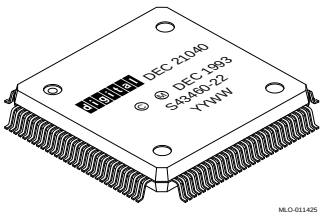
DECchip 21040 Ethernet LAN Controller for PCI
Product Brief

November 1993

digital



Description

The DECchip 21040 Ethernet LAN Controller for PCI is a single chip master direct memory access (DMA) Ethernet LAN controller with a direct interface to the PCI local bus. It supports full duplex, and its unique design is optimized to reduce the host bus utilization.

The 21040 is highly integrated to support 10BASE5, 10BASE-T, or 10BASE2 network connections. It is a high-performance device designed for PCI-based systems. The 21040 is supported by a variety of software drivers and therefore offers a complete solution for all the leading networking environments.

Features

- Offers a single-chip Ethernet controller for PCI local bus
  - Provides glueless connection to PCI bus
  - Contains on-chip integrated attachment unit interface (AUI) port and a 10BASE-T transceiver
- Supports full duplex operation
- Provides PCI clock speed up to 33 MHz, with no wait states
- Enables powerful on-chip DMA with programmable, unlimited burst size providing for low CPU utilization
- Implements unique, patent-pending intelligent arbitration between DMA channels preventing underflow or overflow and optimized for full duplex
- Contains two large (256-byte) independent receive and transmit FIFOs
- Supports either big or little endian byte ordering
- Implements JTAG test access port with boundary-scan pins
- Provides full support of IEEE 802.3, ANSI 8802-3, and Ethernet standards
- Offers a unique, patented solution to Ethernet capture effect problem
- Contains a variety of flexible address filtering modes
  - 16 perfect addresses or
  - 512 hash-filtered multicast addresses and one perfect address or
  - 512 hash-filtered physical addresses and multicast addresses
  - Inverse perfect filtering
- Provides serial ROM interface for Ethernet ID address ROM
- Supports three LEDs: network activity, LinkPass, and AUI/10BASE-T
- Enables automatic detection and correction of 10BASE-T receive polarity
- Provides external and internal loopback capability
- Implements low power, 3.3 V complimentary metal oxide semiconductor (CMOS) device, interfaces to 5.0 V or 3.3 V logic

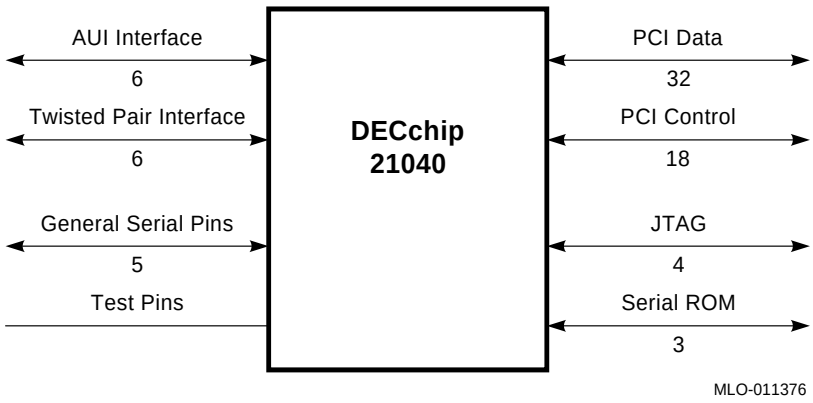
21040 Microarchitecture

The 21040 communicates with the host processor using on-chip command and status registers, and a shared host memory area. Most of the required setup and initialization is done after power-up. The 21040 software interface and data structures are optimized to remove load from the host CPU and to allow for maximum flexibility in the buffers descriptor management. In normal operation, very little host CPU intervention is required. The 21040 filters out runt frames and does not need to reload the FIFO following collision, thereby minimizing bus traffic.

On the network side, the 21040 provides a direct interface to the AUI and 10BASE-T connections. The 21040 sustains full-line speed reception and transmission. The dual on-chip 256-byte FIFOs and the internal microarchitecture provide complete support for full duplex operation.

Figure 1 shows the functional groups of 21040 interface pins.

Figure 1 21040 Pin Interface



System Applications

The 21040 is optimized for PCI-based systems. A direct connection to 10BASE-T is made through the twisted-pair port. From the AUI port, the 21040 can connect to 10BASE2, 10BASE5, or 10BASE-F using the appropriate media access unit (MAU) and circuitry. The 21040 is a high performance, highly-integrated solution for a variety of applications, such as:

- Minimum-size, cost-effective PCI-to-Ethernet adapter card
- Minimum space, cost-effective integrated PCI motherboard controller
- PCI-based, switched Ethernet or multiport Ethernet bridge

Figure 2 shows the PCI-to-Ethernet adapter card using the 21040.

Figure 3 shows the PCI Motherboard system with the 21040.

Figure 4 shows the PCI-based bridge and switch using the 21040.

