

### Installation Guide

SMC8724ML3  
SMC8748ML3



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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 or better for 100 Mbps connections, and Category 5 or 5e for 1000 Mbps connections. Use 50/125 or 62.

5/125 micron multimode fiber optic cable, or 9/125 micron single-mode cable, for fiber-optic transceiver 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. Japan VCCI Class A iii COMPLIANCES CE Mark Declaration of Conformance for EMI and Safety (EEC) 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: · EN60950:2000 Warning: Do not plug a phone jack connector in the RJ-45 port. This may damage this device. Attention: Les raccordeurs ne sont pas utilisés pour le système téléphonique! iv COMPLIANCES 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 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. Power Cord Safety Please read the following safety information carefully before installing the switch: Warning: Installation and removal of the unit must be carried out by qualified personnel only. · The unit must be connected to an earthed (grounded) outlet to comply with international safety standards. · Do not connect the unit to an A.C.

outlet (power supply) without an earth (ground) connection. · The appliance coupler (the connector to the unit and not the wall plug) must have a configuration for mating with an EN 60320/IEC 320 appliance inlet. · The socket outlet pour un cable de longueur inférieure à 2 mètres. - type SV ou SJ - 3 conducteurs Le cordon doit être en mesure d'acheminer un courant nominal d'au moins 10 A. La prise femelle de branchement doit être du type à mise à la terre (mise à la masse) et respecter la configuration NEMA 5-15P (15 A, 125 V) ou NEMA 6-15P (15 A, 250 V).

Danemark: La prise mâle d'alimentation doit respecter la section 107-2 D1 de la norme DK2 1a ou DK2 5a. vii COMPLIANCES Cordon électrique - Il doit être agréé dans le pays d'utilisation Suisse: Europe La prise mâle d'alimentation doit respecter la norme SEV/ASE 1011. La prise secteur doit être conforme aux normes CEE 7/7 ("SCHUKO") LE cordon secteur doit porter la mention <HAR> ou <BASEC> et doit être de type HO3VVF3GO.75 (minimum). Bitte unbedingt vor dem Einbauen des Switches die folgenden Sicherheitsanweisungen durchlesen: WARNUNG: Die Installation und der Ausbau des Geräts darf nur durch Fachpersonal erfolgen. · Das Gerät sollte nicht an eine ungeerdete Wechselstromsteckdose angeschlossen werden. · Das Gerät muß an eine geerdete Steckdose angeschlossen werden, welche die internationalen Sicherheitsnormen erfüllt. · Der Gerätestecker (der Anschluß an das Gerät, nicht der Wandsteckdosenstecker) muß einen gemäß EN 60320/IEC 320 konfigurierten Geräteeingang haben. · Die Netzsteckdose muß in der Nähe des Geräts und leicht zugänglich sein. Die Stromversorgung des Geräts kann nur durch Herausziehen des Geräte netzkabels aus der Netzsteckdose unterbrochen werden.

· Der Betrieb dieses Geräts erfolgt unter den SELV-Bedingungen (Sicherheitskleinstspannung) gemäß IEC 60950. Diese Bedingungen sind nur gegeben, wenn auch die an das Gerät angeschlossenen Geräte unter SELV-Bedingungen betrieben werden. Stromkabel. Dies muss von dem Land, in dem es benutzt wird geprüft werden: Schweiz Europe Dieser Stromstecker muß die SEV/ASE 1011 Bestimmungen einhalten. Das Netzkabel muß vom Typ HO3VVF3GO.75 (Mindestanforderung) sein und die Aufschrift <HAR> oder <BASEC> tragen. Der Netzstecker muß die Norm CEE 7/7 erfüllen ("SCHUKO"). viii COMPLIANCES Warnings and Cautionary Messages Warning: Warning: Warning: This product does not contain any serviceable user parts.



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Installation and removal of the unit must be carried out by qualified personnel only. When connecting this device 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.

This switch uses lasers to transmit signals over fiber optic cable. The lasers are compliant with the requirements of a Class 1 Laser Product and are inherently eye safe in normal operation. However, you should never look directly at a transmit port when it is powered on. Wear an anti-static wrist strap or take other suitable measures to prevent electrostatic discharge when handling this equipment. Do not plug a phone jack connector in the RJ-45 port.

