Dynatech Communications PADs

datapro
ANALYSIS

UPDATE: *Dynatech, through restructuring its operations, is striving to be seen as a single source of communications systems and hardware.*

The new Dynatech Communications consists of three operating entities: Dynatech Communications Systems, Dynatech Communications Products, and Dynatech Communications International. All of the X.25 packet assembler/disassemblers (PADs) are offered by Dynatech Communications Products, formerly Dynatech Packet Technology.

Like many companies, Dynatech is aiming to serve an emerging international market for communications products, including a presence in Canada, England, France, Italy, Japan, Norway, Sweden, and West Germany.

By concentrating on offering customers a "total network" solution, Dynatech has developed a product line that includes all the packet network essentials, including packet switches; packet assembler/disassemblers; X.25 gateway devices; a Message Detail Recorder (MDR) data link adapter; and a Small Packet Network Control Center, a comprehensive network management and control software package that runs on IBM or compatible personal computers.

PRODUCT EVALUATION

This report focuses on Dynatech's PADs, the CPX Model 8, Multi-PAD X.25, and the Proto-PAD X.25. The company also sells a one-port Mono-PAD X.25 that allows one asynchronous device to access an X.25 public or private network. Dynatech products operate on most public
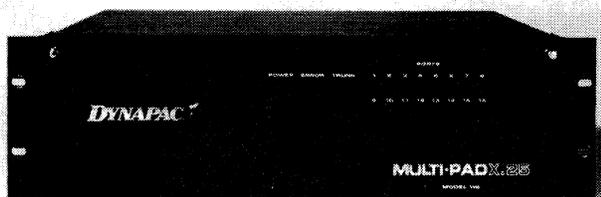
Dynatech's Multi-PAD X.25 allows asynchronous terminals to access X.25 packet services.

VENDOR: Dynatech Communications, 991 Annapolis Way, Woodbridge, Virginia, 22191. Telephone (703) 550-0011.
CANADIAN DISTRIBUTION: Dynatech Communications Limited, Suite 700, 55 Town Center Court, Scarborough, Ontario L1P 4X4
MODELS: CPX Model 8, Multi-PAD X.25—Models 108, 116; Proto-PAD X.25—Models 301, 341, and 381.
COMPETITION: IBM, Local Data, PCI.
PRICE: CPX Model 8—$2,250 to $2,950, Multi-PAD X.25 Model 108—$2,205 to $2,905; Model 116—$3,415 to $5,550; Proto-PAD X.25 (all models)—$6,490 to $7,990.

data networks internationally. The units support all three levels of CCITT Recommendation X.25, bit-oriented (HDLC) framing, LAP (pre-1980) and LAPB (post-1980) at the link level, and 18 of the 22 terminal parameters defined in CCITT Recommendation X.3.

Dynatech PADs support a variety of modems, including AT&T 113 and 212 and compatible units. The PADs can also support ASCII auto dialers, terminals with various flow control schemes, printer delay characteristics, type font distinctions, and many types of host computers and front-end processors. PAD ports are configurable for dial-in modem connections with optional auto speed and auto parity and for direct connections with asynchronous host and front-end processor ports. Ports can both accept and place calls and be set up to automatically establish a connection to a matching port at the other end of the X.25 trunk. Mnemonic addressing capability allows users to set up addressing by name rather than numeric code; this is a clear advantage, particularly in large networks supporting thousands of terminals.

The CPX Model 8 is newest to the line. Announced in early 1988, the CPX Model 8 supports connection of up to eight asynchronous ports onto a single X.25 trunk. Trunk speeds up to 19.2K bps are supported, while the asynchronous ports are supported at 19.2K bps. It would be unreasonable, however, to configure eight devices constantly sending data at 19.2K bps to the PAD, since the outgoing

X.25 trunk couldn't support the aggregate data volume. In interactive applications, on the other hand, the stop/start data transmissions coming from the DTE devices, even at 19.2K bps each, usually allow time for the PAD to catch up between transmissions. Since this is essentially a multiplexing process, analysis should be performed in advance to achieve the optimum traffic balance.

