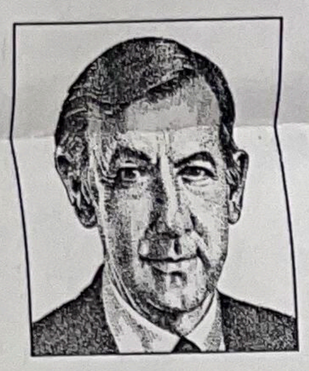
APPLIED INTELLIGENCE

Integrated Multivendor Solutions Are Crucial to Networking



JAMES MARTIN

This is the last in a series of articles on key industry trends affecting computer hardware, software, database environments and communications environments.

Corporations are moving rapidly toward implementing large-scale strategic systems that integrate all components of an enterprise. These complex systems will be based on the installation of networks capable of supporting large numbers of PCs, file servers and links to mainframe systems. Both data and processing modules will be distributed throughout the network in cooperative-processing and client/server applications.

Large corporate networks of computers are being implemented both to computerize entire organizations and to establish intercorporate links with suppliers, retailers, customers, dealers, distributors and financial organizations.

Among the communications mechanisms used are E-mail for person-to-person interfaces; electronic data access for person-to-application interfaces; and electronic data interchange for application-to-application interfaces.

Many corporations have greatly increased the strategic value of their computer systems through intercorporate networks used for electronic data interchange. These networks have enabled them to reduce trading delays, provide better customer service, increase their competitiveness in the market and reduce costs. In addition, these networks can reduce transportation expenses, improve production scheduling and decrease waste.

In addition to building networks of PCs and mainframes, organizations will link other communications functions and make them accessible through the PC. Voice mail, E-mail and fax will all be accessible through the individual's PC. Gateways to outside networks will be used to tie into real-time news wires, newsletters and syndicated databases.

To build these complex networks, high-speed communications matched to the processing power of local PCs must be in place. Fiber optics will become the standard cabling technique to implement the networks. LANs will utilize servers and PCs at the rate of 100M bps.

Broadband Integrated Services Digital Networks (ISDN) will provide open interconnections across all vendors using low-cost, mass-produced chips. Widespread use of ISDN will facilitate intercorporate networking and will provide simpler access to high-speed switched digital circuits.

To implement corporatewide communications networks, the current incompatibilities between hardware and software systems must be resolved. Despite major commitments to international communications protocols, problems still exist in linking hardware and software systems from different vendors.

The figure illustrates the type of interconnections that are available to link both IBM and non-IBM systems. The example shows communications interfaces between SAA applications, applications running under AIX (IBM's version of Unix) and other systems (such as Sun workstations under Sun OS, Unix workstations under Unix System V or DEC VAX computers under VMS).

To communicate effectively among these diverse systems, it's necessary to specify multivendor architectures that define a standard set of networking services, data-transfer protocols and data-transfer media. The figure illustrates a representative multivendor architecture based on SQL-compatible data-access standards and communications protocols supported by IBM's SNA, TCP/IP and Open Systems Interconnect (OSI) international communications protocols.

IBM's Systems Network Architecture (SNA) has been incorporated within Systems Application Architecture (SAA) and is used to support communications between distributed SAA applications. The SNA networking architecture has been used by IBM for years to interconnect dissimilar systems. These SNA elements, together with OSI international protocols, implement the SAA communications services.

As discussed in a previous article, SAA provides a comprehensive set of facilities to distribute both process and data across IBM PS/2, AS/400 and System/370 computers. Interprocess communications between IBM machines is supported by SNA conventions, including Synchronous Data Link Control (SDLC), LU 6.2 peer-to-peer communications protocols and Token-Ring LAN protocols. Access of data located on remote, non-IBM computers is supported within SAA through the use of standard OSI protocols including X.25 packet switching, X.400 electronic mail and IEEE 802 Token-Ring.

