

PCI SmartNet Protocol Converters

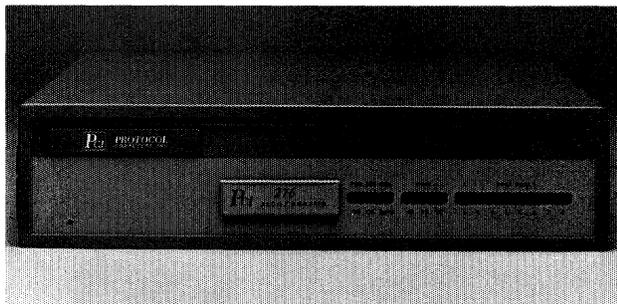
datapro **ANALYSIS**

UPDATE: Since our last report on the PCI SmartNet Protocol Converters, PCI has dropped the Series 1000 PADs which performed protocol conversion. PCI is marketing the Series 2000, 3000, and 4000 PADs that have been enhanced with SNA connectivity. These products will be covered in Datapro Reports on Data Communications' PAD tab. PCI has added the SmartNet 376 to its line, a protocol converter that is used in place of an IBM 3X74/3X76 to allow asynchronous devices access to 3270-based applications across an X.25 network.

To broaden its range of network solutions, Telematics International Inc., a wide area networking company that specializes in data switching, acquired Protocol Computers Incorporated in July 1986. One of the original developers of protocol conversion technology, PCI has contended in the protocol conversion market since 1976. PCI manufactures high-performance protocol converters and X.25 communications products to link ASCII asynchronous equipment to IBM mainframes and system 3X host computers and to provide a gateway to wide area networks, data PBXs, and packet switched networks. It also markets communications software for micro-to-mainframe file transfer applications.

Within its SmartNet X.25 Series, PCI markets the SmartNet 2000, 3000, and 4000 Series. These PADs perform asynchronous, multiprotocol, and SNA switching functions.

PCI's protocol conversion products include the SmartNet 276, SmartNet 376, and SmartNet 5250/T. All SmartNet



PCI's SmartNet 276 is an ASCII-to-SNA 3270 protocol converter that allows ASCII terminals, printers, and IBM Personal Computers to attach to IBM SNA networks as 3278 displays.

VENDOR: PCI, Inc., 26630 Augoura Road, Calabasas, California 91302-1988. Telephone (818) 880-5704.

MODELS: SmartNet 276—ASCII-to-3270 SNA/SDLC protocol converter; SmartNet 376 async 3270/X.25; SmartNet 5250/T—async to IBM 34/36/38 via twinax.

TRANSMISSION RATES: On the host side, primary rates range from 900 to 19.2K bps, while primary rates on the terminal side are 19.2K bps.

COMPETITION: In protocol conversion market: IBM, Local Data, Lee Data/Data Stream.

PRICING: \$2,650 to \$8,570 (SmartNet 276); \$2,925 (SmartNet 5250/T).

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(short for "smart networking") protocol converters offer dial-in, dialback security; full IBM screen emulation; extensive file transfer capabilities that are compatible with IBM's resident host software programs; and the most necessary ingredient, field upgradability. All SmartNet products are available in desktop or rack-mountable versions.

PCI's SmartNet customers include *Fortune* 1000 companies, small-end users, original equipment manufacturers, value-added resellers, and value-added distributors. The products currently address the following markets: financial, insurance, manufacturing, government, communications, transportation, medical, education, small business, and automotive.

PRODUCT EVALUATION

PCI offers a broad line of conversion products and is, therefore, an excellent source for prospective buyers whose needs are specialized or varied. As one of the first companies in the protocol conversion market, PCI is experienced in researching and developing conversion technologies, which can be difficult to implement. One of the company's strongest advantages is its established position in the marketplace.

Those contemplating the use of PCI converters should note that different models handle different conversion re-

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quirements. This can pose a problem for networks that use several different protocols simultaneously. A few conversion systems provide line concentration and multiple protocol capability, whereby several different types of emulations are available on software modules loaded from an IBM host to the converter. In some cases, it is cheaper to install a multiprotocol converter than a variety of converters, each handling a separate emulation. The major disadvantage of a multiconversion unit, however, is the extensive host-based programming involved in defining parameters for its operation. There are trade-offs in installing a multiprotocol converter instead of a variety of different units, and users need to analyze network requirements carefully in terms of both types of products.

In June 1989, PCI introduced the SmartLink 5250/MacCOM software. With this product, PCI has achieved an industry first: providing full-function connectivity between the Macintosh and IBM midrange systems without requiring hardware add-ons to the Macintosh workstation.

SmartLink 5250/MacCOM will appeal to many users because they will be able to retrieve IBM system files and merge the data into Macintosh applications. Since the software supports the Macintosh user interface, the connections to IBM systems are transparent. In addition, prior to

downloading to the Macintosh, the contents of System/3X and AS/400 files can be filtered on the host. This procedure supports the use of popular database software such as Excel, Jazz, Multiplan, and 4th Generation. Users can perform record searches on the host offline, thereby freeing them to undertake other interactive functions.

MARKET POSITION

PCI is one of the leading vendors in the protocol conversion market. Although IBM's entry into the market strongly affected the sales of smaller vendors, PCI is holding its own. PCI is unique—it is one of the few vendors that specializes in a particular data communications technology. The company has researched and developed protocol conversion technology since 1980, when only Industrial Computer Controls, Inc. (later purchased by Micom) offered significant competition. This experience is PCI's strongest competitive advantage.

Since its alignment with Telematics, PCI has branched out into the X.25 equipment market, where there is much activity and profit potential. PCI is positioned well in the X.25 equipment market, which is a natural extension of the company's existing product line.

SPECIFICATIONS

MODELS: SmartNet 276; SmartNet Series 376, and SmartNet 5250/T.

DATE OF ANNOUNCEMENT: SmartNet Series 200—March 1985; SmartNet 5250/T—March 1987.

DATE OF FIRST DELIVERY: SmartNet Series 200—March 1985; SmartNet 5250/T—March 1987.

SERVICED BY: PCI, Inc.