The Multi-PAD X.25 converts asynchronous traffic from DTE into a synchronous X.25 format. In addition, the unit serves as a terminal concentrator by consolidating traffic from up to 16 terminals onto one X.25 trunk. Multi-PAD is also a host port concentrator for computers without X.25 interfaces. The unit supports 4 to 16 asynchronous ports and line speeds of 50 to 9600 bps.

The Proto-PAD X.25 handles both synchronous and asynchronous connections. Through its synchronous port, it supports IBM 3270 BSC device attachment, allowing an IBM BSC host to communicate with up to eight, 3270-type cluster controllers over an X.25 link. Proto-PAD also supports up to eight asynchronous ports. All models are available in cluster emulator or host emulator versions.

When the unit is operating with IBM BSC equipment, Proto-PAD provides communication over the packet network through local emulation, transmitting only screen information over the X.25 link. This results in reduced line use and transmission costs. (Packet network charges are billed according to number of information packets sent; therefore, charges are lower if the amount of information sent is reduced.) The unit supports synchronous transmission from 1200 to 9600 bps and asynchronous transmission from 110 to 9600 bps.

Depending upon application, Dynatech PADs can also communicate with similar devices from other manufacturers, and it is common to find PADs from a number of manufacturers coexisting in a large X.25 network. Multi-PAD is often used with Dynatech's Multi-Switch X.25 to build extensive local or long-haul networks. Multi-Switch X.25 routes data from one X.25 trunk to another X.25 trunk and can concentrate traffic from many X.25 trunks onto one. Dynatech also has a joint marketing agreement with Prime Computers.

MARKET POSITION

Dynatech, an established international supplier of X.25 networking equipment, has strengthened its market position through its recent reorganization. Nevertheless, Dynatech now must compete with a number of new entrants in the X.25 arena, including companies like Micom Systems; ComDesign; Timeplex; and Memotec Data, a Canadian firm.

The market for PADs and packet switches is generally split into domestic and international realms, as well as public and private arenas. Companies like Telenet and Tymnet manufacture a large amount of equipment for use in their own public data networks, while companies such as Dynatech, Memotec, Cableshare, and Timeplex market primarily to private network users. Dynatech concentrates its marketing efforts at the low end of the private network market.

PAD users are increasingly aware that improved throughput performance is needed. Dynatech is addressing this need with its new CPX Model 8. The Z80 microprocessor is superseded by a more powerful MC 68000-class device. If Dynatech continues to employ design improvements in new products, customers can expect to see more high-performance features in the future.

Dynatech PAD users we spoke with cited X.25 communications software as a possible problem area on PADs from any vendor. There are often discrepancies in the implementation of X.25 from vendor to vendor, and even the slightest difference can be problematic. Dynatech PADs (as well as those from other vendors) often must undergo software changes to accommodate these differences. Dynatech works closely with customers to iron out difficulties in software implementation, and maintains over 70 software releases to meet customer needs.

APPLICATIONS PROFILE

We interviewed two users of Dynatech PADs and other X.25 networking equipment concerning their experiences with the products. Both give Dynatech's PADs good to excellent ratings in overall performance, ease of installation and operation, device reliability, and maintenance and technical support. One user does note that installing a Model 12 Multi-Switch is far more difficult than setting up a corresponding Multi-PAD X.25.

SITE ONE: The first user we contacted was the telecommunications manager of a large financial institution in New York City. The company has an international network with major centers in New York, London, and Hong Kong and satellite offices located throughout the world. This institution uses about 90 Model 108 and Model 116 Multi-PADs in its network, as well as Multi-Switches at busy, remote locations. (This figure does not include redundant equipment.) A Northern Telecom SL-10 packet switch is used at each major network hub. During the equipment selection process, planners reviewed products from Dynatech and Cableshare. Dynatech products were chosen because they were priced well and could be easily modified through software changes.

This user cites protocol discrepancies that "caused the company many headaches" as his largest problem. He points out that although Dynatech has done a fairly good job developing software for its PADs and switches, one doesn't experience many problems until the equipment is actually up and running in the field. This is generally due to vendor differences in X.25 implementation. Dynatech

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is very accommodating concerning software problems but slow to actually deliver new releases to solve difficulties. The user feels that this slowness is because it is difficult to find programmers adept at handling X.25 implementations. He also cites the difficulty in acquiring good communications software, and he sympathizes with any problems Dynatech encountered in helping him.

