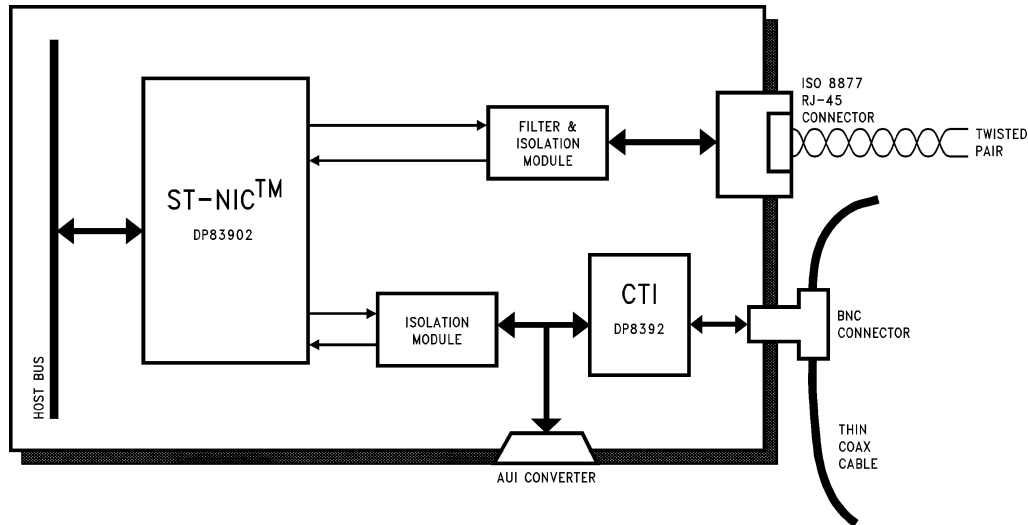


10Base-T Solutions: Network Interface Adapter

National Semiconductor
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FIGURE 1. Ethernet Network Interface Adapter

INTRODUCTION

The IEEE 802.3 Standard for Ethernet has emerged as the most popular, cost effective Local Area Network (LAN) for connecting computers, workstations, printers and other peripherals together. Until now, most Ethernet networks have been connected using Thin and Thick Coax cabling, the 10Base2 and 10Base5 Specifications respectively. With the passage of the 10Base-T Specification, inexpensive Twisted Pair wiring can be used to make point-to-point Ethernet connections. Shielded and Unshielded Twisted Pair wiring, commonly used for phone cabling, will provide for the same high-speed 10 Mbits/s Ethernet data rates found in Thin and Thick Coax networks.

MARKET DEMANDS

With the new standard will come the further proliferation of Ethernet into the installed base of personal computers waiting for inexpensive networking solutions. While the 10Base-T Standard will eventually be the Ethernet connection of choice, there will be a period where the market place will demand a mix of Coax and Twisted Pair Network Interface Adapters.

MANUFACTURING DILEMMA

- The OEM manufacturer may be required to produce two or more Ethernet designs in production to satisfy the demand for either Coax or Twisted Pair connections
- Production costs rise as multiple designs are supported and inventoried
- Accurate production mix forecasting becomes even more crucial if short lead times are to be supported

DESIGN CHALLENGES

- Meet All Requirements of the IEEE Specifications
- Protect Software Investment
- Multiple Media Connection Support
- Streamline Design and Manufacturing
- Lower System Power Consumption
- Lower System Cost

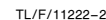
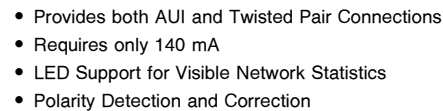
PC-AT® is a registered trademark of International Business Machines Corporation.

- Serial Network Interface Controller for Twisted Pair (ST-NIC)
- Coaxial Transceiver Interface (CTI)

A Network Interface Adapter design using the ST-NIC and CTI will support three IEEE Standards for the Physical Layer—10Base-T, 10Base2, and 10Base5.

- The Network interface Adapter would have one design in manufacturing with the option of excluding the CTI device when only a 10Base-T connection is needed to meet demand. This allows the manufacturer to lower manufacturing and inventory costs by supporting only one design and inserting the CTI optionally. Only one software package is needed and time to market is reduced.

- Integration of DP8390, DP83910, and 10Base-T Transceiver
- 100% Software Preservation



With this architecture, the Adapter incorporates the transmitter, receiver, link integrity, collision, loopback, and jabber as it is defined in the IEEE Standard. The Adapter has its own bus to access board memory, and prevents the system interfering when real-time (transmitting or receiving) is occurring. The I/O Port architecture isolates the CPU from the network traffic. The unique dual DMA capabilities (with

RAM) allow the Adapter to appear as a standard I/O Port to the system, and provides simple and efficient packet transmission and reception. The local DMA channel buffers packets between the local memory and the network, while the remote DMA channel passes data between the local memory and the system through an I/O Port.

BILL OF MATERIALS						
Function		Description		NSC Part		Quantity
Ethernet Controller		ST NIC for Twisted Pair		DP83902		1
Coax Interface		CTI		DP8392		1
Memory		RAM				2
		EPROM (Optional)				1
Bus Interface		Bus Logic		LS244/245/373/374		2
System Clock		Crystal Oscillator				
Filter/Isolation		Transformer/Filter		(see below)		2
Resistors		Various				12
Capacitors		Various				14
LEDs		Various				5

TABLE I. Partial List of 10BASE-T Transformer-Filter Products						
Part Number	Filter	Transformer	Choke	Termination Resistor	Pin Compatible	Tested** by NSC
Pulse Engineering						
PE65431	✓	✓	✓			✓
Valor						
PT3877	✓	✓	✓†		PT3877	✓
FL1012	✓	✓	✓			✓
FL1020	✓	✓	✓	✓		
Bel Fuse						
A556-2006-DE	✓	✓	✓		PT3877	
0556-3392-00	✓	✓	✓			
0556-2006-00	✓	✓	✓†		PT3877	✓
0556-2006-01	✓	✓	✓			
FEE Fil-Mag						
78Z1120B-01	✓	✓	✓		PT3877	
78Z1122B-01	✓	✓	✓		PT3877	
78Z1120B-03	✓	✓	✓			

**NSC has evaluated a sampling of 10BASE-T filter-transformer products for operation with the ST-NIC. Other products listed should provide suitable performance but have not been evaluated at this time. The designer should use this list as a starting point for researching suitable products for his design.

†There is a single common mode choke on the transmit channel only.

TABLE II. Pulse Transformer Vendors			
	Company and Address	Phone	FAX
1	Pulse Engineering PO Box 12235 San Diego, CA 92112	619-268-2400	619-268-2515
2	Valor Electronics 6275 Nancy Ridge Dr. San Diego, CA 92121	619-458-1471	619-458-0875
3	Bel Fuse 198 Van Vorst St. Jersey City, NJ 07302	201-432-0463	201-432-9542
4	FEE Fil-Mag 4787 Cardin Street San Diego, CA 92111-1416	619-569-6577	619-569-6073

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