

Datapro

Communications Perspective

Technologies, Systems, Strategies

SEPTEMBER 1989

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Beyond Mere Connectivity

In an April 1988 newsletter article in *Datapro Reports on PC Communications* (before *Communications Perspectives* was introduced), we commented on the battle lines being drawn among several database server product vendors for the OS/2 network environment. In that article, we stated that it was "applications developers, not networking vendors, that will have significant roles in OS/2 networking."

How is this so? In particular, why should this be true of OS/2 networking more than, say, PC-/MS-DOS networking? In other words, how does OS/2 enhance the impact software developers have on the networking market more than previous PC operating systems?

It is common knowledge that OS/2 offers certain inherent advantages over MS-DOS from the standpoint of software developers. But, as a whole, the industry's maturity has primarily helped to shape the major vendor lineups in the networking market. This is not to suggest that the role of the network vendor has ended. Far from it. Rather, it is an attempt to focus on key technologies that are bringing applications developers to the forefront of the desktop connectivity market.

The most interesting development today for OS/2 networking is the so-called client/server computing model and the roles that database software vendors have assumed for their wares to fit that model.

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Connectivity

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Traditional database vendors of the minicomputer and mainframe worlds, such as Oracle (Belmont, California), Sybase (Berkeley, California), Relational Technology (Alameda, California), or Information Builders (New York, New York), are developing database server (engine) products for the OS/2 environment, or are licensing their technology to vendors already active in the desktop computing area. Traditional PC database vendors, such as Borland International (Scotts Valley, California), DataEase International (Trumbull, Connecticut), and Revelation Technologies (Bellevue, Washington), primarily serve the client or requester end of the client/server database dichotomy with front-end or presentation products.

The benefit of this technology demarcation is efficiency. No longer do such different decision support tools as spreadsheets, PC databases, and presentation graphics need to create and maintain their own unique databases. They use data from a common data pool created and maintained by a database server that is compliant with IBM's Structured Query Language (SQL) standard.

Unfortunately, as in every segment of the computer industry, there are still variances even in the midst of such standards as SQL. To start with, there is the ANSI SQL standard and the IBM standard. Even if a few vendors were to stick to one version, they would still come up with a few incompatibilities. Not everyone implements features and capabilities in the same fashion. Some

add extensions that are not found in other compatible products. It is this nature of the industry, the permanence of incompatibilities even while there exist certain standards, that always fuels the innovative energies of many start-up companies. One such company we have watched for over a year is Network Innovations Corporation (Cupertino, California), an independent subsidiary of Apple Computer.

Founded in 1984, Network Innovations (NI) concentrated its initial efforts in developing a software product that provided transparent access from within Macintosh applications to databases, files, and applications running on Digital VAX/VMS systems. NI developed the CL/1 connectivity language in order to enable "desktop software developers to build transparent access to shared corporate data directly into their desktop applications."

A company background brief states that NI "was founded to address one of the most important challenges facing information managers—the need to make desktop personal computer applications work with incompatible data processing applications in corporate computer networks." Having found that previous solutions that focused on "physical links, protocols and technical solutions . . . failed to address the requirement for application-level connectivity," NI embarked on the task of developing a product that would meet this challenge. Hence, it developed CL/1.

As Figure 1 illustrates, CL/1 serves as an interface between a desktop application and DP application and resources.

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Macintosh LAN Connectivity Products Are on the Way

The Macintosh personal computer, with its graphics capabilities, has won widespread acceptance in corporate and university environments. Its popularity, as an alternative to the IBM PC, has long since created a need for connectivity solutions that enable both machines to share files, printers, and other resources. Much to the chagrin of loyal Macintosh users, such solutions have, until now, been largely filled by third-party vendors rather than by Apple Computer Corporation. Last June, however, Apple announced its plans to release a number of new LAN connectivity products for the Macintosh, including a token-ring adapter card, by the third or fourth quarter of this year.

