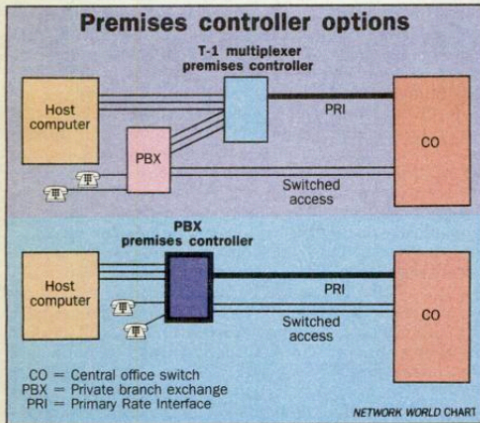


NETWORK WORLD

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PRIMARY RATE INTERFACE

ISDN raises new CPE questions

Customer premises controller could be T-1 mux or PBX.

BY JOSH GONZE
Senior Writer

As ISDN becomes commercially available, corporate network managers will face a critical question: What type of customer premises equipment should be used to terminate and control ISDN Primary Rate Interfaces?

The Primary Rate Interface is the standard for T-1-like, high-capacity access facilities linking customer premises equipment at corporate sites to Integrated Services Digital Networks.

The issue before users is whether a private branch exchange, a T-1 multiplexer or some other type of network processor will best serve as the premises controller used to configure Primary Rate circuits.

Most of the major PBX vendors, including AT&T and Northern Telecom, Inc., have announced Primary Rate Interfaces or are at least committed to the stan-

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ALTERNATIVE CARRIERS

Merrill Lynch, Fidelity team for bypass net

Boston venture to offer private-line services.

BY KARYL SCOTT
Washington, D.C. Correspondent

BOSTON — Merrill Lynch Teleport Technologies, Inc. last week launched a joint venture with Fidelity Investments of Boston to build a fiber-optic metropolitan-area network that will give businesses here a

private-line alternative to New England Telephone and Telegraph Co.

Merrill Lynch and Fidelity are equal partners in Teleport Communications-Boston (TCB), which has already begun construction of a 40-mile fiber network that will link sites throughout Boston's Govern-

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INDUSTRY FOCUS

GOSIP to govern federal nets

BY L. DAVID PASSMORE AND JEFFREY HORN
Special to Network World

Whether users are ready or not, the Government Open Systems Interconnection Profile (GOSIP) is about to become a federal standard. Many government users who will be required to adopt it are

still unaware of the specification and its implications, while a number of vendors will be caught with inadequate Open Systems Interconnect (OSI) product implementations.

GOSIP won't become mandatory for over two years. Even then, loopholes will allow continued use of Transmission Con-

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INTEROPERABILITY

X/Open group forges ahead

BY PAM POWERS
Senior Editor

SAN FRANCISCO — X/Open, a consortium formed to mold existing standards into a common applications architecture, is drawing top vendors as users begin to press for compliance with its specifications.

The goal of X/Open is to define specifications based on existing standards, enabling vendors to develop applications that run on any device compliant with X/Open specifications.

The creation of a common application environment (CAE) is intended to allow global interoperability

among applications while providing a migration path to Open Systems Interconnect (OSI) standards.

IBM is involved in a similar effort with its evolving Systems Application Architecture (SAA), which is intended to enable IBM applications to run across the

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NETWORK LINE

News

▶ AT&T and Tandem will develop ISDN interfaces for Tandem systems. Page 2.

▶ Siemens unveils an ISDN Primary Rate Interface for

its Saturn PBXs. Page 2.

▶ AT&T offers a net management system that will let telephone companies give users greater control over Centrex. Page 2.

▶ The University of Connecticut awards a \$13 million contract for a 5ESS-

based ISDN net. Page 4.

▶ Communications Solutions unwraps a local net-to-IBM host gateway that it will sell directly to users. Page 4.

Features

▶ The U.S. government brings its telecom system into the 20th century and rids itself of a dinosaur. Page 32.

▶ Two end-to-end data encryption devices from Cylink and Hughes Network Systems can stymie even the most cunning data thieves. Page 47.

USER STRATEGIES

LAN users look to microwave links

BY LAURA DIDIO
Senior Editor

BOSTON — Boston University (BU), Harvard University and Massachusetts General Hospital last year faced the same problem: finding a high-speed, cost-effective way to link remote Ethernets.