MODELS

SmartNet 276: This model is an asynchronous 3270 cluster controller that provides connectivity for asynchronous terminals, personal computers, printers, and plotters to an IBM 3270 SNA host. Asynchronous devices attached to the SmartNet 276 can make use of host applications that support full-screen 3270 displays and printers. Devices that would have to connect through the Network Terminal Option (NTO) licensed program running on an IBM 3705 or 3725 communications controller can communicate through SmartNet 276 to IBM host applications.

PCI equips the 276 with up to 32 ports to support the attachment of local and remote ASCII devices, which appear to an IBM SNA host as IBM 3270 displays and printers. Users can attach the SmartNet 276 remotely to an IBM

host via synchronous modems on a multidrop SNA/SDLC line with other controllers or directly attach it to an IBM 37X5 without a modem at speeds up to 19,200 bits per second. Either attachment occurs through an RS-232-C connection.

The unit supports most asynchronous displays, including IBM 3101 and Digital VT100. In graphics mode, the SmartNet 276 supports many ASCII graphics terminals, such as Tektronix displays. Users can access SAS/GRAPH, PLOT-10, DISSPLA and TELE-A-GRAPH, and DI 3000 applications through the same SmartNet 276 that supports nongraphic terminals. SmartNet 276 supports almost any ASCII serial printer and appears to the host as an IBM 328X printer. Users can directly connect printers to the 276 or attach them to a display auxiliary port.

SmartNet 376: This model is a protocol converter that is used in place of an IBM 3X74/3X76 to provide asynchronous devices with access to 3270-based applications across an X.25 network. An SNA host supports SmartNet 376 through a front end equipped with the NCP packet-switching interface, or through a public or private X.25 network. Instead of the NCP interface, the host computer can use a SmartNet 1200 Host SNA PAD as a front end. The 376 supports a full-duplex HDLC link with LAPB

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link-level protocol at speeds up to 19.2K bps. Its display and printer support are the same as those of the 276.

SmartNet 5250/T: This model provides a fully compatible twinax interface for connecting up to seven asynchronous devices to an IBM System 34/36/38 or 5294 without necessitating an additional investment in IBM communications hardware or software. Local and remote displays can communicate with IBM 5291, 5292 (Model 01), and 3180 (Model 2) System 34-/36-/38-based application programs without any host reprogramming.

SmartNet 5250/T attaches to the System 34/36/38 or IBM 5294 via a standard two-conductor shielded twinax cable. Users can place the 5250/T up to 5,000 feet from the host in an arrangement that allows other twinax workstations that are connected upstream to share the twinax cable. The unit supports most popular asynchronous displays, such as IBM 3161/3162/3163/3164 and Digital VT100/VT200. Video and editing support allow the user to connect 132-column/27 line asynchronous displays to emulate IBM 3180 Model 2 terminals. The 5250/T also provides seven-color support to enable asynchronous color displays to emulate IBM 5292 Model 01 terminals.

Transmission Specifications

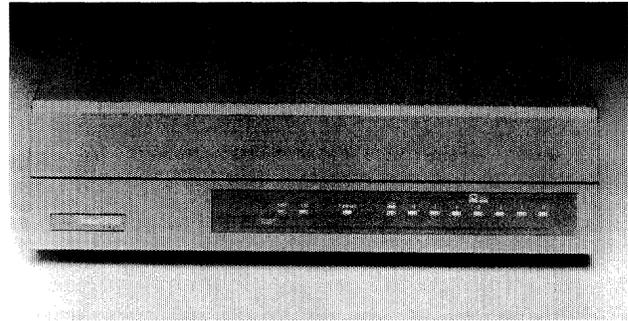
The **SmartNet 276** provides up to 32 physical RS-232-C ports that offer simultaneous support for any combination of up to 32 ASCII terminals, PCs, and printers attached directly or remotely via modems at speeds from 300 to 19,200 bps using even, odd, or no parity. PCs or terminals can also access SmartNet 276 via any port contention device capable of accepting an RS-232-C signal and selecting a port on the 276, such as switches, PBXs, or CBXs.

The **SmartNet 376** supports a full-duplex HDLC link with LAPB link-level protocol at speeds up to 19.2K bps.

The **SmartNet 5250/T** supports asynchronous data rates up to 19.2K bps.

Device Control

To set up and configure the SmartNet 276, SmartNet 376, and SmartNet 5250/T, the user follows factory default parameters to connect the system online. Full-screen 3278-style configuration menus facilitate the reconfiguration of the devices from the control port. All configuration parameters are stored in nonvolatile memory to be protected from power outages.



The 5250/T provides asynchronous-to-IBM System 34/36/38 conversion via twinax cable. The unit emulates the IBM 3180, 5219, 525, 5291, or 5292 display stations.

Software

SmartLink 5250/MacCOM: Used in conjunction with the SmartNet 5250/T, SmartLink 5250/MacCOM connects Apple Macintosh workstations to IBM AS/400 and System/3X midrange systems. It supports interactive transactions, bidirectional file transfers, and editing between the two systems. SmartLink 5150/MacCOM provides full-function connectivity between the Macintosh and IBM midrange systems without requiring hardware add-ons to the Macintosh workstation.

Users can connect the Macintosh through its standard asynchronous serial port to the 5250/T and achieve the effect of a Macintosh emulating an IBM 5291 twinax terminal. In addition to supporting both direct cabling and dial-in connections, an asynchronous gateway can connect Macintosh stations networked via an AppleTalk LAN. In this mode, each Macintosh can perform multiple sessions with the host.

Since SmartLink 5250/MacCOM fully supports the Macintosh user interface, connection to IBM systems is user transparent. Contents of System/3X and AS/400 files can be filtered on the host before downloading to the Macintosh. To free the Macintosh for other interactive tasks, users can perform record searches on the host offline. The Macintosh printer can be configured to output System/3X and AS/400 listings, text, or spreadsheets.