At present, Apple provides Macintosh-to-IBM PC connectivity through AppleShare PC software. This product, when installed into an IBM PC with the AppleTalk Interface Card, enables the PC to connect to an AppleShare server and to exercise all the rights of a normal Macintosh workstation.

Other LAN connectivity solutions are available from a variety of third-party vendors such as 3Com (Santa Clara, California), Sun Microsystems (Mountain View, California), and Touch Communications (Campbell, California). 3Com's 3+Share network operating system incorporates 3+Mac, software that supports connections between Macintoshes on a LocalTalk network and PCs on an Ethernet network running

3+Share. 3Com also offers EtherLink/NB, an Ethernet adapter card for connecting an individual Macintosh II to the 3Com network.

Sun Microsystems markets TOPS, software and hardware designed to interconnect Macintoshes, IBM PCs, and UNIX-based workstations. Installed into each personal computer, TOPS creates a distributed system in which each machine acts as both a file server and a workstation.

Touch Communications markets Touch OSI, software and hardware designed to provide OSI File Transfer, Access, and Management (FTAM) capabilities to Macintosh and IBM PC workstations connected to a VAX/VMS server.

Daystar Digital (Flowery Branch, Georgia), and Kinetics Inc., a division of Novell Inc., (Walnut Creek, California) are two lesser-known vendors that support Macintosh-to-PC connectivity. Daystar Digital distributes the FS100 File Server System, which enables an IBM PC, PS/2, or compatible to be converted into an AppleShare file server. Kinetics markets FastPath 4, an AppleTalk-to-Ethernet gateway that enables the Macintosh II to communicate with VAXs, UNIX systems, and PCs. Kinetics also offers the EtherPort II Card, an adapter for linking an individual Macintosh II to an Ethernet Network. This card supports DECnet, TCP/IP, and OSI protocols.

Apple's new product line, referred to as AppleTalk Phase 2,

will support token-ring and Ethernet networking through the following LAN and WAN products:

- **Apple TokenTalk NB Card**—a gateway card for a Macintosh II workstation or file server, which enables Macintosh IIs to share files and printers with IBM PCs and PS/2s on an IBM Token-Ring Network. This card comes bundled with TokenTalk Version 2.0 software and SMB File Transfer Utility software. The Apple TokenTalk NB Card will also support connections to IBM mainframes and midrange computers connected to the Token-Ring Network. Other upcoming Apple Phase 2 products will work along with the card to provide 3270 terminal emulation, support for IBM's APPC and LU.6 peer protocols, and access to DB2 and SQL/DS databases.

- **Apple EtherTalk NB Card**—a gateway card for a Macintosh II workstation or file server which, when used with Apple's A/UX operating system for UNIX, enables Macintosh IIs to access UNIX-based systems on Ethernet networks. The card comes with EtherTalk Version 2.0 software. The EtherTalk NB Card supports various protocols including TCP/IP and Network File System (NFS).

- **AppleTalk Internet Router**—software that installs into a Macintosh server and acts as a bridge between LocalTalk, EtherTalk, and TokenTalk subnetworks, allowing users in the different subnetworks to share file, printer, and E-Mail resources. This router,

along with all AppleTalk Phase 2 products, supports an almost unlimited number of network nodes.

- **AppleShare PC Version 2.0 software**—an enhancement of Version 1.2. It enables any DOS-based PC to communicate across Apple's EtherTalk and TokenTalk networks using the AppleTalk protocols.

- **MacX25**—software that installs into a Macintosh II server,

linking Macintosh workstations to an X.25 wide area network via the OSI X.25 protocols.

The release of the TokenTalk cards will be a major step for Apple towards securing its position in the corporate networking environment. Apple needs token-ring compatibility to capture business from existing IBM accounts.

The release of the card will also preserve Apple's credibility in the

eyes of the current 1.5 million networked Macintosh users, who have been waiting for Apple to fulfill its promise for token-ring support since 1987, when Apple first made the pledge. Users will feel more secure knowing that they can obtain their connectivity solutions from a single source—Apple Computer—instead of from third-party vendors.

