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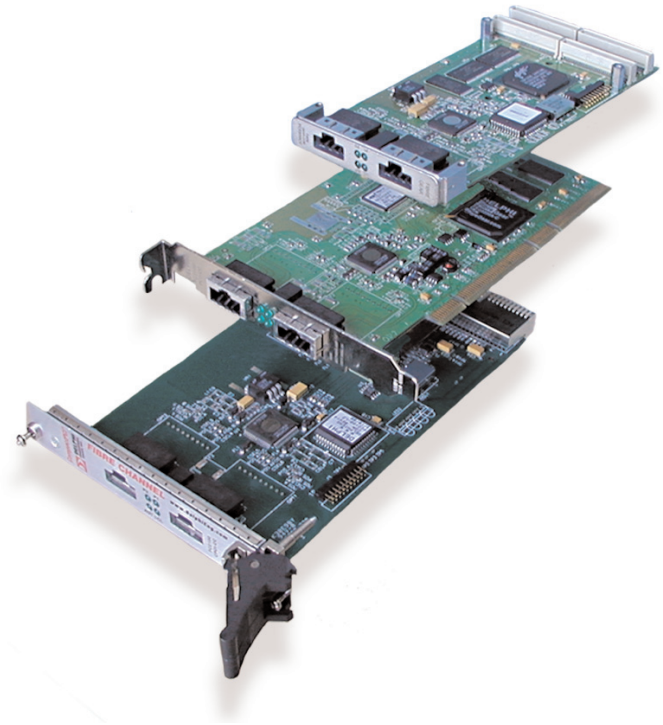
Fibre Channel HBAs

1-Gigabit Host Bus Adapters
PMC & PCI HBAs

I/O & COMMUNICATIONS

Features

- 64-bit / 66 MHz PCI/PMC
- 102.7 MB/s data transfer rate; up to 200 MB/s full duplex
- Integrated hub supports arbitrated loop, point-to-point, switched network and daisy chaining topologies
- Multiple initiator capable
- Fiber-optic and copper interface support
- RemoteDMA, SCSI target, SCSI initiator and IP protocol support on selected operating systems
- Unique high-bandwidth, low-latency firmware & software running on industry-standard QLogic® Fibre Channel controller chips