This may damage this device. Use only twisted-pair cables with RJ-45 connectors that conform to FCC standards. Warning: Caution: Caution: Caution: Warnings (in German) Achtung: Achtung: Achtung: Dieses Produkt enthält keine Teile, die eine Wartung vom Benutzer benötigen. Installation und Deinstallation des Gerätes müssen von qualifiziertem Servicepersonal durchgeführt werden. Wenn das Gerät an eine Steckdose angeschlossen wird, muß der Masseanschluß am dreipoligen Netzstecker mit Schutzterde verbunden werden, um elektrische Gefahren zu vermeiden.

Dieses Gerät nutzt Laser zur Signalübertragung über Glasfasern. Die Laser entsprechen den Anforderungen an eine Lasereinrichtung der Klasse 1 und sind durch ihre Bauart im normalen Betrieb sicher für die Augen. Trotzdem sollte niemals direkt in den einen Übertragungskanal geblickt werden, wenn er eingeschaltet ist. Achtung: Environmental Statement The manufacturer of this product endeavours to sustain an environmentally-friendly policy throughout the entire production process. This is achieved through the following means: . . . . . Adherence to national legislation and regulations on environmental production standards. Conservation of operational resources. Waste reduction and safe disposal of all harmful un-recyclable by-products. Recycling of all reusable waste content. Design of products to maximize recyclables at the end of the product's life span. Continual monitoring of safety standards.

ix COMPLIANCES End of Product Life Span This product is manufactured in such a way as to allow for the recovery and disposal of all included electrical components once the product has reached the end of its life. Manufacturing Materials There are no hazardous nor ozone-depleting materials in this product. Documentation All printed documentation for this product uses biodegradable paper that originates from sustained and managed forests. The inks used in the printing process are non-toxic. Purpose This guide details the hardware features of the switch, including its physical and performance-related characteristics, and how to install the switch. Audience The guide is intended for use by network administrators who are responsible for installing and setting up network equipment; consequently, it assumes a basic working knowledge of LANs (Local Area Networks). Diese Anleitung ist für die Benutzung durch Netzwerkadministratoren vorgesehen, die für die Installation und das Einstellen von Netzwerkkomponenten verantwortlich sind; sie setzt Erfahrung bei der Arbeit mit LANs (Local Area Networks) voraus. Related Publications The following publication gives specific information on how to operate and use the management functions of the switch: The SMC8724ML3, SMC8748ML3 Management Guide Also, as part of the switch's firmware, there is an online web-based help that describes all management related features. x TABLE OF CONTENTS 1 About the TigerStack 1000 . .

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.. B-4 xv FIGURES xvi CHAPTER 1 ABOUT THE TIGERSTACK 1000 Overview SMC's TigerStack 1000 SMC8724ML3 and SMC8748ML3 are intelligent multilayer switches (Layer 2, 3) with 24/48 10/100/1000BASE-T ports, four of which are combination ports\* that are shared with four SFP transceiver slots (see Figure 1-1, Ports 21-24/45-48). The rear panel provides a slot for single-port 10 Gigabit Ethernet hot-swappable expansion modules, and two stacking ports. Units can be stacked up to eight high through the built-in stacking ports that provide a 40 Gbps stack backplane. The switch includes an SNMP-based management agent embedded on the main board, which supports both in-band and out-of-band access for managing the stack. These switches can easily tame your network with full support for Spanning Tree Protocol, Multicast Switching, Virtual LANs, and IP routing. It brings order to poorly performing networks by segregating them into separate broadcast domains with IEEE 802.1Q compliant VLANs, empowers multimedia applications with multicast switching and CoS services, and eliminates conventional router bottlenecks. \* If an SFP transceiver is plugged in, the corresponding RJ-45 port is disabled for ports 21-24 on SMC8724ML3 or ports 45-48 on SMC8748ML3.