PRICING

The SmartNet 276 with 8 asynchronous ports costs \$2,650 and with 32 asynchronous ports, \$8,570. The SmartNet 5250/T with seven asynchronous ports costs \$2,925. SmartLink PC File Transfer Communications Software costs \$95, and SmartLink 5250/MacCOM costs \$1,200. □

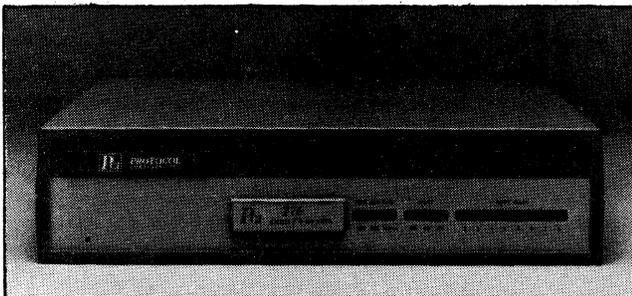
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UPDATE: Holding 27 percent of the installed base of protocol converters at IBM/PCM mainframe sites (according to a Computer Intelligence Corporation study), PCI is a major vendor in the protocol conversion arena. With the introduction in 1985 the SmartNet Series 1000 packet assembler/disassemblers (PADs) that perform protocol conversion, PCI also entered the X.25 PAD market. Covered in this report are PCI's top SmartNet protocol conversion products, as well as the SmartNet 1000 units.

To broaden its range of network solutions, Telematics, International Inc., a wide area networking company that specializes in data switching, acquired Protocol Computers Incorporated in July 1986. One of the original developers of protocol conversion technology, CI has contended in the protocol conversion market since 1976. Before the acquisition, however, PCI was losing ground to IBM and other competitors. PCI's rivals quickly scooped up shares of the conversion market once they introduced products. Since the acquisition, Protocol Computers, now officially called *PCI, Incorporated*, is spending more on marketing communications and expanding its customer support. According to PCI, as of January 1987, more than 20,000 of its protocol converters are installed worldwide.

PCI manufactures high-performance protocol converters and X.25 communication products linking ASCII asynchronous equipment to IBM mainframes and System/3X host computers to provide a gateway to wide area networks, data PBXs, and packet switched networks. It also markets communications software for micro-to-mainframe file transfer applications.



PCI's SmartNet 276 is an ASCII-to-SNA 3270 protocol converter that allows ASCII terminals, printers, and IBM Personal Computers to attach to IBM SNA networks as 3278 displays.

VENDOR: PCI, Incorporated, 26630 Augoura Road, Calabasas, California 91302-1988. Telephone (818) 880-5704, (800) 423-5904.

MODELS: SmartNet 251—ASCII to IBM 34/36/38 SNA/SDLC protocol converter; SmartNet 271—ASCII to 3270 bisync protocol converter; SmartNet 276—ASCII to 3270 SNA/SDLC protocol converter; SmartNet 1200—X.25 to 3270 SNA host packet assembler/disassembler (HPAD); SmartNet 1300—3270 SNA to X.25 terminal PAD (TPAD); SmartNet 1500—ASCII to X.25 PAD; SmartNet 5250/T—async to IBM 34/36/38 via twinax.

TRANSMISSION RATES: On the host side, primary rates range from 900 to 19.2K bps, while primary rates on the terminal side are 19.2K bps.

COMPETITION: In protocol conversion market: IBM, Local Data, Lee Data/Data Stream. In the PAD market: General Datacomm.

PRICING: Ranges from \$1,050 for the SmartNet 1500 with one X.25 link and one asynchronous port to \$9,700 for any SmartNet 200 Series model with 32 asynchronous ports.

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PCI's hottest protocol conversion products are the SmartNet Series 200 and SmartNet 5250/T. All SmartNet (short for "smart networking") protocol converters offer dial-in, dial-back security; full IBM screen emulation; extensive file transfer capabilities that are compatible with IBM's resident host software programs; and the most necessary ingredient, field upgradability. All SmartNet products are available in desktop or rackmountable versions.

The *SmartNet 200* converters feature program packs that slide into a slot on a basic enclosure. SmartNet 200 offers network management capabilities and security features, which are generally not available on protocol converters. For all SmartNet 200 units, an option called SmartLink lets those using an IBM PC to transfer data files to and from System 34/36/38 computers and allocate, delete, and rename files on the PC's diskette.

Included in the SmartNet 200 line is the *SmartNet 251*, an ASCII-to-SDLC converter that emulates an IBM 5251-12

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SNA/SDLC cluster controller and allows asynchronous ASCII devices to access a System 34/36/38. The desktop unit supports up to eight physical devices and one floating-point logical unit. The SmartNet 251 MSU supports up to 32 asynchronous devices.

Also in the Smartnet 200 family is the *SmartNet 271*, an ASCII-to-bisync converter that provides IBM 3271 controller emulation, permitting the use of ASCII peripherals in a bisync network. The desktop 171 supports up to seven ASCII devices, allowing them to emulate standard 3270 bisync terminals. The 271 MSU supports up to 32 asynchronous workstations. The *SmartNet 276*, emulating an IBM 3274/76 SNA/SDLC Physical Unit Type 2 cluster controller, supports 18 concurrent IBM Logical Units (LUs) and 32 user profiles; a separate ASCII port supports control-console functions. The 276 MSU offers up to 32 asynchronous links.

The *SmartNet 5250/T* (twinax) protocol converter provides a fully compatible twinax interface for connecting up to seven asynchronous devices to an IBM System/3X or 5294 cluster controller without additional IBM communications hardware or software. Attached to the host (or dual hosts) via a standard two-conductor shielded twinax cable, the 5250/T can be located up to 5,000 feet from the System 34/36/38 with other twinax workstations connected upstream sharing the twinax cable. The 5250/T has 512K bytes of memory and supports up to seven serial async devices and one parallel printer. It emulates IBM 5291; 5292-01; 3180-2 displays, and 5256, 5219, and 3812 printers. Like the Smartnet 200 converters, the 5250/T supports PCI's SmartLink PC file transfer option.

While PCI originally specialized in protocol converters, the company also recognized other industry needs. Products that transmit data from different geographical areas through either private data communications networks or public X.25 packet data networks (PDNs) such as Datapac, Tymnet, Telenet, Accunet, and Transpac were required. To fill this need, PCI has developed the SmartNet 1000/2000/3000 products. The Series 2000 and 3000 feature higher end functions, such as switching capabilities, and work with a PC AT-based network management system that controls multiple SmartNet 2000 and 3000 communications processors in an X.25 network. Those products, the most actively marketed of PCI's Packet Assembler/Disassemblers (PADs), will be covered in a separate report in the near future. Covered in this report is the SmartNet 1000 family of three PADs. Models 1200 and 1300 provide SNA/host or terminal X.25 packet data network access.