Major advantages of Dynatech PADs, according to the manager, are mnemonic addressing, which allows PADs to be addressed by name rather than 10-digit codes; the ability to modify the Multi-Switch software; and competitive pricing. He also commends Dynatech's willingness to work with his department to solve equipment and software problems and to respond to requests for additional features. In fact, Dynatech honored his request for additional ID password support for the Multi-PADs. In this manager's particular application, a form to prompt for ID password can be set up to appear on a terminal screen upon logon. Screen ID and passwords are forwarded to the SL-10 for final confirmation. The ability to protect the network from unauthorized access is considered a critical feature in this user's application.

SITE TWO: The second user we interviewed is a communications manager with a large, midwestern university. The network includes 448 PAD ports, some hosts with direct X.25 interfaces, three VAX computers, two Harris machines, a Digital Equipment Corporation PDP-11, a Honeywell GCOS, and several IBM computers. The IBM hosts access the network PADs via IBM's 7171 protocol converters. The user notes that while many of the PADs in his network are Dynatech Multi-PAD X.25s, others are from Micom Systems and ComDesign. All of these units are interchanged with few problems.

When asked to cite the chief advantages of Dynatech PADs, the manager notes their mnemonic addressing capability, the ability to assign different controls to RS-232-C leads for special applications, outstanding functionality and reliability, and comprehensive support for X.3 parameters. He stresses that mean-time-between-failure for his Multi-PADs is excellent: in 2½ years, only one PAD required service. (The university's service center stocks at least one backup PAD at all times; if a PAD goes down, it is immediately replaced by in-house service personnel, and the defective PAD is returned to the company for service or replacement.) He rated Dynatech's service and response to problems excellent.

Disadvantages noted included cooling fans that went out more than they should have and an AC power glitch. If the PADs experience a minor (less than one second) power outage, they have to be reset manually. However, automatic switchover to backup power always occurs during a major power failure. The user also notes that every PAD had to undergo software changes to accommodate slight differences in X.25 implementation from product to product. Dynatech was extremely responsive in this regard and tailored software specifically for the university's applications. As a side note, the user adds that one needs a solid background in X.25 networking to install Dynatech PADs. "They are not plug in and run sort of devices," he says.

Overall, this manager rates Dynatech and its products company very good. His institution plans to expand its network to include a backbone switch and more X.25 equipment.

SPECIFICATIONS

MODELS: CPX Model 8, Multi-PAD X.25—Models 108, 116; Proto-PAD X.25—Models 301, 341, and 381.
DATE ANNOUNCED: Multi-PAD X.25—1982; Proto-PAD X.25—September 1985; CPX Model 8—February 1988.
DATE FIRST INSTALLED: Multi-PAD X.25—1982; Proto-PAD X.25—1985.
NUMBER INSTALLED TO DATE: Multi-PAD X.25— over 4,500; Proto-PAD X.25 and CPX Model III—information not available.

MODELS

Models within the Dynatech PAD family differ according to number and type of ports supported. The models and their corresponding number of ports are as follows:

CPX Model 8—four to eight ports.

Multi-PAD X.25 Model 108—four or eight ports.

Multi-PAD X.25 Model 116—12 or 16 ports.

Proto-PAD X.25 Model 301—one synchronous 3270 port.

Proto-PAD X.25 Model 341—one synchronous and four asynchronous ports.

Proto-PAD X.25 Model 381—one synchronous 3270 and eight asynchronous ports.

In addition to the Multi-PAD and Proto-PAD, Dynatech also manufactures the Mono-PAD X.25, a single-port unit that allows one asynchronous device to access X.25 public and private networks.

GENERAL DESCRIPTION

The CPX Model 8, an asynchronous PAD capable of concentrating up to eight ports onto a single X.25 trunk,

accesses either a public or private packet network. The unit complies with CCITT X.3, X.25, X.28, X.29, and X.121 recommendations. One of the frustrations of running packet networks is the lack of a broadcast channel facility. Dynatech provides one through the diagnostic port on this PAD. Network users are notified of scheduled downtime, system problems, etc.

