VMFC-2230

Fibre Channel

Adapters for PMC and PCI

VMETRO

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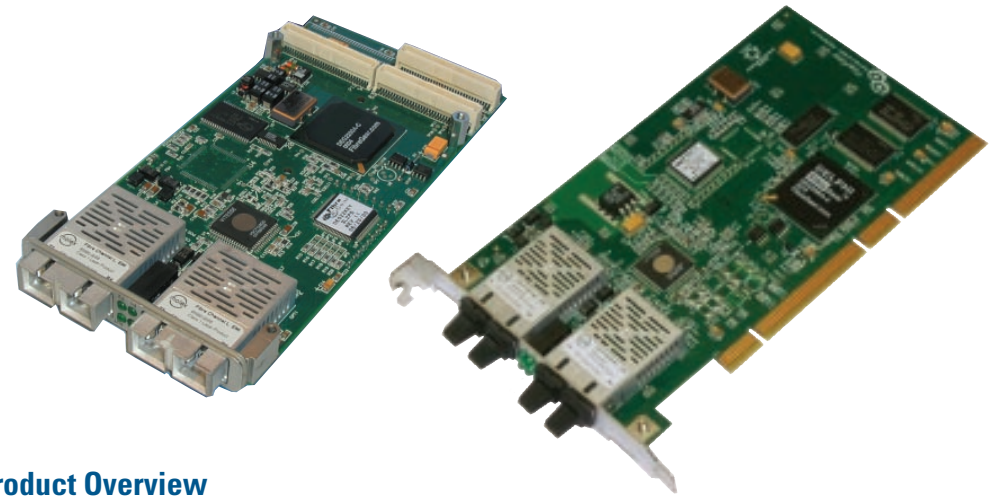
Fibre Channel Adapters for PMC and PCI

Features:

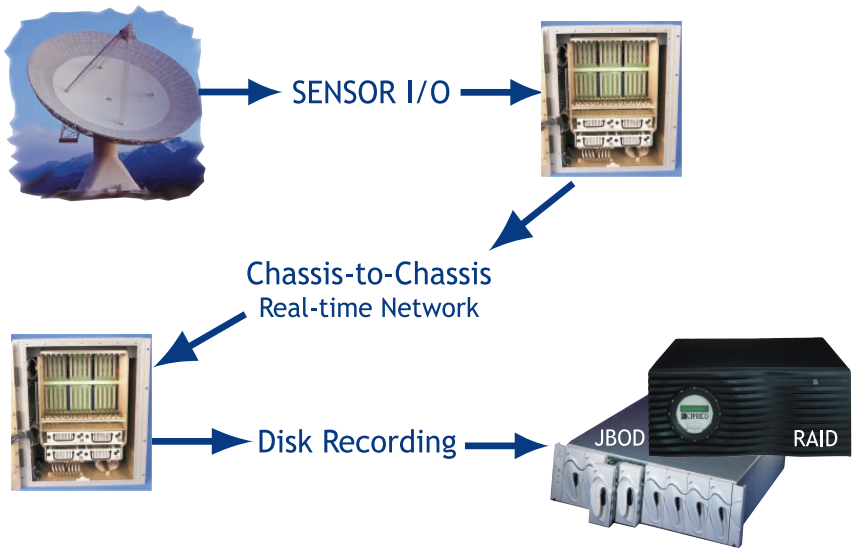
- Sustained 100+ MBytes/sec transfer rate in both directions
- Onboard protocol engine minimizes host intervention, 40% more powerful compared to previous models
- Full Fibre Channel protocol and topology support, Switched Fabric, Arbitrated Loop and Point-to-Point
- Under-the-hood control of the Qlogic FC chip gives transfer rate close to the theoretical possible on Fibre Channel
- "Integrated Hub" with dual optical ports simplifies system configuration and allows redundancy
- Bus mastering 66 MHz 64-bit PCI with DMA
- Dual Copper, Dual Fiber Optic or combined configurations
- 30 m cable length with copper, 10 km possible with optical I/F
- Full suite of flexible driver software
- VxWorks® driver for PowerMIDAS and PowerPC SBCs
- Windows NT driver for workstation integration
- MC/OS™ API for RACEway/ RACE++ computers (MIDAS RX)
- Best performer in the 1Gb/s FC market today!