1-1 ABOUT THE TIGERSTACK 1000 These switches can be used to augment or completely replace slow legacy routers, off-loading local IP traffic to release valuable resources for non-IP routing or WAN access. With wire-speed performance for Layer 2 and Layer 3, these switches can significantly improve the throughput between IP segments or VLANs. Port Status LEDs Stack ID Console Port SMC8748ML3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 10/100/1000 Mbps RJ-45 Ports System Indicators SFP Slots SMC8724ML3 TigerStack 1000 8724ML3 Figure 1-1 Front Panels Power Socket Module RPU 100-240V~ 50-60Hz 2A DC 12V 13A Up Down Redundant Power Socket Module Slot Stacking Ports Figure 1-2 Rear Panel Switch Architecture The switches employ a wire-speed, non-blocking switching fabric.



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This permits simultaneous wire-speed transport of multiple packets at low latency on all ports. The switches also feature full-duplex capability on all ports, which effectively doubles the bandwidth of each connection. For communications between different VLANs, these switches use IP routing. For communications within the same VLAN, they use 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.

**1-2 DESCRIPTION OF HARDWARE** These switches include built-in stacking ports that enable up to eight units to be connected together through a 40 Gbps stack backplane.

The switch stack can be managed from a master unit using a single IP address. These switches also include a slot on the rear panel for slide-in single-port 10G modules with Xenpak transceivers. **Network Management Options** These switches contain a comprehensive array of LEDs for "at-a-glance" monitoring of network and port status. They also include a management agent that allows you to configure or monitor the switch using its embedded management software, or via SNMP applications. To manage the switch, you can make a direct connection to the RS-232 console port (out-of-band), or you can manage the switch through a network connection (in-band) using Telnet, the on-board web agent, or SNMP-based network management software.

For a detailed description of both switches' advanced features, refer to the Management Guide. **Description of Hardware 10/100/1000BASE-T Ports** The switches contain 24/48 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 these switches 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-5.) Each of these ports support auto-negotiation, so the optimum transmission mode (half or full duplex), and data rate (10, 100, or 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. **1-3 ABOUT THE TIGERSTACK 1000 SFP Slots** The Small Form Factor Pluggable (SFP) transceiver slots are shared with four of the RJ-45 ports (ports 21-24 for the SMC8724ML3 and ports 45-48 for the SMC8748ML3). In its default configuration, 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. The switch can also be configured to force the use of an RJ-45 port or SFP slot, as required. **Stacking Ports** Each unit includes two stacking ports that provide a 40 Gbps high-speed serial stack backplane connection. Up to eight SMC8724ML3 or SMC8748ML3 switches can be connected together using optional stacking cables. Note that the 24-port and 48-port switches can be mixed in the same stack. The Stack Master button enables one switch in the stack to be selected as the Master. **1-4 DESCRIPTION OF HARDWARE Port and System Status LEDs** The switches include a display panel for key system and port indications that simplify installation and network troubleshooting. The LEDs, which are located on the front panel for easy viewing, are shown below and described in the following tables.

**Port Status LEDs** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 **Figure 1-3 Port LEDs Table 1-1 Port Status LEDs LED 1-24/1-48 (Link/Activity) Condition** On/Flashing Amber On/Flashing Green Off Status Port has a valid link at 10 or 100 Mbps. Flashing indicates activity.

Port has a valid link at 1000 Mbps. Flashing indicates activity. There is no link on the port. **1-5 ABOUT THE TIGERSTACK 1000 System Status LEDs TigerStack 1000 8748ML3 Figure 1-4 System LEDs Table 1-2 System Status LEDs LED Power Condition** Green Amber Off Diag Flashing Green Green Amber RPU Green Amber Off Stack Master Green Amber Flashing Amber Off Status Internal power is operating normally. Internal power supply fault. Power off or failure. System self-diagnostic test in progress. System self-diagnostic test successfully completed.

System self-diagnostic test has detected a fault. Redundant power unit is receiving power. Fault in redundant power unit. Redundant power unit is off. Switch is operating as the Master unit in the stack.

Switch is operating as a Slave unit in the stack. System in Master arbitration/election state. System in standalone mode. **1-6 DESCRIPTION OF HARDWARE Table 1-2 System Status LEDs (Continued) LED Stack Link Condition** Green Flashing Green Flashing Amber Off Module Green Flashing green Off Stack ID 1-8 Status Uplink and downlink operating normally. Uplink has failed.

