



V/Ethernet 4207 Eagle

Ethernet 32-bit Protocol Platform

Interphase Corporation's V/Ethernet 4207 Eagle is an ultrahigh-performance Ethernet 32-bit Protocol Platform for the VMEbus. A partitioned architecture enables the Eagle's 68020 microprocessor to efficiently execute complex layered protocols while it receives or transmits Ethernet packets. And, with the proprietary BUSpacket Interface, the V/Ethernet 4207 Eagle can transfer data over the VMEbus at rates in excess of 30 MB/s.

The V/Ethernet 4207 Eagle is designed for high-traffic applications, such as file servers or Ethernet ports on mini-supercomputers. Because the Eagle has the facilities on-board to efficiently execute protocol firmware it can maximize node throughput. This can provide significant system performance improvements because in most systems the protocol software determines the throughput of the entire network.

The V/Ethernet 4207 Eagle is a member of the Interphase family of products for the VMEbus and represents Interphase's continuing commitment to design excellence and superiority in:

- Performance
- Reliability
- Ease of integration
- Application Support

The V/Ethernet 4207 Eagle is but one element in an array of Interphase products that provides a comprehensive approach to the development of high-performance VMEbus systems.

PARTITIONED ARCHITECTURE

The Eagle's performance is a result of its partitioned architecture that allows the 68020 microprocessor, the Ethernet interface electronics, and the VMEbus interface to all function both simultaneously and independently. Thus, the Eagle may transmit or receive an Ethernet packet at the same time as it transfers data to or from the system memory over the VMEbus, and simultaneous with its microprocessor executing protocol firmware.

Powerful 68020 Microprocessor

The V/Ethernet 4207 Eagle provides true 32-bit processing because it has a 68020 microprocessor running at 16 MHz along with full 32-bit RAM arrays and internal data buses. To utilize the processing power of this on-board 68020, protocol software for layers 3 & 4 can be downloaded to and executed on the V/Ethernet 4207 Eagle.

RAM

As part of its partitioned architecture, the Eagle has two independent 32-bit wide RAM arrays. The first, a 128 KB scratch pad (512KB optional), is for the exclusive use of the 68020. The second, a half megabyte quad-ported communication buffer, can be accessed by the 68020, the Ethernet interface, the VMEbus Slave interface, and the VMEbus Master interface.

The 128 KB of zero wait state RAM on the V/Ethernet 4207 Eagle is used exclusively by the 68020 as an execution RAM and as a scratchpad. Unlike other node controllers that force the CPU, the host, and the Local Area Network Controller for Ethernet (LANCE) to contend for the same RAM, this dedicated RAM on the Eagle enables the 68020 to continue executing instructions, even when access to the communication buffer RAM is limited because of network or VMEbus activity.

The V/Ethernet 4207 Eagle also has a 512 KB communication buffer RAM. It serves as a buffer, decoupling network activity from both VMEbus activity and the execution of protocol firmware. It can be accessed by the LANCE, the 68020, and the host CPU via the VMEbus through both Slave and Master Interfaces.

UNIQUE PIPELINE REGISTER

The Eagle implements the low level Ethernet interface with the LANCE and the Serial Interface Adapter (SIA). The LANCE/SIA pair provides control for layers 1 & 2 of the Ethernet and IEEE 802.3 specifications.

Unfortunately, in many designs of other Ethernet node controllers, the LANCE's inability to relinquish control of the bus, while it is transmitting or receiving a packet, can adversely affect the overall performance of the Ethernet node controller. The Eagle resolves this problem by interposing a set of pipeline registers between the LANCE and the local bus. The pipeline registers, unique to the V/Ethernet 4207 Eagle, provide fast interleaved access to the 512 KB communication buffer RAM. This improves overall controller throughput because the LANCE is not allowed to monopolize the RAM or the local bus.

BUSpacket INTERFACE

The same engineering expertise that originally developed the BUSpacket InterfaceSM for high-performance disk controllers has now applied this proprietary technology to the V/Ethernet 4207 Eagle. With its 1 KB BUSpacket FIFO, the Eagle can transfer data over the VMEbus (in DMA mode) at data rates in excess of 30 MB/s. Thus the Eagle conserves VMEbus bandwidth for use by other system processes.

INCREASED FLEXIBILITY

The three data transfer modes of the V/Ethernet 4207 Eagle let the system architect select the mode that optimizes data movement in a particular application. While other Ethernet node controllers can operate in only one data transfer mode, the V/Ethernet 4207 Eagle can operate in three: DMA, Slave, and Mixed modes.