The *1200 Host PAD* attaches to an IBM host; Model 1300 supports SNA/SDLC controllers. Used in conjunction, the Model 1200 only accepts calls, while the 1300 both initiates and accepts calls. The Model 1200 unit, an integrated SNA/SDLC-to-X.25 converter and PAD, is used in place of IBM's Network Packet Switching Interface

(NPSI) front-end software and converts messages from the host into X.25 packets, which are sent via a virtual path through the X.25 network. The 1200 maintains up to eight virtual circuits through the X.25 network. It presents data to its SDLC host by appearing to the host as one or more 3274/6 control units communicating over a point-to-point or multipoint line.

The *1300 Terminal PAD*, designed to interface with SNA/SDLC terminal controllers, lets attached SDLC cluster controllers communicate with up to three SDLC hosts through an X.25 network. Each 1300 supports up to three IBM 3274/6-type controllers in a multidrop configuration. The 1300 maintains a virtual circuit through the X.25 network to a companion SmartNet 1200 HPAD at each host site. The 1200 presents the data to its host from the SDLC controllers connected via the 1300s as if they were attached on a point-to-point multipoint line. (See Figure 1.)

The third product in the 1000 Series is the *SmartNet 1500*. Unlike the SNA-to-X.25 1200 and 1300, this unit is a basic asynchronous PAD that connects asynchronous devices to X.25 networks and performs the opposite conversion as well. The unit is available in one-, three-, five-, or seven-asynchronous port versions, all of which support one X.25 link. The unit is best used to connect PC users and remote offices to PDNs. It is fully compatible with SmartNet 2000 and 3000 networking products and supports X.3, X.28, X.29, X.121, and X.25 CCITT Recommendations. The unit may accept or reject incoming calls with reverse charging.

PCI's SmartNet customers include *Fortune* 1000 companies, small-end users, original equipment manufacturers, value-added resellers, and value-added distributors. The products currently address the following markets: financial, insurance, manufacturing, government, communications, transportation, medical, education, small business, and automotive.

PRODUCT EVALUATION

PCI offers a broad line of conversion products and is, therefore, an excellent source for prospective buyers whose needs are specialized or varied. As one of the first companies in the protocol conversion market, PCI is experienced in researching and developing conversion technologies, which can be tricky and difficult to implement. One of the company's strongest advantages is its established position in a marketplace filled with relative newcomers.

With the SmartNet Series, PCI entered the wide area networking market, which is now far more volatile than the protocol converter market. Several large data communications equipment vendors, such as Memotec, are entrenched in the PAD market, and PCI faces stiff competition in selling these products. PCI's Series 1000

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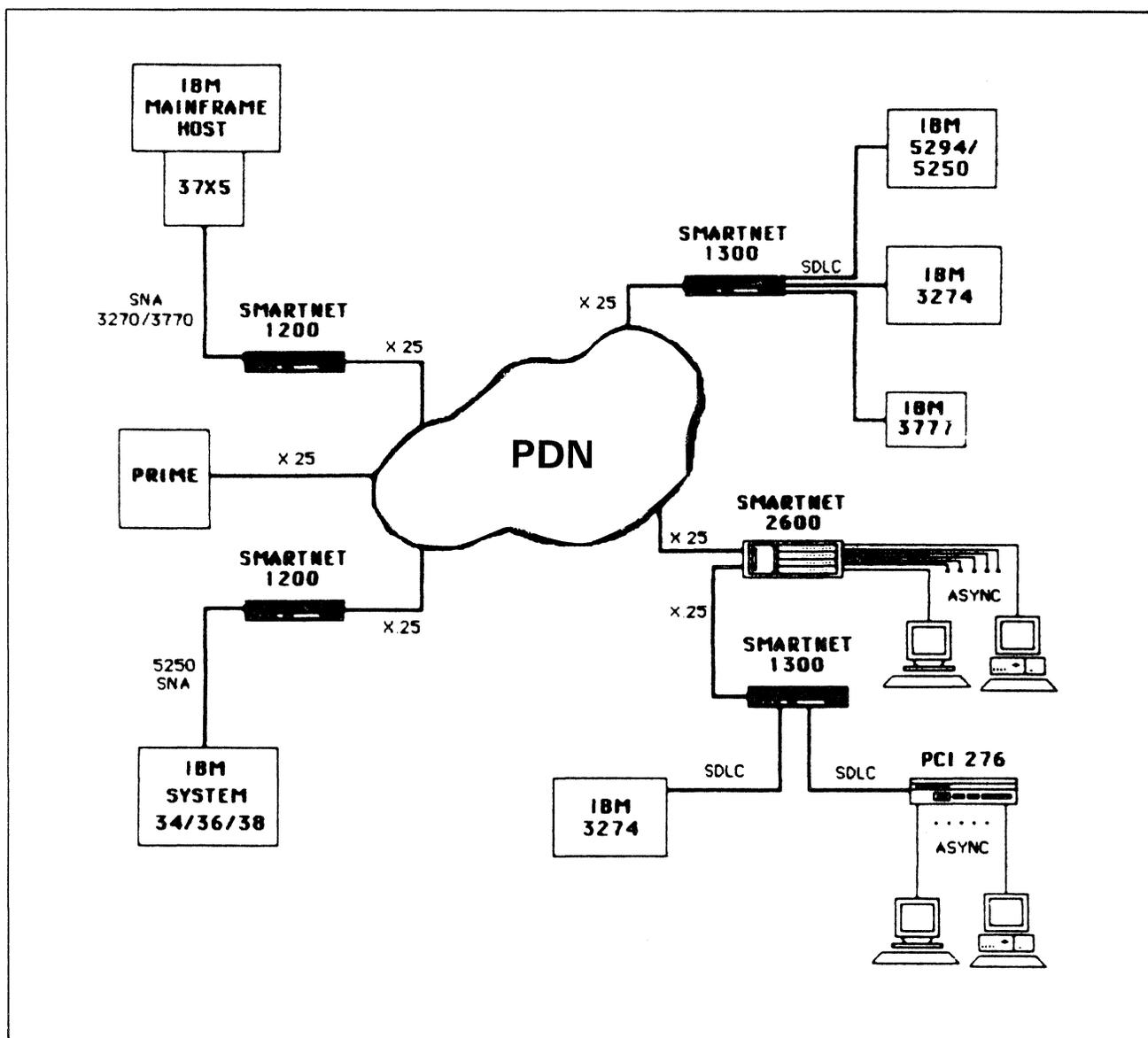


Figure 1. Shown above is a typical application using the SmartNet Series 1000 units and the SmartNet 276. Also in the network is the SmartNet 2600, a switching Packet Assembler/Disassembler (PAD) that provides asynchronous-to-X.25 protocol conversion.