—Martin Dintzis

Fractional T1 Services Unveiled

Fractional T1 (FT-1) reached a new peak in the communications industry with offerings from several equipment vendors and carriers. FT-1 allows users to lease individual 64K bps channels at a lower cost than a full T1 line (1.544M bps). Up until now users had to purchase full T1 lines or 56K bps lines without always needing those capacities. With fractional T1, users customize their networks by ordering only the capacity they need, reducing costs considerably. Some users, however, have found that cost savings are not as great as first thought. The Regional Bell Holding Companies (RBHCs) require users to lease full T1 circuits to access fractional services. The RBHCs are reviewing options for providing access to interexchange carriers' FT-1 services, but until then, full T1 circuits are required.

The concept of FT-1 is not new. Vendors and carriers, in Europe and Canada, have offered FT-1 equipment and services for several years. In the U.S., equipment vendors finally jumped on the bandwagon. Newbridge Networks (Herndon, Virginia) and

Avanti Communications (Newport, Rhode Island) began marketing FT-1 multiplexers in 1986. General DataComm (Middlebury, Connecticut) offers the MegaMux TMS, while Pacific Communication Sciences (San Diego, California) announced the Clarity Series 4100 voice multiplexer. Telenet Communications Services (Reston, Virginia), Infotron Systems (Cherry Hill, New Jersey), and Data-America (Herndon) also offer FT-1 equipment. Timeplex (Woodcliff, New Jersey) announced enhancements to its Link T1 switch to support FT-1 in January 1989.

Cable and Wireless Communications Inc. offered IntelliFlex service in September 1988. AT&T also announced its FT-1 product, Accunet Spectrum of Digital Services (ASDS), which offers capacities ranging from 56K or 64K bps to 1.544M bps. US Sprint's service allows users to purchase individual channels within its CLEARLINE 1.5 circuit in multiples of 56K bps. It will operate over the digital fiber optic private line network, using Digital Cross-Connect technology. MCI plans to

introduce its product later this year or in early 1990. Long-distance carriers, Williams Telecommunications Inc. and Lightnet, also offer fractional T1 services.

The fractional T1 concept fell prey to a misconception or industry belief that often plagues the communications industry: A new technology, service, or product is not legitimate until AT&T enters the picture. At that point, those very same technologies, services, and products become "hot" and the race begins. In whatever manner fractional T1 came to life, it appears that it's here to stay. Cost justification, network manipulation, and bundling capabilities play a key role in its success. With lower costs and a more efficient use of T1 lines, users can create network redundancy at more sites customized to their needs and price range.

Several companies are already using fractional T1 services as primary transmission resources and are reporting savings of up to 50 percent. While FT-1 may not be for everyone, it is an alternate transmission vehicle that is worth reviewing.

—Audrey Womack

Managing the Nets: An Exercise in Teamwork

When an organization's LAN bases are loaded, it's time to bring up a heavy hitter. For power in the clutch, many companies are turning to bridges and routers that connect to T1 networks, a combination that successfully drives large networks of LAN workgroups.

Connecting bridges and routers to T1 networks calls for pooling the talents of two types of vendors: those who produce T1 multiplexers and those who specialize in internetworking. Such alliances have already occurred between Network Equipment Technologies (Redwood City, California) and cisco Systems (Menlo Park, California), and Newbridge Networks (Herndon, Virginia) and Wellfleet Communications (Bedford, Massachusetts).

In February 1989, N.E.T., a leading T1 mux vendor, entered the LAN-to-WAN bridge/router/gateway market by signing a technology and OEM agreement with cisco Systems, a major internetworking contender. Frederick E. Glave, senior vice president of N.E.T.'s Private Networks Division, explained the reason for teaming up with cisco. "We are committed to LAN/WAN capability that will effectively address the increasingly sophisticated requirements of our clients' networks. The combination of cisco's expertise in LAN internetworking with N.E.T.'s wide area communications technology will allow us to break new ground in the area of LAN/WAN integration."

