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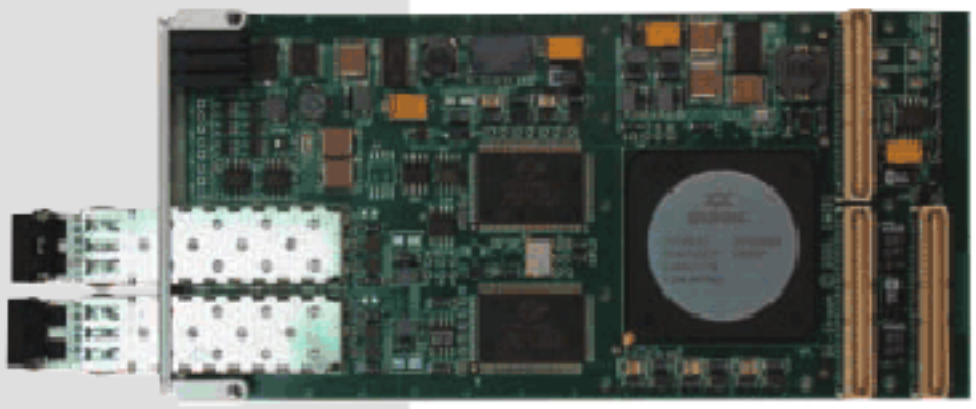
Find the *Curtiss-Wright FX400* at our website: *Click HERE*



Product Fact Sheet

FX400 Fibre Channel

- PCI-to-FC ASIC with two independent FC functions
- Dedicated RISC Engine for each FC function
- Provides the performance of two HBAs on a single HBA form factor
- Requires only one system slot
- Two independent 4.25 Gbps channels (up to 800 MBps per channel, full duplex)
- Detects 1.0625, 2.125, and 4.25 Gbps using Auto-Speed Negotiation
- FC physical media interface is SFP transceivers
- Status LEDs indicate current condition of each channel
- PMC form factor
- Available for standard commercial and harsh/rugged environments
- Provides mechanical interface to stiffener rib, located on PMC-compliant carriers, to ensure robust mechanical performance



The Curtiss Wright Controls FX400 Dual-Channel (DC) Fibre Channel PMC cards are high-performance host bus adapters (HBA) ideally suited for demanding high-bandwidth data communications and storage applications. The FX400 series of products provide support for SCSI Fibre Channel Protocol (FCP) and Internet Protocol (IP), eliminating the need to deal directly with the FC interface. In addition, the FX400 DC cards feature two separate high-performance RISC I/O engines to minimize host CPU overhead. The superior communication and interconnect capabilities of the FC standard are maximized by Curtiss-Wright Controls' FX400 DC cards.

The FX400 DC cards incorporate the functionality of two independent FC 4.25 Gbps channels on a single HBA. This compact design minimizes the number of required host computer slots, while providing the performance of two separate HBAs. As a result, an efficient Fibre Channel (FC) system is established using only a minimal number of Single Board Computers (SBC) or PMC slots.

Each channel on the FX400 DC card is capable of sustaining a 400 MBps transfer rate, and up to 800 MBps transfer rate in full duplex, thus achieving 1600 MBps in combined throughput. In addition, both channels on the FX400 DC card support 1.0625 Gbps, 2.125 Gbps, and 4.25 Gbps rates, automatically detecting and switching to the appropriate rate using Auto-Speed Negotiation. This feature enables the FX400 cards to interoperate with existing FC devices at 1.0625 Gbps and 2.125 Gbps, and provides seamless transition to higher performance 4.25 Gbps devices.

For more information on this product or our other high-integrity computing solutions:
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Since the physical media interface of the FX400 Dual Channel design uses Small Form-factor Pluggable (SFP) transceiver modules they can be hot swapped, providing an efficient way to modify the media interface configuration as needed. Since the dual channels on the FX400 cards are completely separate functions, changing an SFP transceiver module can be done without requiring any downtime of the unmodified channel. Therefore, a short wavelength fiber-optic transceiver in Channel A could be replaced without disrupting any active transactions occurring on Channel B.

Multi-protocol driver software

- Combined File System SCSI, Raw Initiator SCSI and Internet Protocol functions maximize data throughput and board functionality
- Supports interoperability between a variety of computing platforms and operating systems
- Drivers provide a direct link to application for improved performance
- Fabric Switch support provides reliable fault-tolerant connections via the Fibre Channel fabric

Multiple Topology Support

The FX400 card can be utilized in a variety of topologies, enabling you to make the best use of the connection bandwidth and system resources. With the added capability of the multi-protocol driver software, FX400 boards provide a flexible, custom tailored solution for your application. In a *switched fabric topology*, a central Fibre Channel fabric switch is used to receive data from the sending nodes and then route it to the appropriate receiving nodes in the system. Each node is responsible only for its own point-to-point connection with the switch. Because the switch handles the arbitration of multiple point-to-point connections simultaneously, this is often referred to as a "scaled bandwidth" topology.

