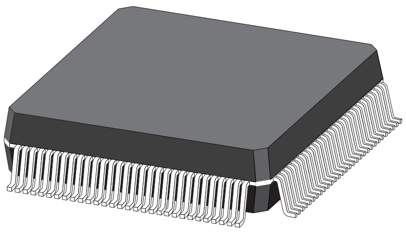
Digital Semiconductor

DECchip 21040 PCI Ethernet LAN Controller

Product Brief

March 1995



Description

The DECchip 21040 PCI Ethernet LAN Controller 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 the local bus:
  - Provides glueless connection to the PCI bus
  - Contains an onchip integrated attachment unit interface (AUI) port and a 10BASE-T transceiver
- Supports full-duplex operation
- Provides PCI clock speed of up to 33 MHz, with no wait states on PCI master operation
- Enables powerful onchip DMA with programmable burst sizes up to 32 longwords, providing for low CPU utilization
- Implements unique, patent-pending intelligent arbitration between DMA channels to prevent underflow or overflow and is optimized for full duplex operation
- Contains two large (256-byte) independent receive and transmit FIFOs
- Supports either big or little endian byte ordering
- Implements JTAG compatible 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 the Ethernet capture-effect problem
- Contains a variety of flexible address filtering modes:
  - 16 perfect addresses
  - 512 hash-filtered multicast addresses and one perfect address
  - 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
- Low power 3.3-V CMOS process technology
- Interfaces to 5.0-V or 3.3-V logic

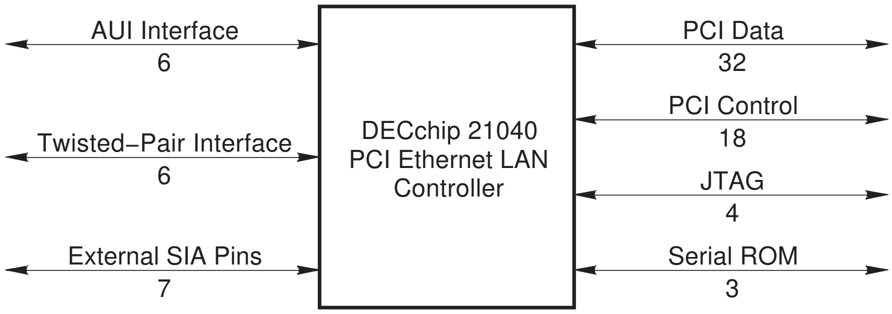
DECchip 21040 Microarchitecture

The 21040 communicates with the host processor using onchip 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 onchip 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 DECchip 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