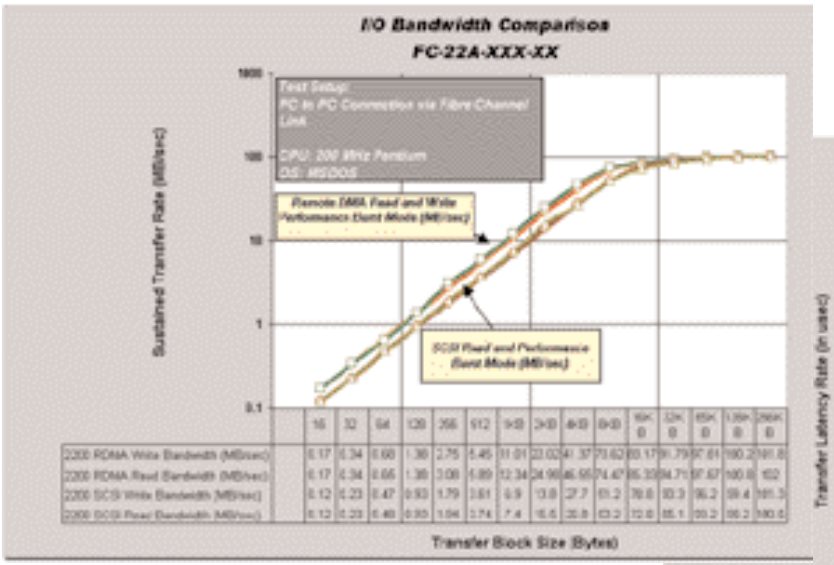


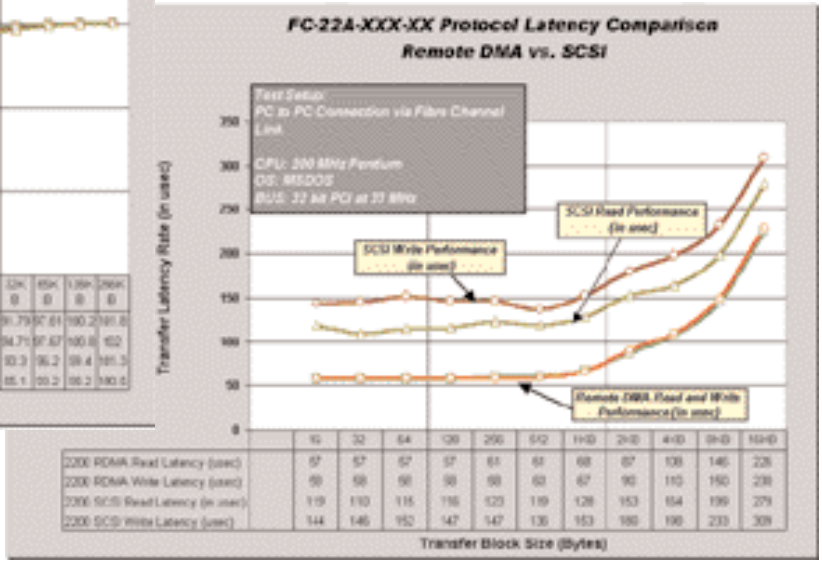
** CompactPCI HBAs not available.*

SBS' Fibre Channel PCI and PMC Host Bus Adapters (HBAs) and supporting software tools provide the high sustained throughput and low latency required for demanding real-time and storage applications. Engineered to take full advantage of industry standard Fibre Channel features and benefits, SBS HBAs incorporate unique value-added features such as an integrated three port hub (dual port HBAs only), a streamlined protocol engine, RemoteDMA protocol, and SCSI initiator and target protocol.

Optimized device drivers for various operating systems are provided for standard file system and network support. Please contact SBS for additional information and driver availability.

Performance





A Fibre Channel link operates at 1.0625 Gbits/s. After coding and packet overhead is accounted for, the effective theoretical maximum transfer rate is 103 megabytes/second (MB/s). Due to hardware architecture and software protocol issues, Fibre Channel interfaces typically achieve only 25% to 40% of maximum on a sustained basis. SBS HBA tests resulted in a sustained transfer rate of 102.7 MB/s (99.7%) over a 32-bit / 33-MHz PCI interface as well as a 200 MB/s sustained transfer rate full-duplex. SBS' Fibre Channel interface's effective data transfer rate is dependent on several factors, including data block size and protocol used.

For very large transfers, SCSI may be used with the SCSI target driver to achieve high-performance transfers. A workstation can run SCSI initiator, SCSI target, and RDMA protocols concurrently.

Three-Port Integrated Hub

Most Fibre Channel HBAs operating in an arbitrated loop topology require an external hub in order to interconnect devices on the loop. SBS dual-port HBAs, however, have standard hub features integrated into the interface module to create a simple and automatic method for supporting point-to-point, daisy-chained, and remote hub interconnects with common duplex connectors and cable. Port sense and control logic are integral parts of the Fibre Channel hub. This circuitry controls the state of the 1-Gbit/s multiplexor (MUX) devices. Software controls the way in which it operates. Typically, the external ports operate in auto enable mode. In auto enable mode, each MUX is automatically configured to admit the external port to the Fibre Channel loop whenever that port is active (valid clock and data).

The hub can also operate in manual mode. In this case, ports can be individually bypassed or selected under software control without regard to the state of the external port. Single failure redundancy is supported in point-to-point arbitrated loop, and when connected to a dual-ported RAID or JBOD.

SCSI Target Emulator Protocol

Fibre Channel is optimized to move large blocks of data between processors and storage devices. For this application, the SCSI protocol which can move data at rates over 100 MB/s is predominant. For peer-to-peer communication, Internet Protocol (IP) is most commonly used; however, it delivers only about one third the performance of SCSI when moving large blocks of data.

SBS' Fibre Channel drivers allow a computer to function as a SCSI target, achieving the maximum bandwidth for peer-to-peer communications. When running the SCSI target emulator driver, the computer appears as a disk to any SCSI initiator reading or writing it. The computer may also concurrently be both an initiator and a target, thus allowing full duplex peer-to-peer communications at aggregate data rates over 200 MB/s.

RemoteDMA Protocol

The RemoteDMA (RDMA) protocol for SBS Fibre Channel HBAs bypasses complex protocol stacks to allow data to be moved between one system and another workstation or single board computer (SBC) without using any processor cycles on the remote computer. This allows system flexibility, the highest bandwidth, and the lowest transfer latency.

RDMA provides low-latency, higher bandwidth direct memory access among multiple host computers. An initiator sends RDMA commands to a target, and the target responds to the read or write operations without requiring that any action be taken by the target CPU. Consequently, RDMA provides transparent high-speed, low-latency transfers directly into a designated buffer in the target computer's memory. In addition to enhancing performance, the RDMA protocol can be used similarly to a PCI bus extender or a reflective memory. Host devices can read or write blocks of memory or individual control registers directly to or from multiple target hosts. Remote shared memory and circular buffers can easily be created with RDMA. The target first registers a data buffer with the API. Any initiator can then read or write data anywhere within that buffer. The initiator also has control over whether the target is interrupted upon completion. If the target is given a completion notice, it is told whichnode performed the transfer, where the data was placed in the buffer and how much data was transferred. Several HBAs, together with the RDMA protocol, can be used for low-latency, high-bandwidth communication between multiple workstations or embedded computers, offering capabilities similar to reflective memory but with much higher performance. Using RDMA, each workstation can read and write directly to the other workstations' system memory.