All three of the Boston-based users found an answer in microwave bypass technology. The organizations implemented microwave local network extensions that operate at Ethernet's 10M bit/sec speed.

Using a data-link-layer Ethernet extender from Cambridge, Mass.-based Microwave Bypass Systems, Inc., a

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NEWSPAPER

X/Open group forges ahead

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range of IBM equipment. X/Open, however, could prove an attractive alternative for users that seek a common application environment outside the IBM camp.

X/Open currently has 13 members. The consortium was founded in 1984 by European vendors Groupe Bull, Nixdorf Computer Corp., Ing. C. Olivetti & Co., S.p.A., Siemens AG and International Computers, Ltd. and has since added several major U.S. vendors, including AT&T, Sun Microsystems, Inc., Hewlett-Packard Co., Unisys Corp. and Digital Equipment Corp.

Those vendors, in conjunction with software vendors such as Cullinet Software, Inc., Microsoft Corp., Oracle Corp. and Informix Software, Inc., have committed to compliance with the CAE standards in future product development. Some users are also working with the specifications to develop interoperable applications.

"The goal of X/Open is the creation of a vendor-independent open systems marketplace based on a common application environment," said Robert Ackerman, chief marketing officer of X/Open.

Ackerman defined CAE as "a set of international de facto standards that provide a comprehensive application environment across a variety of hardware platforms." Ideally, the creation of a CAE would allow applications to run on any hardware and software platform.

Unlike IBM's SAA, X/Open hopes to address the plethora of users with multivendor shops. And unlike the numerous standards bodies in existence today, X/Open's charter does not involve the creation of standards, but rather the integration of existing standards. Proponents of the group point to those differences as critical to X/Open's ability to move swiftly in developing CAE.

"X/Open takes what exists and builds on it, whereas [the International Standards Organization] is building from scratch," observed David Terrie, president of NewPort Consulting in Scituate, Mass. "ISO will never be able to catch groups like that because [those groups] have a much more efficient way of doing things."

Indeed, two years after its founding, X/Open claims to have a workable CAE today. The specifications for CAE are available in a 1,900-page book called the *Portability Guide*.

The guide provides specifications of operating system interfaces, programming languages, data management facilities and formats for transferring application source codes among X/Open systems. The guide is continually updated as more standards are adopted by the consortium.

Ackerman said standards are adopted according to a priority schedule that is largely set by the Independent Software Vendor Council and User Advisory Council within X/Open. "Senior executives from software and user companies

sit down with us on a frequent basis to help determine what areas to focus on next," he said.

X/Open user members

Among X/Open's user council members are Aetna Life & Casualty Co., Eastman Kodak Co., Shearson Lehman Hutton, Inc., Lockheed Corp. and the U.S. Treasury Department. In late 1987, the Treasury Department solicited vendor comments on X/Open for a \$2 billion minicomputer procurement.

"That's a significant indication of the user demand for a common application environment," Ackerman said.

X/Open has specified the Unix System V platform as the operating system base for its CAE. Ackerman said that in 1985, System V was the only operating system to fit the X/Open criteria. That criteria stated that the system must be vendor-independent, architecturally independent and have broad market acceptance. Unix runs on a range of processors, from microcomputers to mainframes. Among the standards that X/Open has adopted are SQL and XWindows.

To prevent any single company from gaining an advantage in the field of X/Open, Ackerman said the group adapts standards before incorporating them into CAE. X/Open has, for example, modified System V by replacing part of the application interface with one proposed by the Institute of Electrical and Electronics Engineers. "Over time, the de facto standard that looks like System V today will be replaced by an international standard," he said.

Steps toward networking

Two weeks ago, X/Open took its first step toward developing standards for networking in the CAE. Ackerman said the consortium has committed to incorporating the programming interface spelled out in Level 4 of the OSI standards. The intent is to write applications to that interface so that they will be portable to OSI when that architecture becomes operable. "Networking is a very high priority for us," Ackerman said. "Long term, our commitment is to OSI."

Rather than waiting for OSI, X/Open will rely on the European Strategic Programme for Research (ESPRIT), a group of 12 European vendors that has created a special subgroup to develop interim communications standards for X/Open. X/Open is considering adopting the Inter-Process Communication and the Distributed File System as two communications services now operable within the CAE.