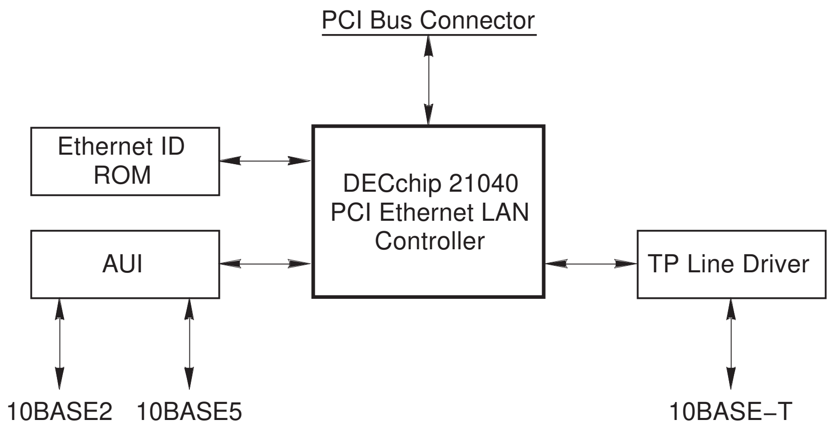


Figure 3   PCI Motherboard System

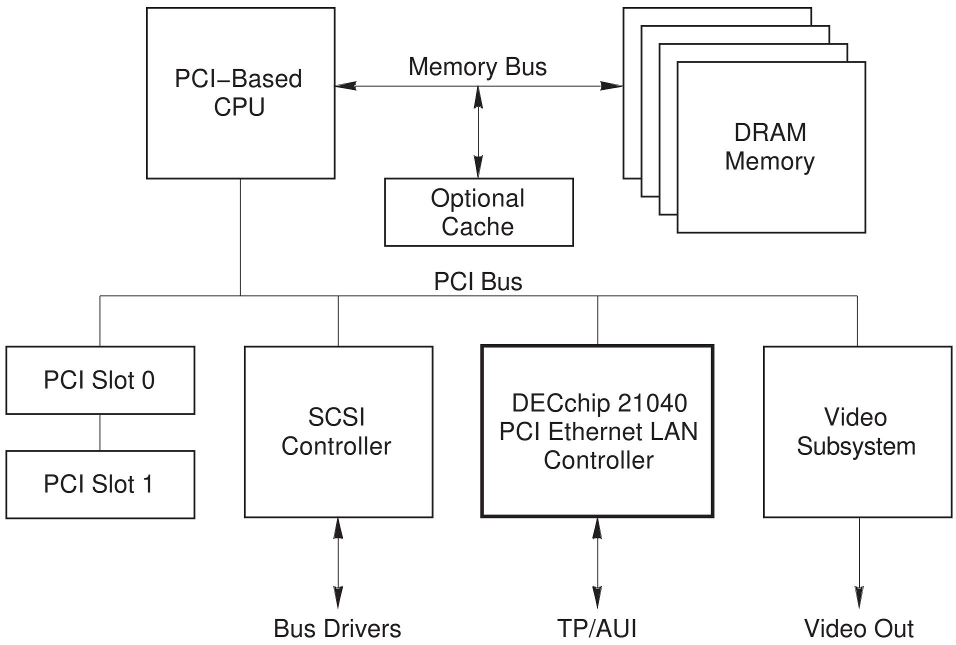
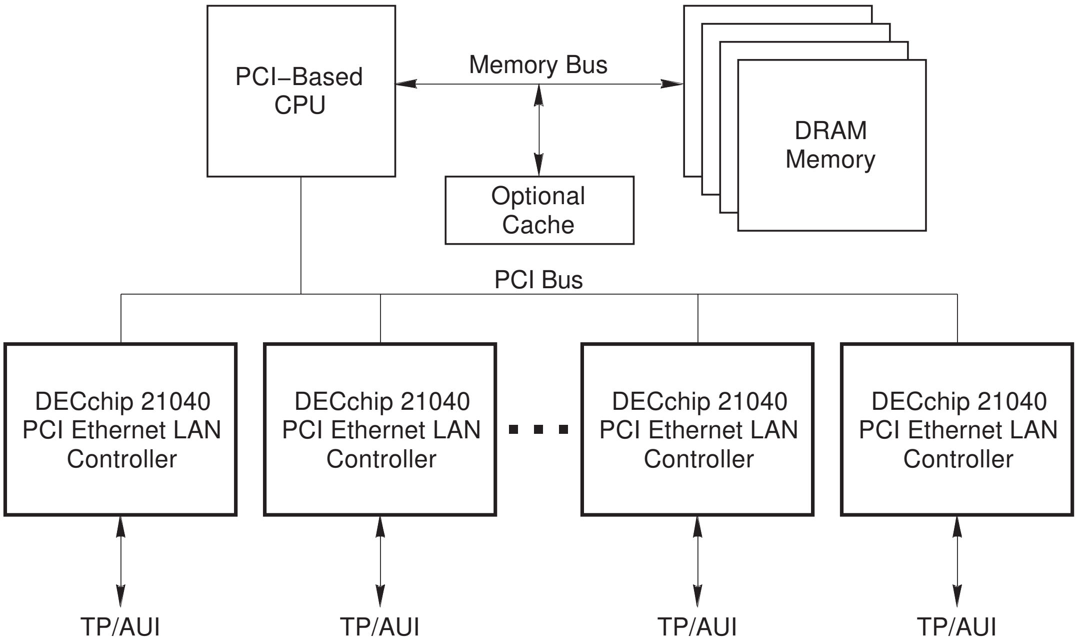


Figure 4   PCI-Based Bridge and Switch



Complete Solution

For a complete solution, supporting hardware and software products and tools are available.

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 operation will be provided for NetWare, PATHWORKS, SCO UNIX, and Microsoft's LAN Manager, Windows NT, Windows 95, and Windows for Workgroups.

Characteristics	
Characteristic	**Specification**
Power supply	Vdd = 3.3 V Vdd_clamp = 5 V or 3.3 V
Operating temperature	0°C to 70°C
Storage temperature range	–55°C to 125°C
Power dissipation @ Vdd = 3.3 V and PCI clock frequency = 33 MHz	0.5 W
Package	120-pin PQFP

For More Information

To learn more about the availability of the DECchip 21040, contact your local semiconductor distributor. To learn more about Digital Semiconductor's product portfolio, contact the Digital Semiconductor Information Line:

1-800-332-2717
1-800-332-2515 (TTY)

Outside North America, call:

+1-508-568-6868

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