Product Overview

The VMFC-2230 is a third generation Fibre Channel Adapter from VMETRO, available in PMC and PCI form factors. It utilizes the QLogic ISP2200 chip that manages full duplex communication. VMFC-2230 is specifically designed to maximize throughput while minimizing transfer latency and host processor overhead in embedded real-time applications. In addition to mainstream Fibre Channel applications such as disk storage, this interface is particularly well suited to applications where low latency communications and high sustained throughput are essential. This includes areas such as multi-processor communications (telecom & radar signal processing), sensor I/O (radar, sonar & image processing), and ultra-high performance computer networks (digital broadcasting & subsystem to subsystem data links). The high-speed, on-chip RISC processor and high-level software interface enable the controller to complete multiple I/O operations without host intervention.

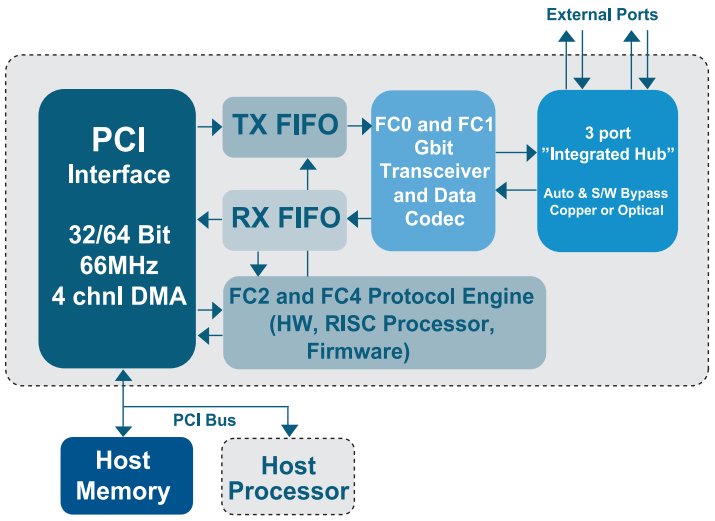
VMFC-2230 applications:



FC Protocol Support

The QLogic ISP-2200 with an integrated RISC Processor and associated firmware is used to perform the majority of the interface management tasks. The firmware is placed on the card by the host driver which makes field upgrades simple. The VMFC-2230 supports all the FC topologies: Point-to-Point, Arbitrated Loop and Switched Fabric.

The SCSI driver supports multiple initiators and targets, intended for storage and network applications as well as for peer-to-peer communication.



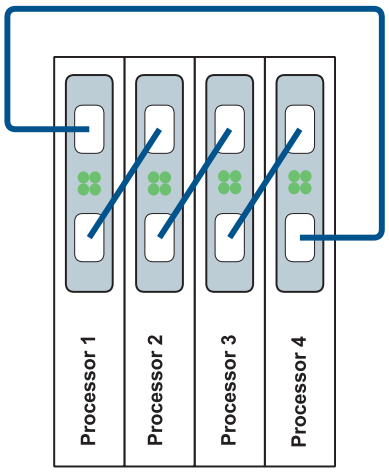
Block diagram, VMFC-2230 Fibre Channel PMC module.

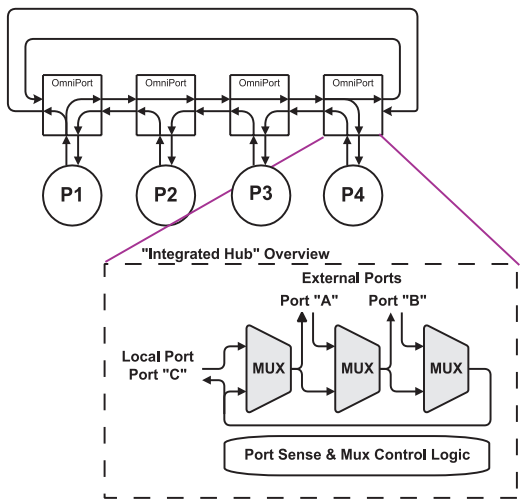
Integrated Hub

Typically, Fibre Channel ports operating in an Arbitrated Loop topology require separate simplex connectors for both transmit and receive channels or the use of duplex connectors and an external Hub (so as to interconnect the devices on the loop). However, the VMFC-2230 incorporates integrated standard Hub features to create a simple and automatic method for supporting point-to-point, daisy chained, and remote hub interconnects with common duplex connectors and cables. An integral part of the Fibre Channel hub is the port sense and control logic. This circuitry controls the state of the 1 Gbit/sec mux devices. The manner in which it operates is controlled through software. Typically, the external ports operate in an "Auto Enable" mode. In this mode, each multiplexer is automatically configured to admit the external port to the Fibre Channel loop whenever that port is active (valid clock & data). The hub can also operate in a manual mode. In this mode, ports can be individually bypassed or elected under software control without regard to the state of the external port.