The Multi-PAD X.25 connects asynchronous, start-stop devices to the synchronous X.25 network. In the network, the units function as statistical multiplexers or terminal/host concentrators by consolidating traffic from many terminals/hosts onto a single trunk; in the concentration application, the need for dial-in/dial-out modems is eliminated, along with the related telephone company charges.

Each Multi-PAD X.25 consists of a main printed circuit board containing a Z-80 microprocessor; RAM; ROM circuitry for the X.25 link; and circuitry for four asynchronous ports, expandable in four-port increments. The Model 108 unit contains 10K bytes of ROM; 12K bytes of RAM; and for units with software versions prior to 1.9, a piggyback memory board containing space for 26K bytes of additional memory. Units with software Releases 1.9 and above contain a larger piggyback board with space for 14K bytes of additional ROM and 16K bytes or 28K bytes of RAM. Model 108 contains the circuitry for four additional asynchronous ports. Model 116 is similar to the Model 108, but contains a main, four-port expansion board; a memory board with 14K bytes of additional ROM and 16K bytes or 28K bytes of RAM; and provisions for two asynchronous, four-port expansion boards. Memory used for statistics and configuration has battery backup; downline loading is available as an option.

The Proto-PAD X.25, a combined protocol converter and emulator, allows an IBM BSC host and cluster controllers to communicate via an X.25 network. Each unit consists of a printed circuit board that contains two independent microprocessors (one dedicated to handling link-level X.25 protocol across the trunk, the other handling X.25 packet-level and BSC protocols and host/cluster emulation functions), 32K bytes of ROM, 28K bytes of RAM, dual synchronous ports, and a single asynchronous port. An optional connector allows communication between expansion boards and system RAM through an internal data bus. The dual microprocessors operate asynchronously and use local PROM/RAM and input/output (I/O) facilities. Messages transferred between the processors are stored in a public RAM.

TRANSMISSION SPECIFICATIONS

CPX Model 8 Physical Level:

• Interface—RS-232-C, V.24 (synchronous X.21 bis), full duplex.

• Transmission rates—75 to 19.2K bps asynchronous.

Link Level:

• Framing—HDLC.

• Addressing—DTE or DCE.

• Procedure—LAPB.

• Numbering—Modulo 8.

• Parameters—K is variable from one to seven; N1 equals 2,104 (263 octets); N2 is 1 to 49; and T1 is variable from 100 milliseconds to 25.5 seconds.

Packet Level:

• Services—Permanent Virtual Circuit (PVC) or Switched Virtual Circuit (SVC), configurable on per-port basis.

• Numbering—Modulo 8.

• Data fields—octet aligned.

• Logical group number—O-F (full range); user configurable.

• Logical channel number (LCN) used—accepts calls on any LCN, 0 through 4,095; PVC ports can be assigned individual LCNs.

• Address format—up to 15 digits; supports abbreviated addressing conversion for Telenet and other public networks.

• Window size—one to seven.

• Packet size—256 bytes.

• Reverse charge—accepted; optionally refused; terminal user can originate.

• Throughput class—supported.

• Closed user group (CUG)—M-bit supported; D-bit accepted; Q-bit indicates X.29 command; terminal user can specify CUG ID.

Terminal User Interface:

• User interface—asynchronous RS-232-C, V.24.

• Transmission rates—75 to 19.2K bps; auto baud at any speed.

• Stop bits—one or two.

• Character set—ASCII.

• Parity—odd, even, transparent, or auto parity.

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- Incoming call rotary—10; any or all ports in any rotaries or individually addressed.

- Flow control—X-on/X-off.

- Call clearing—dropping DTR or DSR or via X.28 command or watchdog timer.

- Break generation—upon receipt of interrupt packet.

Multi-PAD X.25 Physical Level:

- Interface—RS-232-C, V.24 (synchronous X.21 bis), full-duplex, continuous carrier; operates on digital or analog facilities (via modem); Multi-PAD supplies DTR and RTS; modem or DSU supplies DCD and CTS.

- Transmission rates—50 to 9600 bps asynchronous and 1200 to 9600 bps synchronous; modem or DSU supplies clock on pins 15 and 17.

Link Level:

- Framing—HDLC.

- Addressing—DTE or DCE.

- Procedure—LAP or LAPB.