Downlink has failed. No stacking link present. An expansion module is installed in the slot. An installed expansion module has been disabled. There is no module installed. Indicates the switch stack ID. The Master unit is numbered 1. Slave units are numbered 2-8. In standalone mode. Off **Optional Redundant Power Unit** SMC 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 Sockets** There are two power sockets on the rear panel of each switch. The standard power socket is for the AC power cord. The socket labeled "RPU" is for the optional Redundant Power Unit (RPU). **Power Socket Redundant Power Socket Figure 1-5 Power Supply Sockets 1-7 ABOUT THE TIGERSTACK 1000 Optional Media Extender Modules 10G Xenpak Module 10G Xenpak Module Diag Link/Activity Figure 1-6 Single-Port 10G Module (Xenpak)** The module Xenpak slot supports all standard 10 Gigabit Ethernet (10G) Xenpak transceivers. All 10GBASE transceivers operate at 10 Gbps full duplex. **Extender Module LEDs** The optional slide-in 10G module includes its own integrated LED indicators on the module panel. The following table describes the LEDs. **Table 1-3 Module LEDs LED Condition Status** Port has a valid link at 10 Gbps. Flashing indicates activity. There is no link on the port. System self-diagnostic test successfully completed. System self-diagnostic test has detected a fault. Link/ On/Flashing Activity Green Off Diag Green Amber Flashing Green System self-diagnostic test in progress. **1-8 FEATURES AND BENEFITS Features and Benefits Connectivity** · · 24/48 10/100/1000 Mbps ports for easy Gigabit Ethernet integration and for protection of your investment in legacy LAN equipment. 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.



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RJ-45 ports support auto MDI/MDI-X pinout selection. 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, 6 or better for 1000 Mbps connections. IEEE 802.3-2002 Ethernet, Fast Ethernet, Gigabit Ethernet, and IEEE 802.3ae 10 Gigabit Ethernet compliance ensures compatibility with standards-based hubs, network cards and switches from any vendor.

Provides stacking capability via high-speed serial ports with 40 Gbps stacking bandwidth. Up to 8 units can be stacked together. . . . Expandability . . . Supports 1000BASE-SX and 1000BASE-LX and 1000BASE-ZX SFP transceivers. Optional single-port 10G expansion module with a Xenpak transceiver slot. Performance . . . Transparent bridging. Aggregate duplex bandwidth of up to 108/156 Gbps. 1-9 ABOUT THE TIGERSTACK 1000 . . . Switching table with a total of 16K MAC address entries and 8K IP address entries. Provides store-and-forward switching for intra-VLAN traffic, and IP routing for inter-VLAN traffic. Supports wire-speed switching at layer 2, and wire-speed routing at layer 3. Broadcast storm control.

Management . . . "At-a-glance" LEDs for easy troubleshooting. Network management agent - Manages switch (or entire stack) in-band or out-of-band - Supports console, Telnet, SSH, SNMP v1/v2c/v3, RMON 4 groups and web-based interface . Slave units provide backup stack management. 1-10 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 distance between end stations is limited by a maximum 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, Fast Ethernet, Gigabit Ethernet, or 10G Ethernet network to significantly boost bandwidth while using conventional cabling and network cards. 2-1 NETWORK PLANNING Application Examples The TigerStack 1000 is not only designed to segment your network, but also to provide a wide range of options in setting up network connections and linking VLANs or IP subnets. Some typical applications are described below. Collapsed Backbone The TigerStack 1000 is an excellent choice for mixed Ethernet, Fast Ethernet, and 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 24/48 workstations or servers.

You can easily build on this basic configuration, adding direct full-duplex connections to workstations or servers. When the time comes for further expansion, just connect to another hub or switch using one of the Gigabit Ethernet ports built into the front panel, a Gigabit Ethernet port on a plug-in SFP transceiver, or a 10G transceiver on the optional module. In the figure below, the 48-port switch is operating as a collapsed backbone for a small LAN. It is providing dedicated 10 Mbps full-duplex connections to workstations, 100 Mbps full-duplex connections to power users, and 1 Gbps full-duplex connections to servers. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 .