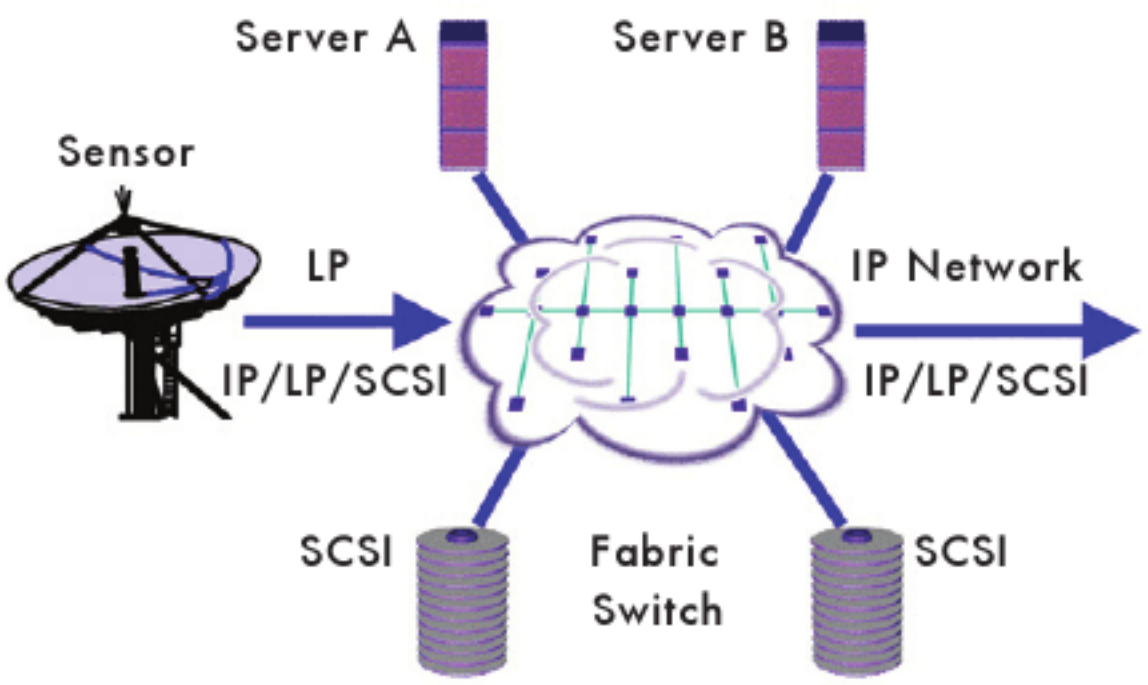
In an *arbitrated loop topology* individual nodes share access to the Fibre Channel loop, but use the full bandwidth of the connection once they have made a logical point-to-point connection with another node in the loop. Only one pair of nodes can communicate at a time. This "shared bandwidth" topology provides a low-cost solution when multiple devices need to share the full bandwidth of the Fibre Channel connection.

Multiple Protocol Support

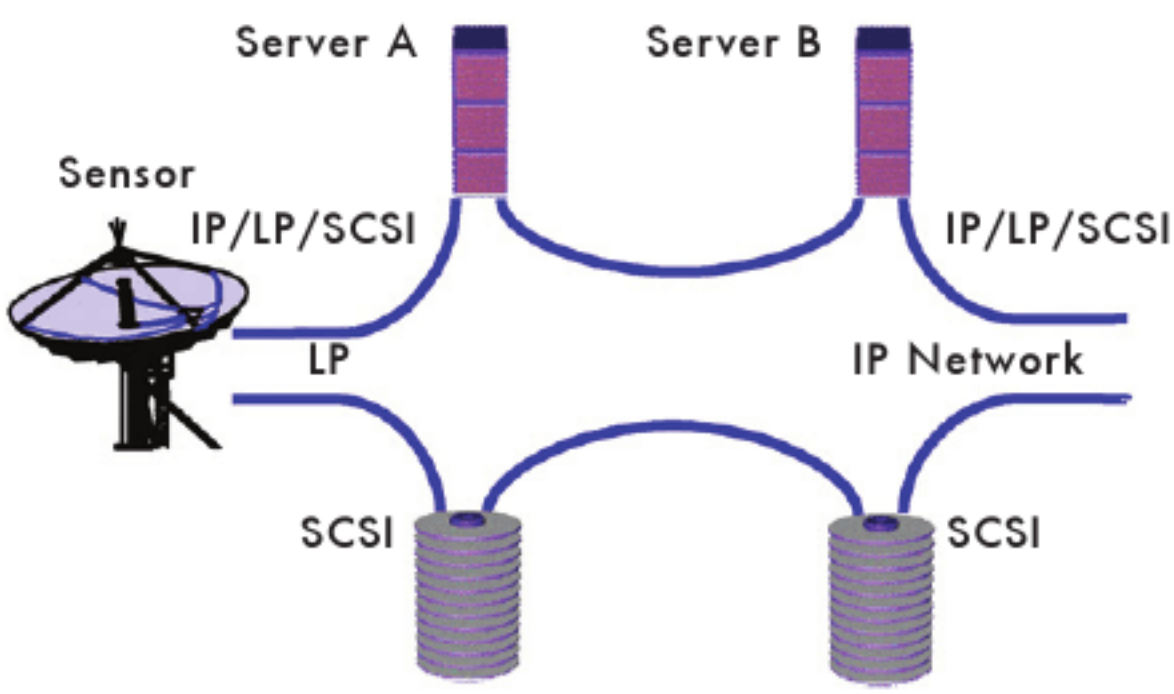
FX400 multi-protocol drivers combine the functionality of IP, File System SCSI and Raw Initiator SCSI into a single, powerful driver system. This provides increased functionality in individual FX400 adapters. With the multi-protocol feature, application software can communicate with a SCSI device using File System SCSI or RI; and communicate with other devices using IP – simultaneously!