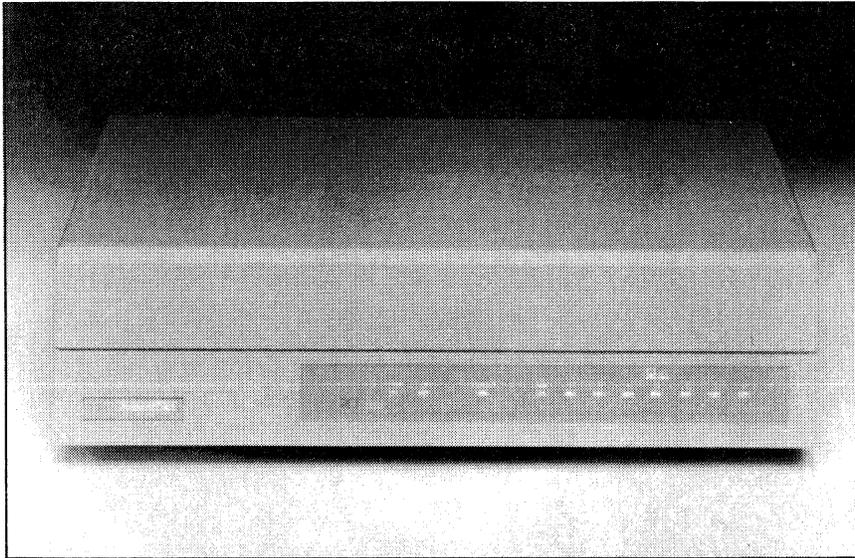
units are unique in that they allow ASCII or SNA/SDLC devices to communicate through the X.25 network with IBM SDLC hosts. PCI sources say that it is the richness of features and functionality that makes the SmartNet products competitive with the larger companies' offerings.

Those contemplating the use of PCI converters should note that different models handle different conversion requirements. This can pose a problem for networks that use several different protocols simultaneously. A few conversion systems provide line concentration and multiple protocol capability, whereby several different types of emulations are available on software modules loaded from an IBM host to the converter. In some cases, it is cheaper

to install a multiprotocol converter than a variety of converters, each handling a separate emulation. The major disadvantage of installing a multiconversion unit, however, is the extensive host-based programming involved in defining parameters for its operation. There are trade-offs in installing a multiprotocol converter instead of a variety of different units, and users need to analyze network requirements carefully in terms of both types of products.

An area in which PCI can improve its field service, which users have complained in the past. PCI is aware of the service problem, and since Telematics acquired the company, improving service is being emphasized. The company has expanded both its customer support and its

PCI SmartNet Protocol Converters



The 5250/T provides asynchronous-to-IBM System 34/36/38 conversion via twinax cable. The unit emulates the IBM 3180, 5219, 525, 5291, or 5292 display stations.

expanded hardware/software development and is trying to respond quicker to customer problems.

MARKET POSITION

According to a Computer Intelligence Corporation survey of the installed base of protocol converters at IBM/PCM mainframe sites, PCI is one of the top vendors, holding 27 percent of the market. PCI was stronger in the early 1980s when the market was hot, with predictions that 1983 revenues would double in 1984. That, however, was not the case. Sales have eroded and all the major protocol converter vendors felt the pinch. Strong competition also threatens PCI's secure position in the protocol conversion market. IBM poses the biggest challenge to all protocol conversion manufacturers, because most conversions involve the IBM network. Users of IBM mainframes and older bisync equipment can now have a one-vendor solution when purchasing protocol converters.

PCI is unique in that it is one of the few vendors that specialize in a particular data communications technology. The company researched and developed protocol conversion technology since 1980, when only Industrial Computer Controls, Inc. (later purchased by Micom) offered significant competition. It is this experience that marks PCI's strongest competitive advantage. Although PCI now faces competition from a growing number of vendors, the company has the largest base of converters today, and it offers the broadest line of converters available from one source. Since being aligned with Telematics, PCI has branched out into the X.25 equipment market, where there is much activity and profit potential. PCI is positioned well in the X.25 equipment market, which is a natural extension of the company's existing product line.

To strengthen its financial position, PCI has aggressively sought agreements with other companies to distribute, OEM, or sell PCI converters under private labels. The

acquisition by Telematics has already strengthened the company's marketing efforts. Telematics recently announced that for the first nine months of 1987, revenues were \$29.4 million, as compared to \$15.5 million during the same period in 1986, an increase of about 90 percent. According to John Pitt, chairman, president, and chief executive officer of Telematics, "Although the recent sharp, general decline in the value of equity securities in the world's stock markets have been unsettling, Telematics remains a fundamentally sound company with a positive long-term business outlook."

APPLICATIONS PROFILE

We interviewed two PCI Series 200 protocol converter users, both of whom were impressed with the products' performance, ease of use, and reliability.

The first person interviewed is an employee in one of the top 12 banks in the United States who was directly involved in purchasing the product. The bank needed an async-to-SNA converter with a minimum of eight ports and the capability to do protocol conversion for hard copy printing. The protocol converter also had to support local and remote reconfiguration and an auto speed-detect function. After doing a lengthy decision analysis of several protocol converters, including IBM products, she decided to purchase PCI's Models 276 and 251 units because they met most of the bank's criteria. The SmartNet Series 200 products were installed in the bank's network over a year ago. The only criteria that neither the IBM nor PCI converters could meet was the support of a response-time monitoring function. The user said that while both vendors claimed their products could support the function, the units did not do so in a workable manner. In evaluating IBM's products against PCI's, the user said she decided that "protocol conversion just wasn't IBM's business. To get an answer to my questions was like pulling teeth."