Figure 2 PCI to Ethernet Adapter Card

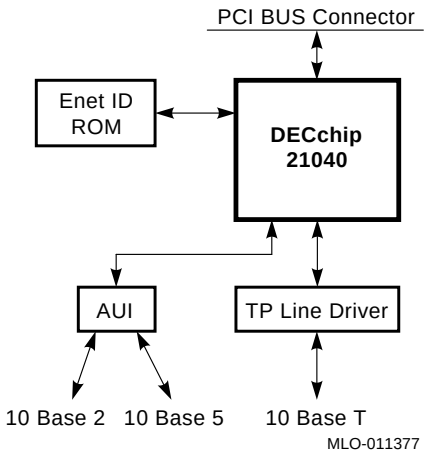


Figure 3 PCI Motherboard System

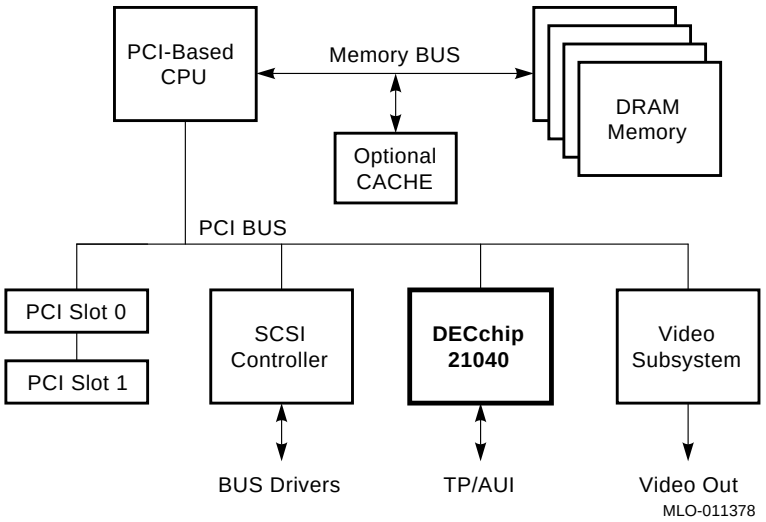
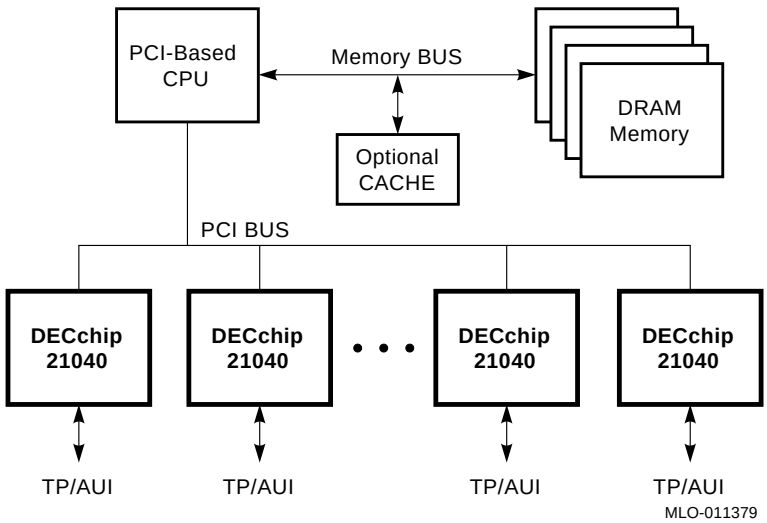


Figure 4 PCI-based Bridge and Switch



Complete Solution

Supporting hardware and software products and tools are available for the 21040 to provide a complete solution.

The following evaluation boards are available:

- PCI adapter to 10BASE-T
- Extended Industry Standard Architecture (EISA) adapter to 10BASE-T, 10BASE5, and 10BASE2
- Ethernet on PCI motherboard

Software drivers for network operating systems will be provided, including Novell, Windows NT, DOS, various versions of UNIX, and others.

digital

21040 Characteristics

Power Supply	VDD = 3.3 V VDD_CLAMP = 5 V or 3.3 V
Operating Temperature	25 C
Storage Temperature Range	-55 C min, + 125 C max
Power Dissipation @ Vdd = Freq =	3.3 V, 1 W 33 MHz PCI clock
Package	120-pin PQFP

For More Information

To learn more about availability of the 21040 contact your Digital sales representative. To learn more about Digital's semiconductors, contact the DECchip Information Line:

1-800-DEC-2717
1-800-DEC-2515 (TTY)

Outside North America, call:

+1-508-568-6868

While Digital believes the information included in this publication is correct as of the date of publication, it is subject to change without notice.

© Digital Equipment Corporation, 1993.

EC-N0281-72

All rights reserved.
Printed in U.S.A.

DEC, DECchip, Digital, and the DIGITAL logo are trademarks of Digital Equipment Corporation.

NetWare and Novell are registered trademarks of Novell, Inc.

OSF/1 is a registered trademark of Open Software Foundation, Inc.

Windows is a trademark and Windows NT is a registered trademark of Microsoft Corporation.

UNIX is a registered trademark licensed exclusively by X/Open Co. Ltd.