.. Servers 1 Gbps ... Workstations 100 Mbps ... Workstations 10 Mbps Figure 2-1 Collapsed Backbone 2-2 APPLICATION EXAMPLES Network Aggregation Plan With 24 or 48 parallel bridging ports (i.e.

24/48 distinct collision domains), these switches can collapse a complex network down into a single efficient bridged node, increasing overall bandwidth and throughput. In the figure below, the 10/100/1000BASE-T ports are providing 1000 Mbps connectivity through stackable switches. In addition, the switches are also connecting several servers at 10 Gbps. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 Server Farm . . . . . 10/100/1000 Mbps Segments ..

... Figure 2-2 Network Aggregation Plan 2-3 NETWORK PLANNING Remote Connections with Fiber Cable Fiber optic technology allows for longer cabling than any other media type.

A 1000BASE-SX (MMF) link can connect to a site up to 550 meters away, a 1000BASE-LX (SMF) link up to 5 km, and a 1000BASE-ZX link up to 100 km. This allows a switch stack to serve as a collapsed backbone, providing direct connectivity for a widespread LAN. A 1000BASE-SX SFP transceiver can be used for a high-speed connection between floors in the same building, and a 10GBASE-LR module can be used for high-bandwidth core connections between buildings in a campus setting. For long-haul connections, a 1000BASE-ZX SFP transceiver can be used to reach another site up to 100 kilometers away. The figure below illustrates three TigerStack 1000 switch stacks interconnecting multiple segments with fiber cable.

Headquarters 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 Warehouse 10GBASE-LR SMF (10 kilometers) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 TigerStack 1000 8748ML3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 TigerStack 1000 8748ML3 Server Farm Remote Switch 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 1000BASE-SX MMF (500 meters) 1000BASE-LX (5 kilometers) 1000BASE-ZX (100 kilometers) .



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.. Remote Switch 39 40 41 42 43 44 45 46 47 48 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 TigerStack 1000 8748ML3 Research & Development ... 10/100/1000 Mbps Segments ... 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 .

.. Figure 2-3 Remote Connections with Fiber Cable 2-4 APPLICATION EXAMPLES Making VLAN Connections These switches support VLANs which can be used to organize any group of network nodes into separate broadcast domains. VLANs confine broadcast traffic to the originating group, and can eliminate broadcast storms in large networks. This provides a more secure and cleaner network environment. VLANs can be based on untagged port groups, or traffic can be explicitly tagged to identify the VLAN group to which it belongs. Untagged VLANs can be used for small networks attached to a single switch. However, tagged VLANs should be used for larger networks and all the VLANs assigned to the inter-switch links. These switch also support multiple spanning trees which allow VLAN groups to maintain a more stable path between all VLAN members. This can reduce the overall amount of protocol traffic crossing the network, and provide a shorter reconfiguration time if any link in the spanning tree fails.

At Layer 3, VLANs are used to create an IP interface, where one or more ports are assigned to the same IP segment. Traffic is automatically routed between different IP segments on the same switch, without any need to configure routing protocols. R&D 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 VLAN 1 Tagged Ports Untagged Ports VLAN unaware switch R&D TigerStack 1000 8748ML3 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 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 Using Layer 3 Routing VLANs can significantly enhance network performance and security.

However, if you use conventional routers to interconnect VLANs, you can lose most of your performance advantage. The TigerStack 1000 switches are routing switches that provide wire-speed routing, which allows you to eliminate your conventional IP routers, except for a router to handle non-IP protocols and a gateway router linked to the WAN. Just assign an IP address to any VLANs that need to communicate. The switch will continue to segregate Layer 2 traffic based on VLANs, but will now provide inter-VLAN connections for IP applications. The switch will perform IP routing for specified VLAN groups, a directly connected subnetwork, a remote IP subnetwork or host address, or an IP multicast address. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 TigerStack 1000 8748ML3 R&D Testing IP Network 2 IP Network 1 VLAN 1 VLAN 2 Figure 2-5 IP Routing for Unicast Traffic 2-6 APPLICATION NOTES Application Notes 1. Full-duplex operation only applies to point-to-point access (such as when a switch is attached to a workstation, server or another switch). When the switch is connected to a hub, both devices must operate in half-duplex mode. 2. For network applications that require routing between dissimilar network types, you can attach these switches directly to a multiprotocol router. However, if you have to interconnect distinct VLANs or IP subnets, you can take advantage of the wire-speed Layer 3 routing provided by these switches. 3. As a general rule, the length of fiber optic cable for a single switched link should not exceed: . . . . . 1000BASE-SX: 550 m (1805 ft) for multimode fiber 1000BASE-LX: 5 km (3.1 miles) for single-mode fiber 1000BASE-ZX: 100 km (62.1 miles) for single-mode fiber 10GBASE-LR: 10 km (6.