John Morgridge, president and CEO of cisco, added, "In creating this alliance, N.E.T. has recognized the increasing importance of LAN internetworking for high-speed backbone networks. Our relationship with N.E.T. will give us the means to expand our T1 market presence into integrated voice and data networks."

The N.E.T./cisco alliance produced the Lan-Exchange/50, an N.E.T.-label version of a product

manufactured by cisco, which incorporates network routing and bridging into one system. It also responds to N.E.T.'s network management systems, which monitor and control its operation within the network.

After scouting for an internetworking partner, Newbridge Networks spotted the synergy inherent in the LAN internetwork router-bridges of Wellfleet Communications. In May, Newbridge and Wellfleet put the final touches on an OEM and technology exchange agreement which calls for Newbridge to market Wellfleet's high-performance router-bridges under its name and for the two companies to exchange technological expertise.

Under terms of the two-year agreement, Newbridge will incorporate a range of LAN bridging and routing functions into its line of MainStreet T1/E1 networks. The companies plan to develop a learning bridge for the 3600 MainStreet family of networking T1 multiplexers and an integrated network management workstation. By integrating a Newbridge 5600 MainStreet Network Manager with Wellfleet's Simple Network Management Protocol (SNMP), the software that is produced will enable local area and wide area networks to be controlled at a single workstation.

Initially, Newbridge will sell, install, and maintain a private-label version of Wellfleet internetworking products called the 3100 MainStreet Multiprotocol Router/Bridge. The new products will support direct LAN bridging and OSI level 3 routing whenever possible in networks based on TCP/IP and DECnet.

Newbridge Chairman Terry Matthews observed, "The Wellfleet relationship will provide Newbridge with the capabilities to offer total connectivity and integrated network management, all from a single supplier."

—Barbara Callahan

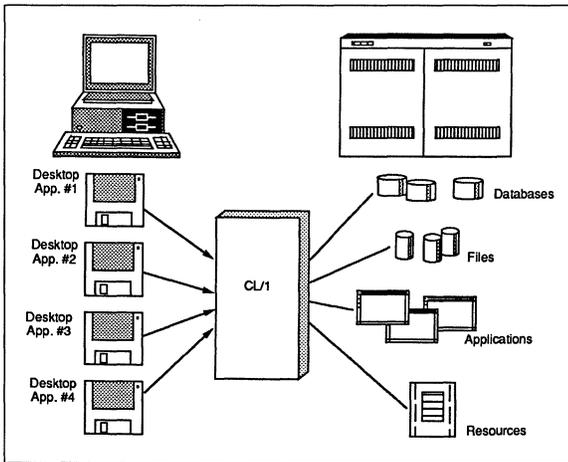


Figure 1. CL/1 connects PC-based desktop applications with host databases, applications, and resources.

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Typically generated by a desktop application (such as a spreadsheet) to specify a host connectivity function it requires, CL/1 becomes the agent that both defines the desktop request and satisfies that request on the host end by making all necessary file system, network protocol, and data structure and format conversions. NI thus defines CL/1 as "a connectivity description language in the same way that PostScript is a page description language."

As a complete programming language, CL/1 includes verb sets (about 50), procedures, variables, data types, an application programming interface (API), an incremental compiler, and connectivity objects. CL/1 automatically converts data types among different systems in a network. CL/1 connectivity objects include host systems, directories and files, databases, applications, and such peripheral devices as printers. CL/1 verbs manipulate these objects by name.