X/Open's stated commitment to OSI is important to users that want to be assured of a migration path from existing to future standards. "My suspicion is, that as long as you have multivendor environments, the best environment is going to be the one that applications gravitate toward — the one with the most functions," Terrie said. "In some ways, it's entirely likely that OSI will act as a functional subset to what is being done at X/Open." □

LAN users try microwave links

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privately held firm, Harvard connected an Ethernet segment at one of its facilities to another Ethernet at a BU site.

Mass General implemented the same system to connect Ethernets at its headquarters and its Cardiac Computer Unit in Charlestown, Mass.

The Ethernet at Mass General actually includes four cable segments at the Charlestown building and 10 more in the hospital. But according to David Murphy, systems and network manager for the hospital, the microwave system runs at full Ethernet speeds and makes the network look like one large network. "We wanted the link to be invisible to the user," Murphy said.

The two Mass General facilities support roughly 350 to 370 devices on the extended Ethernet.

The main campuses of Harvard and BU are located within two miles of each other. Both universities have numerous local networks that are interconnected within their own campuses. Existing links from school to school, however, were relatively low-speed connections. Transmissions between BU's and Harvard's nets had been at 56K bit/sec and 9.6K bit/sec over leased lines.

Mikhail Orlov, network system engineer for BU's distributed computing and communications department, felt that running dedicated coaxial cable or fiber to link the BU and Harvard Ethernets was not really an option. "One solution would have been fiber," he said. "But since we had the Charles River [separating the campuses] and government and city regulations to contend with, plus the tremendous cost, we decided against it."

According to Orlov, when BU installed a fiber-optic network supporting one part of the campus last year, the cost of the cable and labor alone was about \$125,000. "To put a fiber-optic cable connection between Harvard and BU would easily cost \$1 million," he said.

Meanwhile, at Mass General's Cardiac Computer Unit, Murphy was wrestling with a similar problem. The hospital had moved the research portion of its facilities from hospital headquarters in downtown Boston to a site in Charlestown. A scant mile separates the two facilities, but that mile covers the heavily trafficked old North End of Boston.

"We had originally installed Ethernet at Mass General about three years ago to connect the research, administrative and clinical computer facilities to two VAX-11/780s and a DEC Pro/350. It's since grown to 110 DECnet nodes, 250 DEC terminal servers and about eight other types of nodes, including several Unix systems," Murphy said. "We needed to extend the Mass General Ethernet to the Charlestown facility, preserving the full bandwidth of the Ethernet because of the heavy data sharing between different depart-

ments on the network."

Neither Orlov, who has a Ph.D. in computer science from the Electro Technical Institute in Leningrad, USSR, nor Murphy, a self-professed technical whiz "who has been playing with VAXes since college," was familiar with the concept of microwave bypass technology as a tool for extending local networks.

But when they saw Microwave Bypass Systems' advertisements and contacted David Theodore, the company's president and founder, both became convinced the technology could work.

"A lot of people know about microwave bypass technology, but, amazingly, very few users have chosen to implement it for local networks," Orlov observed. "We spent \$50,000, and that covered everything: cable installation, hardware, antennas and licenses. The installation took less than a week to complete," the BU system engineer said.

Microwave's the answer

Mass General's Murphy agreed. "Microwave was infinitely more cost-effective than a fiber-optic solution, because we don't have a right of way. We'd like to get fiber in here eventually as a backup, and we're still trying to find an alternate path, other than phone company conduits, between the hospital and our Charlestown building."

The local network extension that Mass General installed is a "dual link that's completely redundant; we have two microwave dishes next to each other at both facilities," Murphy said. The link connects virtually every department in the hospital.

Both Orlov and Murphy said they have experienced no problems in the six to eight months that they have used the bypass links. Microwave is generally considered to be susceptible to the vagaries of the weather, but both men said they have not had any weather-related outages.

Murphy said, "The only thing I really worry about is lightning directly hitting the roof of Mass General, where the two microwave dishes are. A direct hit would take everything down."

Orlov said the 10M bit/sec speed of the microwave link means Harvard and BU can transmit huge amounts of data within seconds. "If you use 9.6K bit/sec or 56K bit/sec, it takes minutes and sometimes hours, and you have noise and breakup, so you have to incur some retransmission. With microwave we can send data at higher speed and without interruptions," he said.

Additionally, Orlov said, "You can go up to five miles without a repeater before you start to exceed the propagation delay that is inherent in the Ethernet specification. You can't do that with any other technology."

Another advantage of microwave bypass technology is that it is protocol-independent, Murphy said. "What that means to me, the user, is that I can run anything across the link." □