2 miles) for single-mode fiber 10GBASE-SR: 300 m (984 ft) for multimode fiber 10GBASE-ER: 40 km (24.8 miles) for single-mode fiber However, power budget constraints must also be considered when calculating the maximum cable length for your specific environment. 2-7 NETWORK PLANNING 2-8 CHAPTER 3 INSTALLING THE SWITCH Selecting a Site TigerStack 1000 units can be mounted in a standard 19-inch equipment rack or on a flat surface. Be sure to follow the guidelines below when choosing a location. The site should: - be at the center of all the devices you want to link and near a power outlet. - be able to maintain its temperature within 0 to 50 °C (32 to 122 °F) and its humidity within 5% to 95%, non-condensing - provide adequate space (approximately five centimeters or two inches) on all sides for proper air flow - be accessible for installing, cabling and maintaining the devices - 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 and transmitters. Make sure that the unit is connected to a separate grounded power outlet that provides 100 to 240 VAC, 50 to 60 Hz, is within 2 m (6.6 feet) of each device and is powered from an independent circuit breaker. As with any equipment, using a filter or surge suppressor is recommended. 3-1 INSTALLING THE SWITCH Ethernet Cabling To ensure proper operation when installing the switches into a network, make sure that the current cables are suitable for 10BASE-T, 100BASE-TX or 1000BASE-T operation.

Check the following criteria against the current installation of your network: Cable type: Unshielded twisted pair (UTP) or shielded twisted pair (STP) cables with RJ-45 connectors; Category 3 or better for 10BASE-T, Category 5 or better for 100BASE-TX, and Category 5, 5e or 6 for 1000BASE-T. Protection from radio frequency interference emissions Electrical surge suppression Separation of electrical wires (switch related or other) and electromagnetic fields from data based network wiring Safe connections with no damaged cables, connectors or shields RJ-45 Connector Figure 3-1 RJ-45 Connections 3-2 EQUIPMENT CHECKLIST Equipment Checklist After unpacking the TigerStack 1000 unit, check the contents to be sure you have received all the components.



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Then, before beginning the installation, be sure you have all other necessary installation equipment. Package Contents · TigerStack 1000 unit (SMC8724ML3 or SMC8748ML3) · Four adhesive foot pads · Bracket Mounting Kit containing two brackets and eight screws for attaching the brackets to the switch · Power cord—either US, Continental Europe or UK · RS-232 console cable · This Installation Guide · Installation and Management Guide CD · SMC Warranty Registration Card—be sure to complete and return to SMC Optional Rack-Mounting Equipment If you plan to rack-mount the switch, be sure to have the following equipment available: · Four mounting screws for each device you plan to install in a rack—these are not included · A screwdriver (Phillips or flathead, depending on the type of screws used) 3-3 INSTALLING THE SWITCH Mounting A TigerStack 1000 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 (see page C-2). · **Grounding:** Die Rack-Montageeinheit muss richtig geerdet werden. · **Place each device** squarely on top of the one below, in any order. · **To install an optional module into the switch, do the following:** 1. Remove the blank metal plate (or a previously installed module) from the appropriate slot by removing the two screws with a flat-head screwdriver. 2. Before opening the package that contains the module, touch the bag to the switch casing to discharge any potential static electricity.