PCI SmartNet Protocol Converters

Currently, there are three Model 276s and one Model 251 in the bank's network, and a third model will be put in at a remote site in the near future. The units give the company's employees dial in access to their electronic mail or access to the network from home. Customers also use the SmartNet 200s for cash-management applications, dialing in through a PC with Crosstalk software. The SmartNets support about 200 users, although not simultaneously.

The user has experienced no hardware problems since the units were installed. She called them "super reliable," but said that the setup wasn't easy, since the operator's manual didn't reflect the firmware release she had. She assumed the problem came from the fact that PCI was in the process of rewriting the documentation to address the newer firmware.

Commenting on technical support, the interviewee said that PCI's technical support staff has only a few excellent people, but such a situation is to be expected, since PCI is a small company. However, response time on calls has always been good, with a callback time ranging between 30 and 45 minutes from the time a call for assistance is placed.

She said SmartNet 200 protocol converters are easy to use because they are flexible, reliable, easy to configure, and menu driven. Also, the units are "security conscious"; those with privileged access always get a fixed terminal identification, eliminating the need to dedicate ports to priority users.

"Based on our lengthy evaluation, I feel pretty confident that we went with about the best [protocol converter] out there. We are really happy with them. We wouldn't be

expanding if we weren't. PCI just needs to beef up its technical support," she concluded.

The second user, who works for a data processing (DP) service facility, said he agreed that PCI's converters are reliable products. "They're very straightforward and we've had no problems with them." His company has used PCI products since August 1984. "Back then," the user told us, "they were the only ones on the market to handle graphics," the main application for which they were purchased. Having had good experiences with the 1076 models, the company purchased three 8-port SmartNet 276s about a year ago, also for graphics applications. Currently, approximately 100 different users dial into the DP service, with a few dozen using the SmartNet 276 simultaneously.

He noted that the products "don't just install themselves; you have to read the documentation. Earlier, the documentation was sketchy, but, since the spring of 1986, it's been very accurate." The user said that since the installation, he hasn't had one problem with the 276. "Early versions like the 1076 had quirks," he said, but he couldn't think of one Model 276 weakness.

The user rated company's service "acceptable." He commented, "During the purchase by Telematics, customer service went downhill, but since then, the service has been just fine."

In a final evaluation of the SmartNet 276, the user said that PCI's graphics development and support are very strong. "I'm very happy with its reliability, and it gets the job done, which other boxes may not do. KMW and Local Data have boxes that appear to do graphics, but once we were shown that PCI can do the job, we haven't looked at anything else."

SPECIFICATIONS

MODELS: SmartNet Series 200—Models 251, 271, and 276; SmartNet Series 1000—Models 1200, 1300, and 1500; and SmartNet 5250/T.

DATE OF ANNOUNCEMENT: SmartNet Series 200—March 1985; SmartNet 1200 and 1300 and SmartNet 5250/T—March 1987; SmartNet 1500—February 1987.

DATE OF FIRST DELIVERY: SmartNet Series 200—March 1985; SmartNet 1200, 1300, and 1500 and SmartNet 5250/T—March 1987.

NUMBER DELIVERED TO DATE: SmartNet Series 00—7,000; SmartNet Series 1000—853; SmartNet 5250/T—780.

SERVICED BY: PCI, Incorporated.

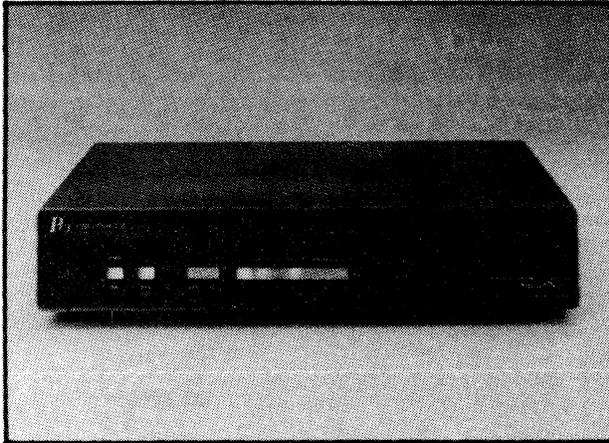
MODELS

SmartNet Series 200 protocol converters allow for the connectivity of asynchronous terminals, PCs, and printers

with IBM 370 and System 34/36/38 host computers. Models within the series include the following:

- **SmartNet 251:** a protocol converter supporting ASCII-to-SNA/SDLC conversion, allowing ASCII terminals, printers, and IBM PCs to attach to IBM System/3X as 5251-11 displays and 5256-3 printers.
- **SmartNet 271:** a protocol converter supporting ASCII-to-bisync conversion, allowing ASCII terminals, printers, and IBM PCs to attach to IBM SNA networks as 3277 or 3278 terminals; the 271 emulates the IBM 3271 or 3274 controller. The 271 performs all the functions of the SmartNet 276 (listed below), but is used with bisynchronous hosts.
- **SmartNet 276:** a protocol converter supporting ASCII-to-SNA/SDLC conversion, allowing ASCII CRTs, print-

PCI SmartNet Protocol Converters



The SmartNet 1200 is an SNA Host Packet Assembler/Disassembler (HPAD) that converts an SNA/SDLC data-stream to CCITT X.25 for transmission across a Packet Data Network. An application of the unit can be seen in Figure 1.

ers, and IBM PCs to attach to IBM SNA networks appearing to the host as 3278 displays and 3287 printers; the 276 appears to the host as an IBM 3274/36 cluster controller.

SmartNet Series 1000 products provide asynchronous and SNA/SDLC-to-X.25 connectivity. Models 1200 and 1300 differ from the 1500 in that they perform not only the basic packet assembling/disassembling function, but also protocol conversion. The three models within the series are listed below.

- **SmartNet 1200:** an SNA Host PAD that interfaces an IBM mainframe or minicomputer to an X.25 PDN. The unit supports X.25-to-3270 conversions, emulating an IBM 3274/76 controller.
- **SmartNet 1300:** an SNA Terminal PAD (TPAD) that interfaces SNA/SDLC terminal controllers, SmartNet 276 ASCII/3270, and SmartNet 251 ASCII/5250 SNA protocol converters to an X.25 PDN. The unit supports 3270 SNA-to-X.25 conversion, emulating an IBM 3278 Model 2 display station.
- **SmartNet 1500:** a basic PAD that connects PCs and small, remote offices to PDNs. The unit can be configured as a host or terminal concentrator.