File System SCSI and IP, respectively, are the two most commonly utilized drivers in mass-storage and networking communications today. While both File System SCSI and IP enjoy broad-based usage, they can produce data collisions and latencies caused by time-consuming layers of protocol.

Switched Fabric Topology



Arbitrated Loop Topology



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Raw Initiator SCSI is a highly optimized driver that maximize bandwidth utilization and deliver high-throughput and deterministic low latency performance.

The Raw Initiator SCSI driver is designed for mass-storage communication, providing performance characteristics not found in other mass storage interfaces. Although applications generally access the disk through the OS file system, the RI driver bypasses this file system dramatically improving performance to the storage system. Software drivers are currently available for VxWorks and Linux Operating Systems.

Fibre Channel Interface

The FX400 provides dual-FC interfaces with the following features per channel:

- Implemented using Q-Logic EP-2422 PCI-to-FC controller ASIC
- 1.0625, 2.125 or 4.25 Gbps Full-Duplex FC data rate
- 200 MBps and 400 MBps and 800 MBps (Full-Duplex) data rate (per channel)
- Auto-Speed Negotiation
- Switched Fabric, Arbitrated Loop, and Point-to-Point support
- Full-Duplex and Dynamic Half-Duplex support
- 4-Gbps FC increases aggregate throughput rates to 1.6 GBps in full-duplex mode.
- 200,000 IOPS delivers high I/O transfer rates for storage applications
- Intelligent interleaved DMA (ilDMA) ensures maximum utilization of all data links.
- Out-of-order frame reassembly (OoOFR) reduces congestion and I/O re-transmissions.
- Supports diagnostic monitoring interface (DMI) for detailed transceiver information.
- T10 cyclic redundancy check (CRC) ensures end-to-end data integrity across SANs.
- Overlapping protection domains for continuous protection on internal data paths.
- Optional error correcting code (ECC) protection for control structures.
- Cisco VSAN frame tagging allows physical ports to be part of multiple logical networks.
- Multi-ID and N Port virtualization allows single port to acquire multiple N_Port IDs.

Also available in extended temperature and conduction-cooled versions.

Host PCI Interface

The FX400 DC products have the following PCI interface:

- 33/66 MHz PCI clock rate
- 66/100/133 MHz PCI-X clock rate
- 32 or 64-bit data path
- 64-bit addressing
- PCI specification 2.3
- PCI –X Revision 1.0a compliant
- 528 MBps burst transfer data rate at 64-bit, 66 MHz
- 1.064 GBps burst transfer data rate at 64-bit, 133 MHz
- Zero-wait-state transfers with cache line streaming
- Fewer than one interrupt per command completion
- Independent DMA channels for receive, transmit and command
- Programmable priority for the DMA channels
- Dual-address cycle capable power management registers
- 3.3 V PCI signaling levels

Hardware Specifications	
Hardware Compatibility	PCI-X Revision 1.0a PCI Local Bus Revision 2.2 PMC IEEE P1386.1 CMC IEEE P1386
Physical Dimensions	2.915 in by 5.866 in (74 mm by 149 mm)
Weight	≈ 0.25 pounds (115 grams)
Operating Voltage	.4.75 V to 5.25 V
Power Dissipation	7.25 W Peak at 5 V 0.00165 W Peak at 3.3 V
Electrical Requirements	Supply: +5 VDC, 1.429 Amps Peak
	PCI Signaling: +3.3 V
Storage Temperature Range	-40 to +85°C
Operating Temperature Range	+0 to +50°C
Storage Humidity Range	5% to 90% (noncondensing)
Operating Humidity Range	20% to 80% (noncondensing)
Network Line Transmission Rate	1.0625, 2.125, or 4.25 Gbps
Fibre Channel ASIC	Q-Logic EP-2422
Mean Time Between Failure (MTBF)	Short wavelength laser: 241,637 hours**

** These MTBF numbers are based on calculations using MIL-HDBK-217F, Appendix A, for a ground-benign environment.

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