Also, it is recommended to use an ESD wrist strap during installation. 3. Remove the module from the anti-static shielded bag. 4. Holding the module level, guide it into the carrier rails on each side and gently push it all the way into the slot, ensuring that it firmly engages with the connector. 5. If you are sure the module is properly mated with the connector, tighten the retainer screws to secure the module in the slot. 6. The Diag LED on the module should turn on to confirm that the module is correctly installed and ready to use. 3-8 INSTALLING AN OPTIONAL MODULE INTO THE SWITCH Installing an Optional SFP Transceiver into the Switch 46 47 48 Tig e rSta 874 1000 8M L3 ck Figure 3-6 Inserting an SFP Transceiver into a Slot The SFP slots support the following optional SFP transceivers: · 1000BASE-SX (SMCBGSLCX1) · 1000BASE-LX (SMCBGLLCX1) · 1000BASE-ZX (SMCBGZLCX1) To install an SFP transceiver, do the following: 1.

Consider network and cabling requirements to select an appropriate SFP transceiver type. 2. Insert the transceiver with the optical connector facing outward and the slot connector facing down. Note that SFP transceivers are keyed so they can only be installed in one orientation. 3.

Slide the SFP transceiver into the slot until it clicks into place. Note: SFP transceivers are hot-swappable. The switch does not need to be powered off before installing or removing a transceiver. However, always first disconnect the network cable before removing a transceiver. Note: SFP transceivers are not provided in the switch package.

3-9 INSTALLING THE SWITCH Connecting Switches in a Stack Figure 3-7 shows how the stack cables are connected between switches in a stack. Each stacking connection is a 40 Gbps full-duplex high-speed serial link using proprietary stacking cables. The switch supports a line- and ring-topology stacking configuration, or can be used stand alone. In line-topology stacking there is a single stack cable connection between each switch that carries two-way communications across the stack. In ring-topology stacking, an extra cable is connected between the top and bottom switches forming a "ring" or "closed-loop." The closed-loop cable provides a redundant path for the stack link, so if one link fails, stack communications can be maintained. Figure 3-7 illustrates a ring-topology stacking configuration. To connect up to eight switches in a stack, perform the following steps: 1. Plug one end of the stack cable (ordered separately) in the Down (right) port of the top unit. 2.

Plug the other end of the stack cable into the Up (left) port of the next unit. 3. Repeat steps 1 and 2 for each unit in the stack. Form a simple chain starting at the Down port on the top unit and ending at the Up port on the bottom unit (stacking up to 8 units). 3-10 CONNECTING SWITCHES IN A STACK 4.

(Optional) To form a wrap-around topology, plug one end of a stack cable into the Down port on the bottom unit and the other end into the Up port on the top unit. Up Dow n Up Dow n Up Dow n Up Dow n Figure 3-7 Making Stacking Connections 5. Select the Master unit in the stack by pressing the Master button in on only one of the switches. Only one switch in the stack can operate as the Master, all other units operate in slave mode. If more than one switch in the stack is selected as Master, or if no switches are selected, the system will select the unit with the lowest MAC address as the Master.

3-11 INSTALLING THE SWITCH Stacking Topologies All units in the stack must be connected via stacking cable. You can connect units in a simple cascade configuration, connecting Up ports to Down ports, from the top unit to the bottom unit. Using this "line" topology, if any link or unit in the stack fails, the stack is split and two separate segments are formed. The Stack Link LEDs on the units that are disconnected flash to indicate that the stack link between them is not functioning. (See Table 1-2 "System Status LEDs" on page 1-6.

) When a stack link failure occurs, the stack reboots and a Master unit is selected within each of the two stack segments. The Master unit will be either the unit with the Master button depressed or the unit with the lowest MAC address if the Master button is not depressed on any unit. When the stack reboots and resumes operations, note that the IP address will be the same for both of the stack segments. To resolve the conflicting IP addresses, you should manually replace the failed link or unit as soon as possible. If you are using a wrap-around stack topology, a single point of failure in the stack will not cause the stack to fail.

It would take two or more points of failure to break the stack apart. If the Master unit fails or is powered off, the backup unit will take control of the stack without any loss of configuration settings. The Slave unit with the lowest MAC address is selected as the backup unit. 3-12 CONNECTING TO A POWER SOURCE Connecting to a Power Source To connect a device to a power source: 1.



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Insert the power cable plug directly into the socket located at the back of the device. 100 -240V~ 50-60Hz 2A Figure 3-8 Power Socket 2. Plug the other end of the cable into a grounded, 3-pin, AC power source. 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 socket type in your country. 3.