- Numbering—Modulo 8.

- Parameters—K is variable from one to seven; N1 equals 2,104 (263 octets); N2 is 10; and T1 is variable from 1 to 127 seconds.

Packet Level:

- Services—Permanent Virtual Circuit (PVC) or Switched Virtual Circuit (SVC), configurable on per-port basis.

- Numbering—Modulo 8.

- Data fields—octet aligned.

- Logical group number—O-F (full range); user configurable.

- Logical channel number (LCN) used—accepts calls on any LCN, 0 through 4,095; PVC ports can be assigned individual LCNs.

- Address format—up to 15 digits; supports abbreviated addressing conversion for Telenet and other public networks.

- Window size—one to seven.

- Packet size—128 or 256 bytes.

- Reverse charge—accepted; optionally refused; terminal user can originate.

- Fast select—accepted; terminal user can originate.

- Throughput class—accepted at any value; originated by terminal user.

- Closed user group (CUG)—M-bit supported; D-bit accepted; Q-bit indicates X.29 command; terminal user can specify CUG ID.

Terminal User Interface:

- User interface—asynchronous RS-232-C, V.24 female as AT&T 103-, 113-, or 212-compatible modem or as terminal for dial-in modem connection.

- Transmission rates—50 to 9600 bps; auto baud to 9600.

- Stop bits—two for 110 bps; one or optionally two for all other rates.

- Character set—ASCII or eight-bit transparent, Baudot.

- Parity—odd, even, transparent, or auto parity.

- Incoming call rotary—10; any or all ports in any rotaries or individually addressed.

- Flow control—X-on/X-off character (DC1/DC3 or user defined); HP ENQ/ACK; physical CTS/RTS, BSY/DTR.

- Incoming call indication—RI, DCD/DSR, or DTR.

- Call clearing—dropping DTR or DSR or via X.28 command or watchdog timer.

- Make busy—port can make modem busy; feature operated remotely through the diagnostic port.

- Break generation—upon receipt of interrupt packet.

- Local switching—between all ports without using trunk; between any port and the diagnostic port; transfer or attach call to another port on the unit.

Proto-PAD X.25 Physical Level:

- Interface—synchronous RS-232-C, V.24 (X.21 bis), full-duplex, continuous carrier. Proto-PAD supplies DTR/RTS; modem supplies DCD, CTS.

- Transmission rate—1200 to 9600 bps; modem supplies clock on pins 15 and 17.

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Link Level:

- Framing—HDLC.

- Addressing—DTE or DCE.

- Procedure—LAPB.

- Numbering—Modulo 8.

- Parameters—K variable from one to seven; N1 equals 2,024; N2 is 10; and T1 is variable from 1 to 49 seconds.

Packet Level:

- Services—SVC.

- Numbering—Modulo 8.

- Data fields—octet aligned.

- Logical channel number used—configuration option.

- Address format—up to 15 digits.

- Window size—variable one to seven.

- Packet size—128 bytes.

- Reverse charge—configurable to accept or originate.

- Closed user group—M-bit supported and used; D-bit accepted but never transmitted; Q-bit not applicable.

Synchronous Port:

- Physical interface—RS-232-C, V.24.

- Transmission rate—2400 to 9600 bps; supplies clock on pins 15 and 17.

- Protocol—IBM 3270 BSC; supports multidrop mode with external modem sharer; emulates both host or cluster configuration option.

Diagnostic port:

- Physical interface—RS-232-C, V.24.

- Transmission rate—100 to 9600 bps.

- Code—ASCII, seven data bits, one stop bit, even parity.

PRICING

Prices for Dynatech's PADs vary according to options and number of ports selected. Prices of the CPX Model 8 range from $2,250 to $2,950; Multi-PAD X.25 Model 108 from $2,205 to $2,905; Multi-PAD X.25 Model 116 from $3,415 to $5,500; Proto-PAD X.25—$2,700 (Model 301); $4,200 (Model 341); $5,200 (Model 381); and Mono-PAD X.25 from $695 to $995.

Dynatech warrants its hardware products against defects in material and quality for 90 days after delivery. Software is warranted for one year. Extended warranty arrangements, including "spare-in-the-air" service, are available for an additional charge. □