Integrated hub "OmniPort":

Enhanced Reliability, any single failure will not interfere with the operation of the loop.





Configurations

The VMFC-2230 Fibre Channel Adapter is available in three configurations according to the media interface options:

1) with two HSSDC copper connectors,

2) with two SC Duplex fiber optic connections, or

3) in a "combo" version with one HSSDC copper and one SC Duplex fiber optic connection.

The third option allows for media conversion to take place through a module.

Performance

The VMFC-2230 Fibre Channel link operates at 1.0625 Gbits/sec. After coding and packet overhead is accounted for, the effective theoretical maximum transfer rate is 103 MBytes/sec. Due to hardware architecture issues, Fibre Channel interfaces typically achieve only 25% to 40% of the maximum rate on a sustained basis. A sustained transfer rate of 102.7 MBytes/sec (99.7%) has been demonstrated memory to memory. The effective transfer rate of the VMFC-2230 Fibre Channel Adapter is dependent on several factors. The most important factors are data block size and protocol. The following graphs show the relationship between sustained transfer rate and latency for different data transfer block size in comparison with the VMFC-2100.

VMFC-2230 Software Support

Loop switches for 1 Gbit/sec networks

When an arbitrated loop network becomes saturated or the application demands more than the 100 Mbit/sec accumulated bandwidth, the only solution is to introduce a switch. Generally a switch lets several pairs of nodes in a network to communicate to each other at the same time. The physical loop topology does not allow for this. The FC_AL protocol was made to communicate on such a loop. However it is not necessary to make the full step to fabric switches, changing all the host adapter software and drivers in order to change to the FC_SW protocol. As the FC_AL protocol is not restricted to a loop topology, a new breed of switches has become available, i.e. the Loop Switches. They operate entirely on the FC_AL protocol. They actively intercept the protocol, but the devices are not aware of it. They can transparently be put in place of a hub. The switch is totally plug-and-play, and the full additional bandwidth is available immediately without changing software or any settings in the loop network. The Loop Switch is able to direct traffic between several nodes concurrently, all the time only using only the proven FC_AL protocol. This is really good news for "legacy" equipment that is inherited in the growth-path, such as storage devices, host adapters and indeed protocols and software. The loop switch can be seen as a circuit switch as compared to the Fabric Switch, which is packet switched. The two nodes that talk to each other have a fixed connection through the network for the duration of the transfer. For long transfers, typically point-to-point streaming, buffer transfers and storage traffic, the Loop-Switch is more efficient than a fabric switch due to the low overhead of each transfer.

FC-AL SCSI API and library for VxWorks & Windows NT

The FC-AL SCSI Library is an API supporting real-time network, point-to-point and disk applications using the VMFC-2230 Fibre Channel Adapter. Arbitrated loop with multiple initiators and targets is supported. The FC-AL SCSI API and Library is offered for VxWorks with VMETRO's PowerMIDAS (i960RN) and Motorola MVME2X00 series of PowerPC single board computers, and Windows NT workstations.

The FC-AL SCSI API and Library provide functions for sending and receiving SCSI commands which can be used to support both disk and networking (or point-to-point) applications. Both synchronous and asynchronous accesses may be implemented. For disk applications, the application programmer has to build the SCSI commands and post it to the controller using one of the API functions. Any SCSI, SCSI-2 or SCSI-3 command or even device specific commands may be implemented. The application programmer is required to understand how to build SCSI commands (refer to SCSI specifications). Example source code is supplied which implements common SCSI commands (like inquiry, modesense, modeselect, read, write, seek, format). The API also provides functionality for allowing the application to take the role of a SCSI target device. This feature may be used for debugging an initiator device.