SmartNet 5250/T, the last model covered in this report, is a protocol converter supporting ASCII-to-EBCDIC conversion, allowing asynchronous ASCII devices to directly attach to the twinax ports of the IBM System 34/36/38 minicomputers or the 5294 cluster controller. The 5250/T emulates the IBM 3180, 5219, 5256, 5291, or 5292 display stations.

TRANSMISSION SPECIFICATIONS

The **SmartNet Series 200** protocol converters each support 32 RS-232-C ports, configurable as Data Terminal

Equipment (DTE) or Data Circuit-Terminating Equipment (DCE), for the connection of up to 32 ASCII devices. The protocol converters are compatible with SmartNet PADs, switches, and switching PADs for X.25 communications and support PC file transfer through SmartLink software, which allows secure PC-to-mainframe communications at a maximum transmission rate of 19.2K bps. SmartLink can be used with the Series 200 units, as well as the 5250/T. In addition to SmartLink software, information users can transfer between a PC and an IBM host through VM/CMS, TSO, and CICS. PCs can also transfer files to and from the System 34/36/38 through a System/3X Emulator Transfer Utility. Emulated terminals include the IBM 3278, IBM 5251, and Digital Equipment Corporation VT100, among others. Series 200 units support a total of 45 common terminal types.

On the host side, SmartNet Series 200 units support synchronous point-to-point, multipoint, and direct connections in half- or full-duplex mode. On the terminal side, direct, dial-up asynchronous connections are supported with full-duplex transmission; flow control is X-on/X-off. Other features common to all Series 200 protocol conversion units include line concentration, modem auto call-back, auto logon, an auto dial directory, full four-color support, and the appending of files.

The **SmartNet 251** supports 4 to 32 ASCII terminals and printers attached directly to the System/3X through a communications adapter or remotely via a synchronous modem on a multidrop SNA/SDLC line with controllers. Terminal side data rates range from 300 to 19.2K bps. The SmartNet 251 supports one 19.2K bps SDLC link into the IBM System 34/36/38 host through an RS-232-C interface.

The 251 supports most asynchronous displays, including the IBM 3101, Digital Equipment VT100/VT52, Lear Siegler, ADDS Viewpoint, Televideo, and Hewlett-Packard (HP) 2621 A/P.

The **SmartNet 271** supports any combination of ASCII terminals, PCs, and serial printers attached directly or remotely to an IBM 3705 or 3725 via a synchronous modem on a multidrop bisync line with other controllers. The 271 supports 4 to 32 physical ports and 8 to 64 concurrent Logical Unit (LU) sessions; data rates on the terminal side of the unit range from 300 to 19.2K bps. The SmartNet 271 also supports one 9600 bps bisync link to the host and one RS-232-C interface.

The 271 supports the following asynchronous displays: the IBM 3101, Digital Equipment VT100, Lear Siegler, ADDS Viewpoint, Data General D200, Freedom 100/50, Hazeltine 1420/1500/1510, HP 2621, and Televideo. Devices that would otherwise connect through the IBM Network Terminal Option (NTO) licensed program running on an IBM 3705 or 3725 can communicate through the 271. The

PCI SmartNet Protocol Converters

271 also supports IBM PCs and compatible units through SmartLink communications software. A graphics mode allows the SmartNet 271 to support graphics on most ASCII terminals and plotters. Graphics applications that can be accessed include SAS/GRAPH, PLOT-10, DISPLAYA, and TELL-AGRAPH, DI-3000. Other features of the 271 include a data transparency mode (protocol enveloping) and auto logoff.

The SmartNet 276 simultaneously supports any combination of 4 to 32 ASCII terminals/PCs and serial printers attached directly or remotely via an asynchronous modem. The 276 can run four to eight LU sessions simultaneously. Both the terminal side and host side support data rates ranging from 300 to 19.2K bps. On the host side, the 276 attaches either directly to the IBM 37X5 or remotely through modems on a single multidrop SNA/SDLC line with other controllers. As on the SmartNets 251 and 271, the host-side connection is through an RS-232-C interface.

Asynchronous displays and graphics mode capabilities are the same as listed above for the SmartNet 271. As with the SmartNet 271, devices that would otherwise connect to the host through the IBM Network Terminal Option (NTO) licensed program running on an IBM 3705 or 3725 can communicate through the 271. The 271's other features include a data transparency mode, auto logoff, a four-level security feature, a system password, and host control of DTR to external dial-up modems.

All SmartNet Series 1000 units support point-to-point or multipoint connections.

The SmartNet 1200, designed as an alternative to IBM's NPSI software on the host end, interfaces to a SmartNet 1300 to convert SNA/SDLC datastreams to X.25 for transmission across a PDN. The unit also interfaces to an IBM System 34/36/38 host, supporting remote access to IBM 5250/5294 clusters. The 1200 only accepts calls.

The 1200 Host PAD supports as many as eight leased or switched virtual circuits and can be directly connected or attached via a modem to the host. The unit supports SNA/SDLC and X.25 link speeds up to 9600 bps. Model 1200 concurrently supports one X.25 link, one SNA/SDLC port, and one asynchronous diagnostic port. SmartNet 1200 also supports the LAPB protocol.

SmartNet 1300 is a terminal PAD that simultaneously supports IBM 3270, 3770 SNA/SDLC controllers, the SmartNet 276 protocol converter, as well as IBM 5294 or 5250 terminal clusters and the SmartNet 251 protocol converter, all for accessing the IBM System 34/36/38 across an X.25 PDN. The 1300 initiates and accepts calls.

On the host side, the 1300 interfaces to the SmartNet 1200 or to NPSI software residing in the IBM front end. The unit supports as many as three SNA/SDLC Physical Unit connections, one X.25 link, and one asynchronous diag-

nostics port and can be direct connected or attached via a modem. The unit is compatible with the SmartNet 2600, 2700, and 3600 products for SNA terminal cluster-to-X.25 PDN conversion.