Standard Fibre Channel Host Bus Adapters

	Model	Form Factor	Media	Ports	3-Port Hub	64-bit/ 66MHz
Dual Port HBAs	FC22A-PCI-CC	PCI	Copper	2 HSSDC	X	X
	FC22A-PCI-FF	PCI	Fiber	2 fiber	X	X
	FC22A-PMC-CC	PMC	Copper	2 HSSDC	X	X
	FC22A-PMC-FF	PMC	Fiber	2 fiber	X	X
	FC22A-CPCI-CC	CompactPCI 3U	Copper	2 HSSDC	X	X
	FC22A-CPCI-FF	CompactPCI 3U	Fiber	2 fiber	X	X
Single Port HBAs	FC22A-PCI-1C	PCI	Copper	1 HSSDC		X
	FC22A-PCI-1F	PCI	Fiber	1 fiber		X
	FC22A-PMC-1C	PMC	Copper	1 HSSDC		X
	FC22A-PMC-1F	PMC	Fiber	1 fiber		X
	FC22A-CPCI-1C	CompactPCI 3U	Copper	1 HSSDC		X
	FC22A-CPCI-1F	CompactPCI 3U	Fiber	1 fiber		X

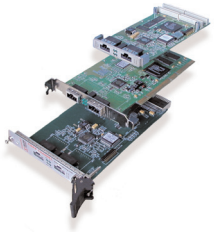
All SBS FC22A HBAs use the QLogic ISP2200A chip.
CompactPCI HBAs are no longer available (FC22A-CPI-xx & FC22A-CPCI-1x)
Single mode fiber and mixed dual port HBAs are also available.
Call SBS at (651)905-4700 for details.

Standard Copper Cable

Length	Type	Model
3-meter	HSSDC HSSDC to 9-pin D	FCC-HH-03 FCC-HD-03
5-meter	HSSDC HSSDC to 9-pin D	FCC-HH-05 FCC-HD-05
10-meter	HSSDC HSSDC to 9-pin D	FCC-HH-10 FCC-HD-10
20-meter	HSSDC HSSDC to 9-pin D	FCC-HH-20 FCC-HD-20

Standard Multimode SC Duplex Fibre-Optic Cable

Length	Model
5-meter	15-103
10-meter	15-101
25-meter	15-102
50-meter	15-104
Custom lengths up to 500 meters available	



1 Gigabit Fibre Channel

Specifications

Fibre Channel HBAs
PMC & PCI

- FC-AL-2
- FC-FS
- SCSI-FCP
- SCSI-FCP-2

PMC Host Bus
PCI & PMC

- PCI Local Bus revision 2.2
- PMC IEEE P1386.1
- CMC IEEE P1386

PCI

- Universal signalling 3.3V or 5V

Weight

- 0.10kg (3.5 ounces)

Power Requirements: +5VDC

- Dual Copper: 1.2A max; 0.9A typical
- Dual Optical: 1.7A max; 1.4A typical
- PMC Single Optical: 1.1A max; 0.8A typical

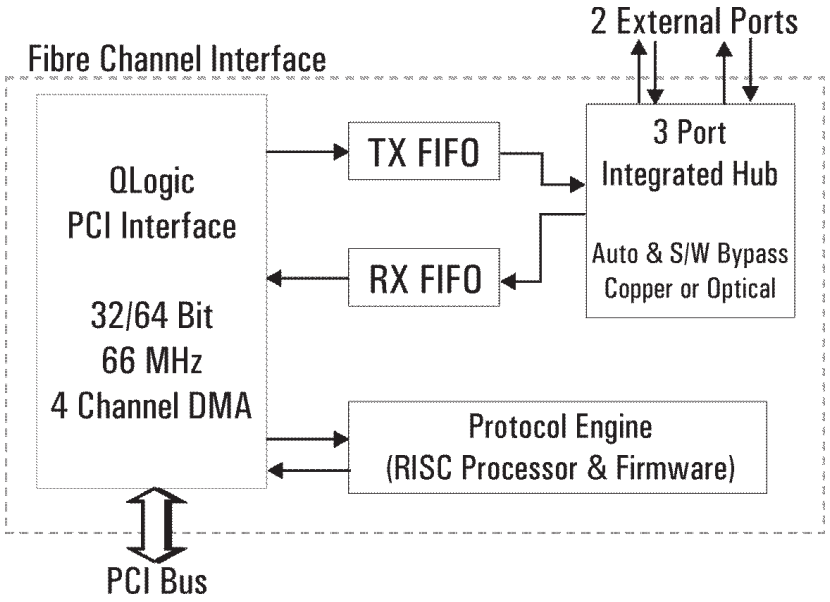
Temperature

- Operating: 0˚ to 70˚ C (commerical grade)
- Storage: -40˚ to 85˚ C
- Greater than 40˚ C operation requires adequate airflow (greater than or equal to 30 linear meters per minute)

Relative Humidity

- 5% to 95% non-condensing

Block Diagram



Software Support

- Windows NT 4.0
- Windows 2000/XP
- Linux 2.4
- LynxOS 4.0
- VxWorks 5.4

SBS Ready Driver Interoperability

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