Related Products

MIDAS RX2 API for Mercury MC/OS, RACE++ and RACEway

MIDAS RX2 is a complete I/O solution with HW and SW for the RACE™ series of real-time multicomputers from Mercury Computer Systems, Inc. Based on the PowerMIDAS family from VMETRO, MIDAS RX2 provides a ready-to-run API for MC/OS and RACE++/RACEway. Fibre Channel is used in two MIDAS RX2 products: RX2-MDR offers Fibre Channel RAID or JBOD ("Just a Bunch of Disks") high-speed disk storage and RX2-FCNET offers a Fibre Channel Network interface.

MDR - MIDAS Data Recorder Subsystem for VMEbus

MDR is a family of VMEbus-based sub systems that form complete ready-to-run real-time Data Recorders or Playback modules based on RAID or JBOD storage. The MDR products are self-contained subsystems based upon VMETRO's MIDAS boards and PMC modules (FPDP and others), intended to be integrated into a customer's VME chassis. Refer to separate data sheets for the MIDAS RX2 and MDR products.

Ordering Information

PMC:

VMFC-2230-DC
Fibre Channel PMC module
Dual Copper Interface (HSSDC)

VMFC-2230-CF
Fibre Channel PMC module
Copper & Fiber Optic Combined Interface (HSSDC/SC Duplex)

VMFC-2230-DF
Fibre Channel PMC module
Dual Fiber Optic Interface (SC Duplex)

PCI:

VMFC-2230P-DC
Fibre Channel PCI module
Dual Copper Interface (HSSDC)

VMFC-2230P-CF
Fibre Channel PCI module
Copper & Fiber Optic Combined Interface (HSSDC/SC Duplex)

VMFC-2230P-DF
Fibre Channel PCI module
Dual Fiber Optic Interface (SC Duplex)

Accessories:

Fibre Channel HSSDC Copper Cables

FCC-HH-005	0.5 meter (1.6 ft)
FCC-HH-03	3 meter (9.8 ft)
FCC-HH-05	5 meter (16.4 ft)
FCC-HH-10	10 meter (32.8 ft)
FCC-HH-20	20 meter (65.6 ft)

25 and 30 meter are special orders

Fibre Channel HSSDC to DB9/M Plug Copper Cables

FCC-HD-03	3 meter (9.8 ft)
FCC-HD-05	5 meter (16.4 ft)
FCC-HD-10	10 meter (32.8 ft)
FCC-HD-20	20 meter (65.6 ft)

25 and 30 meter are special orders

Fibre Channel HSSDC to DB9/F Receptacle adapter

FCC-HAD	0.5 meter (1.6 ft)

Fibre Channel Fiber Optic Duplex Cables (SWL, Dual SC connectors)

FCC-FF-05	5 meter (16.4 ft)
FCC-FF-10	10 meter (32.8 ft)
FCC-FF-20	20 meter (65.6 ft)
FCC-FF-30	30 meter (98.4 ft)

Fibre Channel DB9/M Plug to DB9/M Plug

FCC-DD-03	3 meter (9.8 ft)
FCC-DD-05	5 meter (16.4 ft)
FCC-DD-10	10 meter (32.8 ft)
FCC-DD-20	20 meter (65.6 ft)

Specifications

Standards
PCI local Bus rev. 2.2, 64bit/66MHz
PMC IEEE P1386.1
CMC IEEE P1386
FC-AL-2 (rev 6.4)
FC-FLA (rev 2.7)
FC-PLDA (rev 2.1)
FC-TAPE (rev 1.13)

Features
FC Class 2 and 3 service
FL-PORT and F-PORT fabric login
SCSI initiator and target modes
3 channel DMA
Full duplex 200 MBytes/sec sustained in all FC topologies
FCP-SCSI
Based on QLogic ISP2200 chip

Operating Temperature
0 to +50 °C (>40 °C operation requires adequate airflow, 100 LFPM)

Storage Temperature
-40 to +85 °C

Humidity
5% to 95% non condensing
(Rugged/extended temperature versions available. Please consult factory.)

Software Products, VMFC-2xxx Device Driver

VxWorks, i960, PowerMIDAS

FC225-DRV-VXM9-L	Run-Time License
FC225-DRV-VX9M-B	Project License, Binary Code

VxWorks, PPC, MVE-23xx

FC225-DRV-VXP-L	Run-Time License
FC225-DRV-VXP-B	Project License, Binary Code

Windows NT4.0

FC225-DRV-WNT-L	Run-Time License
FC225-DRV-WNT-B	Project License, Binary Code

For hubs, switches, RAIDs and JBODs, please contact VMETRO.

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