DMA Mode

In the DMA Mode, the V/Ethernet 4207 Eagle operates as a VMEbus Bus Master. Under command from the host CPU, the Eagle moves data over the VMEbus to and from the 512 KB communications buffer at rates in excess of 30 MB/s. The Eagle can also optimize the performance of the system's memory management scheme by performing a scatter/gather function during these DMA transfers.

Slave Mode

In the Slave mode, the 512 KB of RAM is accessible over the VMEbus by any VMEbus Master. In this mode it appears as fast (300 nsec) system memory on the VMEbus.

Mixed Mode

Unique to the V/Ethernet 4207 Eagle is the ability to mix these two data transfer modes. By allowing the system architect to mix the use of DMA and Slave modes, access to the 512 KB communication RAM buffer can be optimized for each transaction. A typical scenario would be for the host to access certain header packets in Slave mode to determine which process the message is addressed to and then command the Eagle to transfer the bulk of the data in DMA mode using its ultrafast BUSpacket Interface. This mixing of the access modes to the communication buffer opens up yet another area in which the system architect can optimize system performance.

HARDWARE DRIVERS IN FIRMWARE, ON-BOARD IN EPROM

The on-board EPROM contains a proprietary real-time executive and a command queuing software interface. This includes a simple monitor and drivers for all of the on-board hardware. This firmware and an optional serial port ease the task of porting protocols to the platform.

EASY TO DESIGN IN

Interphase provides two powerful resources with the V/Ethernet 4207 Eagle or any of the other Interphase family of products. Unique to Interphase and available to you are services of the:

- Design Assistance Group
- Applications Engineering Group

Both of these groups are available to help solve problems, to resolve system design issues, or to design and build complete systems. Seasoned professionals are always available to help with any phase of your project. From recommending parameter settings and software drivers, to consulting on the most difficult system design problems, members of these two groups can virtually become part of your staff.

FUNCTIONAL FEATURES

Architectural Considerations:

- Cleanly Partitioned Architecture
- On-board 68020 Microprocessor Operating at 16 MHz
- 128 KB Downloadable Zero Wait State Execution/Scratchpad RAM (512 KB Optional)
- 512 KB Multi-ported Communication Data Buffer RAM
- 64 KB EPROM Program Storage
- 32 Bytes Nonvolatile RAM for Ethernet Node Address

- Proprietary Real-time Executive and a Command Queuing Software Interface in On-board EPROM
- Firmware Drivers for On-board Hardware Resident in EPROM
- Optional Asynchronous Serial Port and EPROM Monitor to Aid in the Porting of Protocol Software
- BUSpacket Interface to the VMEbus with DMA Data Rates over 30 MB/s
- Scatter/Gather Capability

VMEbus Considerations:

- Double High VMEbus Card
- VMEbus Bus Master Data Transfers:
 - 8-, 16-, and 32-bit Data Transfers
 - 24- and 32-bit Data Addressing
 - Software Programmable Address Modifiers
 - Programmable Burst Rates from 1 to 256 Transfers
- VMEbus Slave Data Transfers:
 - 8-, 16-, 32-bit Data Transfers
 - 24- and 32-bit Data Addressing
 - Address Modifiers: Supervisor or Non-privileged, Standard or Extended Data Access (3D, 39, OD, 09)

- Control/Status Transfers:
 - 8-, 16-, and 32-bit Data Transfers
 - 16-bit Data Addressing
 - Address Modifiers: Supervisor or Non-privileged Short Access
- Software Programmable Interrupt Levels (1 - 7)
- Software Programmable Interrupt Vectors

ETHERNET Considerations:

- Compatible with Ethernet (Rev. 1.0 or 2.0) and IEEE 802.3 (Rev. D)
- Unique Node Address Assigned by IEEE
- On-board Ethernet/Thin Ethernet Cable Interface

THE NEXT STEP

Interphase is ready to help you get your system up and running. Just ask us to send you an Evaluation Reference Guide for the V/Ethernet 4207 Eagle. The Evaluation Reference Guide contains specifications and operational information to help you better understand the capabilities of the V/Ethernet 4207 Eagle.

Or, even better, ask us to send you the V/Ethernet 4207 Eagle as part of our First Time User Program. Under this program, you will receive a complete User's Guide and a V/Ethernet 4207 Eagle board to evaluate for 90 days. And the Applications Engineering Group will be available to help and to answer any questions.

Call us today or complete the enclosed card to take the next step. There is no obligation – except to yourself – to check out the high-performance value of the V/Ethernet 4207 Eagle from Interphase Corporation.

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