NI announced publication of the specifications for the CL/1 Connectivity Language Description in August 1988. Software companies that have developed applications using the NI standard are mainly those in the Macintosh-to-VAX connectivity market. Odesta Corporation (Northbrook, Illinois), a devel-

oper of Macintosh and VAX applications software, has a software product based on the CL/1 connectivity specification. The first Odesta product to support CL/1 is GeoQuery, a business mapping software package used by marketing professionals for sales territory analysis, travel planning, and target mailings. The Odesta product provides sales and marketing professionals using Macintoshes with "transparent access to SQL-based relational databases on Digital VAX computers, such as VAX/Rdb, Sybase, Ingres, Informix, and Oracle. This is in addition to GeoQuery's current ability to access and manipulate data from databases and spreadsheet software like Odesta's Double Helix II and Microsoft's Excel."

CL/1 will attract users because it embodies some of the elements of the ISO's OSI specification in providing broad-based solutions for cross-vendor and cross-technology interconnections. Regardless of whether NI plans to support the OSI standard, it boasts that CL/1 can "combine and extend other connectivity technologies, including Structured

Query Language, network protocols such as AppleTalk and DECnet, communications protocols such as IBM's Advanced Program-to-Program Communications and the OS/2 LAN Manager, distributed databases, and file server and terminal emulation products."

In all probability, most large organizations will continue to look for big-vendor solutions for their total connectivity problems, even in the face of the lack of support for true multivendor interconnections from those vendors. But big vendors are realizing that users will push for true multivendor connectivity sooner or later. Big vendors also know that they cannot do it all. It has been reported that more than a dozen software developers contributed to, or otherwise influenced in some way, the recently announced IBM OfficeVision software package, the first Systems Application Architecture (SAA) compliant product that links applications across four IBM environments—OS/2, OS/400, VM, and MVS.

The importance of vendors such as NI and its CL/1 product extends far beyond filling the gaps that major vendors leave for specific applications. They are the reason that giants such as IBM set out and developed blueprints such as SAA. The industry owes these brave start-ups a debt of gratitude in helping it attain a measure of its great potential.

—Tadesse Giorgis

At the LATA Level

BELL ATLANTIC

Pennsylvania—Bell of Pennsylvania's new service, Multi-Number 800, is for customers requiring large blocks of individual common-line, 800-type telephone numbers. Initial service consists of at least 100 telephone numbers. Additional blocks of 20 numbers can subsequently be added. When the Multi-Number 800 service is in use, all numbers within the initial and subsequent blocks must be activated.

The initial block costs \$500/month with each subsequent block costing \$100 per month. The initial Service Establishment charge is \$1,500, with a \$300 charge each time additional number blocks are added. Usage rates are based on an average of 30 seconds per completed call for each billing period per service group. For up to 20 hours of use, the rate is \$11.50 per hour; over 20 hours, the rate is \$9.80 per hour.

NYNEX

New York—New York Telephone submitted a proposal to introduce a network reconfiguration service. Customers of 56K bps and 1.544M bps digital private line services could change the end terminating points of their circuits within their networks. Currently, the user has to request that the telephone company move the terminating end connection. If approval for the service is granted, it will become effective September 22, 1989.

New York—New York State's Department of Public Service is reviewing its regulatory policies for basic and nonbasic services. The review was prompted by New York Telephone's request to change Intellipath II Digital Centrex' service pricing and rate design. The Commission is considering whether to revise its policies pertaining to cost allocations by local exchange companies among regulated and nonregulated services, basic and nonbasic

services, and competitive and noncompetitive services. The proceeding results will determine a permanent cost allocation.

Rhode Island—New England Telephone and Telegraph Company restructured and consolidated the business Message Telecommunications Service (MTS), Wide Area Telephone Service (WATS), and 800 Services into a single usage-sensitive schedule. The Time of Day discount period is now 9 p.m. to 7 a.m. weekdays and all day on weekends. The Selected Calling Service offering is discontinued. Dedicated WATS and 800 access line rates are replaced by business exchange access line rates, and two new business toll service plans were introduced: Outward Toll Calling Plan and the Inward Toll Calling Plan. The plans are designed for large-volume business customers who can commit to a minimum amount of annual usage.