Check the front-panel LEDs as the device is powered on to be sure the Power LED is on. 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. 3-13 INSTALLING THE SWITCH Connecting to the Console Port 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 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 table. 1 5 6 9 Figure 3-9 Serial Port (DB-9 DTE) Pin-Out Wiring Map for Serial Cable Table 3-1 Wiring Map for Serial Cable Switch's 9-Pin Serial Port 2 RXD (receive data) 3 TXD (transmit data) No other pins are used. Null Modem <-----> PC's 9-Pin DTE Port 3 TXD (transmit data) 2 RXD (receive data) 5 SGND (signal ground) 5 SGND (signal ground) ----- The serial port's configuration requirements are as follows: · Default Baud rate--9,600 bps · Character Size--8 Characters · Parity--None · Stop bit--One · Data bits--8 · Flow control--none 3-14 CHAPTER 4 MAKING NETWORK CONNECTIONS Connecting Network Devices The TigerStack 1000 units are designed to interconnect multiple segments (or collision domains). It can 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 optional SFP or Xenpak transceivers. Twisted-Pair Devices Each device requires an unshielded twisted-pair (UTP) cable with RJ-45 connectors at both ends. Use Category 5, 5e or 6 cable for 1000BASE-T connections, Category 5 or better for 100BASE-TX connections, and Category 3 or better for 10BASE-T connections. Cabling Guidelines The RJ-45 ports on the switch support automatic MDI/MDI-X pinout configuration, so you can use standard straight-through twisted-pair cables to connect to any other network device (PCs, servers, switches, routers, or hubs). See Appendix B "Cables" for further information on cabling.

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. 4-1 MAKING NETWORK CONNECTIONS Connecting to PCs, Servers, Hubs and Switches 1. Attach one end of a twisted-pair cable segment to the device's RJ-45 connector.

Figure 4-1 Making Twisted-Pair Connections 2. If the device is a PC card and the 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 "Network Wiring 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. 3. As each connection is made, the Link LED (on the switch) corresponding to each port will light green (1000 Mbps) or amber (10/100 Mbps) to indicate that the connection is valid. 4-2 TWISTED-PAIR DEVICES Network Wiring 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. See "Cable Labeling and Connection Records" on page 4-10. Equipment Rack (side view) Network Switch Stack Master 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 Stack ID Stack Link Master Select Power RPU Diag Cheetah Switch Workgroup-4549 Module 45 46 47 Console w it ch 10/1 0 0 6724L 3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 ES4524C ES4549 Punch-Down Block Patch Panel Wall Figure 4-2

Wiring Closet Connections 4-3 MAKING NETWORK CONNECTIONS Fiber Optic SFP Devices An optional Gigabit SFP transceiver (1000BASE-SX, 1000BASE-LX or 1000BASE-ZX) can be used for a backbone connection between switches, or for connecting to a high-speed server. Each multimode fiber optic port requires 50/125 or 62.5/125 micron multimode fiber optic cabling with an LC connector at both ends. Each single-mode fiber port requires 9/125 micron single-mode fiber optic cable with an LC connector at both ends. Warning: These switches use lasers to transmit signals over fiber optic cable. The lasers are compliant with the requirements of a Class 1 Laser Product and are inherently eye safe in normal operation. However, you should never look directly at a transmit port when it is powered on. Note: When selecting a fiber SFP device, considering safety, please make sure that it can function at a temperature that is not less than the recommended maximum operational temperature of the product. You must also use an approved Laser Class 1 SFP transceiver. Hinweis: Bei der Wahl eines Glasfasertransceivers muß für die Beurteilung der Gesamtsicherheit beachtet werden, das die maximale Umgebungstemperatur des Transceivers für den Betrieb nicht niedriger ist als die für dieses Produkts. Der Glasfasertransceiver muß auch ein überprüfbares Gerät der Laser Klasse 1 sein. 1. Remove and keep the LC port's rubber cover. When not connected to a fiber cable, the rubber cover should be replaced to protect the optics. 2. Check that the fiber terminators are clean. 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. 4-4 10 GBPS FIBER OPTIC CONNECTIONS 3.



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