The SmartNet 1500 is a basic packet assembler/disassembler for PC users who want to connect to PDNs. The unit is available in one-, three-, five-, or seven-asynchronous port models. Each port operates at selectable rates from 300 to 9600 bps. Features include auto call and mnemonic call methods, two inactivity timers to control idle connections, and a password-protected configurator that can be accessed through any port.

The SmartNet 5250/T connects up to seven asynchronous terminals, PCs, printers, and graphics devices to the twinax port of the IBM System 34/36/38. The 5250 supports 45 asynchronous terminals, including the IBM 3161/62/63/64, Digital Equipment VT100/VT220, Lear Siegler, ADDS Viewpoint, Televideo, and Wyse. Through the 5250/T, asynchronous printers can emulate IBM 5256, 5219, and 3812 printers, which connect directly to the 5250/T or through the auxiliary port of an asynchronous display or PC. Through software, users can select to have either RS-232-C or RS-422A ports.

The 5250/T also has a cable-through feature when the unit is the last twinax drop in a multidrop environment. Cable-through means that the cabling can run through the actual protocol converter itself.

DEVICE CONTROL

An operator configures PCI SmartNet Series 200 converters through a menu-driven configurator. To install the units, the user must configure the synchronous port and asynchronous ports. Examples of the functions that must be set on the host side of the converter include whether the unit will connect to the host directly or via the modem; the polling address; unit operating speed; and the presence or absence of Non-Return-to-Zero-Inverted (NRZI). In contrast to other protocol converters, external strapping allows the user to connect devices and/or modems to individual parts using standard cables without using cross-cables.

The asynchronous ports are configured for the following: whether the ASCII terminal connects directly to the converter or to a modem or modem sharing unit (MSU); which of the ports are assigned to CRTs; CRT brand (over 300 different models are supported by PCI); speed for each port; auto speed selection; which ports are assigned to printers; printer speeds; and whether the dynamic printer port is used, and by which CRT. The synchronous ports are configured for SDLC and/or bisync address; number of devices connected (e.g., up to 32 Logical Units, converted to one SNA Physical Unit Type 2); and SNA/SDLC timeout.

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Upon receiving power, all Series 200 protocol converters test internal components. In addition, all PCI units have built-in diagnostic line monitors and integrated trace capabilities. Diagnostic test sequences activated by keyboard command include the following: display of switch settings; ASCII line test; monitor of SDLC address polling; display of SDLC address and control bytes; display of SDLC status; and SNA tracing of data at the port where the test is executed. Test results are displayed on a CRT and/or printer attached to the converter. A special port monitors the converter itself.

To install a Series 200 converter, the user simply inserts a program pack into a PCI enclosure, which has front-panel LEDs for monitoring power, system operation, carrier detection, reception, and transmission. Users control the Series 200 converters through a terminal connected to a command port. Using setup mode, an operator can configure up to 32 user profiles, which contain information about a terminal's connection to the network. Setup mode allows creation and storage of auto logon/logoff sequences.

In addition, an operator can configure all Series 200 asynchronous channels for non-IBM asynchronous host access, allowing terminals to switch between an IBM mainframe and asynchronous host or the X.25 network and an auto dial modem. Users can monitor the status of both asynchronous and synchronous lines through any terminal connected to a Series 200 converter. Additional diagnostics features allow the converters to display both the address and control bytes of the SDLC line.

All SmartNet 200 models provide four levels of password security: Level 1 creates and stores up to 32 individual passwords in nonvolatile memory; Level 2 allows the network manager to establish predefined session paths to ensure authorized application connections; Level 3 provides auto callback security; and Level 4 limits the distribution of passwords and user identifications through an automatic logon/logoff.

Through a Series 200 dynamic spooling feature, a personal computer communicates with an IBM host as a CRT or printer, letting users address and send output to more than one device at a time. The Series 200 converters are compatible with IBM mainframe file upload and download facilities, allowing personal computer users to share data between applications and host databases. Through a software option available on the 251, a personal computer attached to the converter can transfer data files to and from a System 34/36/38 and allocate, delete, and rename files on the PC's diskette.

On SmartNet 1200 and 1300 units the following selections must be configured for the X.25 link: first logical channel number, packet window, packet length, frame timeout, and packet-level timeout. Asynchronous-side settings include those for direct or modem connection and auto speed detection.

Users can monitor X.25 packets and frames and access information, such as SDLC status and SDLC address and control bytes, through an ASCII terminal. An asynchronous control port handles integral diagnostic tests.

The SmartNet 5250/T, which supports X-on/X-off and DTR flow control, is set up in minutes for on-line operation through factory default parameters. Users can otherwise reconfigure the protocol converter through full-screen configuration menus accessible from any port. The 5250/T provides realtime updates even while the unit is on-line. Configuration parameters are stored in nonvolatile memory.

Basic Assurance Tests that check the processors, the memory, and the input/output circuitry are automatically invoked at power on or can be run when requested by an attached terminal user. Front-panel LEDs indicate faults detected by the diagnostics. Users can also access comprehensive statistics for the twinax link and the asynchronous ports.

PRICING

Shown below are the low- and high-end prices of each SmartNet product. Users can purchase PCI products directly, through manufacturer representatives, or through distributors within the United States. International distributors are located in Canada, South America, Europe, the Middle East, Asia, and Australia.

EQUIPMENT PRICES

Models	Purch. Price* (\$)
SmartNet 251 (ASCII to IBM System 34/36/38)	
SmartNet 271 (ASCII to Bisync)	
SmartNet 276 (ASCII to 3270 SNA/SDLC)	
4 asynchronous ports	3,550
32 asynchronous ports	9,700
SmartNet 1200 Host PAD (SNA/SDLC to X.25)	
1 X.25 link, 1 SNA/SDLC port	3,200
SmartNet 1300 Terminal PAD (SNA/SDLC to X.25)	
1 X.25 link, 3 SNA/SDLC ports	3,200
SmartNet 1500 (Async to X.25 PAD)	
1 X.25 link, 1 async port	1,050
1 X.25 link, 7 async ports	1,550
SmartNet 5250/T (ASCII to IBM System 34/36/38 Twinax)	
7 asynchronous ports	2,595
SmartLink PC File Transfer communications software	195

*Quantity of one.