PACIFIC TELESIS

Pacific Bell has signed a licensing agreement with General DataComm (GDC) that allows GDC to produce equipment that complements Pacific Bell's Advanced Digital Network (ADN) functionality. ADN provides voice and data integration on a single digital circuit at speeds up to 56K bps or 64K bps. ADN' price is a fraction of the cost for high-speed digital circuits (T1) and is also less than the current cost of AT&T's Digital Dataphone Service.

SOUTHWESTERN BELL

Texas—Southwestern Bell's gateway trial, SourceLine, recently celebrated its 10,000 subscriber. SourceLine began last March and offers access to over 150 video information services ranging from sports and business to entertainment and education. Access is through either a personal computer or a Videotel terminal. Houston, Texas was selected for the trial because of its large market base and its progressive outlook.

Terminals are available at less than \$10 per month; software is a onetime charge of \$9.95. A second service, QuickSource, is the company's voice gateway offering. Callers use this service with a standard telephone line and any touch-tone phone. Approximately 1 million local households have built-in access to QuickSource. Southwestern Bell owns only the listings contained in the SourceLine menus and the QuickSource opening announcements, not the information on the gateway service. Audio Information Services, Inc. is the gateway operator for QuickSource, while SourceLine's gateway operator is U.S. Videotel. Individual services come from information providers.

U S WEST

Applied Communications Ins. (ACI) and U S WEST have combined efforts to develop a software package that will give state, county, and local governments the ability to distribute welfare benefits electronically. Based on BASE24 technology, the INFO24-ebt supports Automatic Teller Machines (ATM) and Point-of-Sale (POS) disbursements of cash benefits. The program supports magnetic stripe cards, terminals, and the front end processing of transactions. INFO24-ebt operates on Non-Stop systems from Tandem Computers, Inc.

Nebraska—Northwestern Bell's 800 ServiceLine is accessed over a customer-provided exchange facility. One 800 number is assigned to each existing or newly provided exchange telephone number allowing for the completion of 800 calls, as well as all other usage normally handled on this termination. Billing is based on a specified rate per hour.

Volume discounts may apply (calls completed in one billing period will be billed a minimum of 30 seconds per call). A monthly charge of \$15 is applied to each 800 ServiceLine number, and the hourly rate is \$15. A volume discount of 10 percent applies to all usage in excess of \$60. In addition to other service charges, a nonrecurring charge of \$5 applies.

Oregon—The Oregon Public Utility Commission's June 19th policy order designated the Portland metropolitan area as the first Extended Area Service (EAS) region. The commission's action begins the process of converting all remaining long-distance routes in the Portland areas to EAS.

With seven different local telephone companies and 21 local telephone exchanges involved, the process will be complex and is likely to take several years to complete. The seven local telephone companies involved in this process are U S WEST Communications, GTE Northwest, Cascade Utilities Inc., Beaver Creek Cooperative Telephone Co., Clear Creek Mutual Telephone Co., Continental of the Northwest, and Pacific Telecom Inc.

The process is also likely to involve slight EAS rate increases. With approximately 290,000 phone lines, Portland is the largest local telephone exchange in the state with about one fourth of all local lines in Oregon.

To implement the EAS region, the local telephone companies must submit proposed pricing, service, and implementation schedules. The submitted EAS "menus" are based on the prevailing calling patterns of their customers. The new policy will allow customers to obtain flat-rate EAS to the most frequently called exchanges and measured EAS to other regional exchanges. One of the available options is a choice of flat-rate EAS calling to all exchanges in the Portland EAS region.

The commission said its goal is "to improve service and minimize the cost of calls between exchanges with a community of interest," but cautioned that demand for EAS must be balanced with other goals, such as keeping local phone service affordable. For considering EAS petitions, the commission established these standards for determining a "community of interest" between local telephone exchanges: Proposed EAS exchanges must have common geographic boundaries; average calling volume between the exchanges must be at least four calls per month per phone line; and one third of the customers must make at least one call per month to the neighboring exchange.

—Becky Duncan