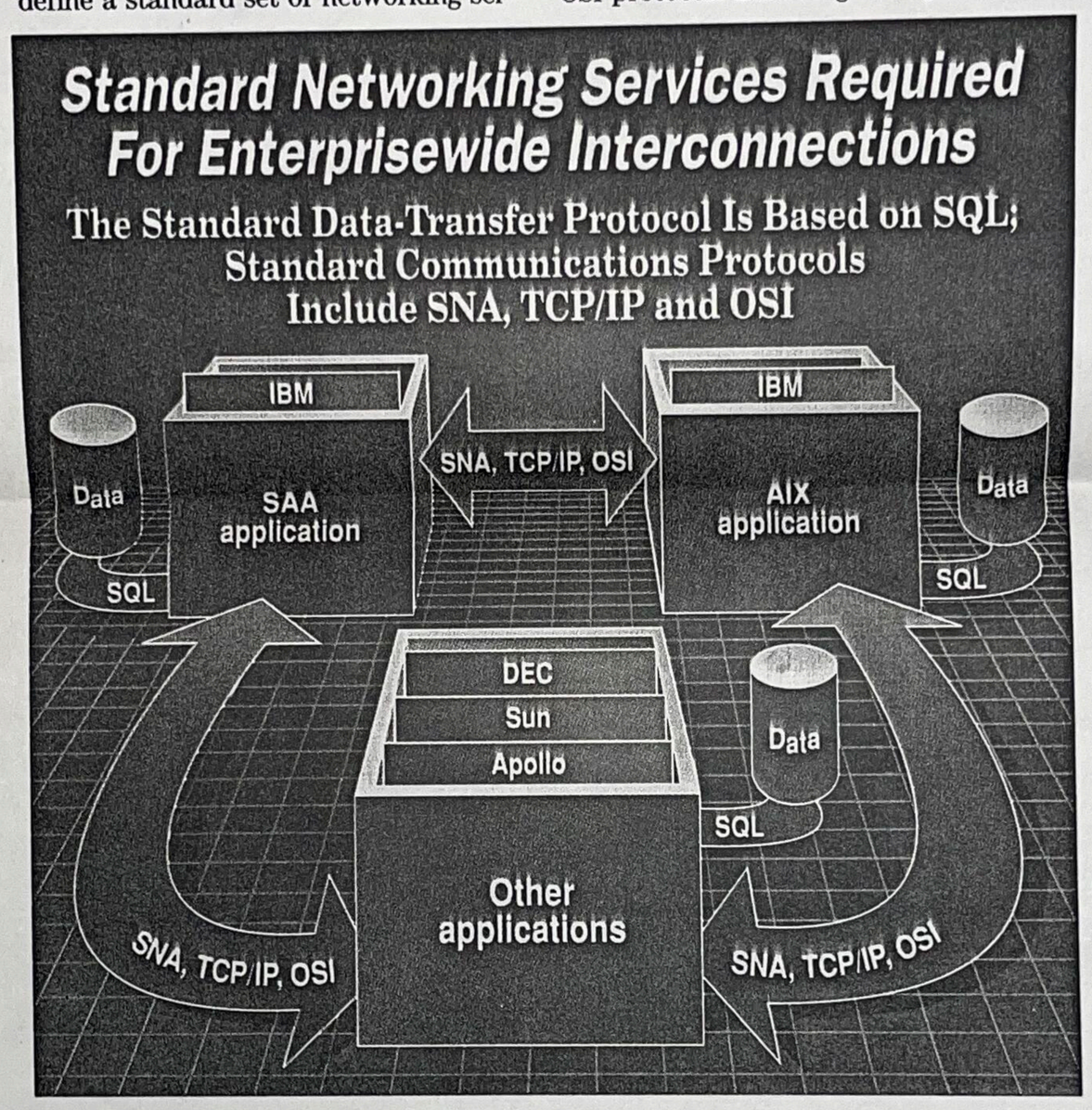
TCP/IP is widely used to support networks for military applications, universities, research laboratories and manufacturing applications. Implementations of TCP/IP include the Ethernet LAN based on the Berkeley variant of Unix, as well as wide area networks using X.25 packet-switched networks for a wide variety of popular computers.

The OSI communications model is based on standards defined by the International Standards Organization. The organization has defined a seven-layer OSI model that forms the basis for a networking architecture. Each layer has a specific set of responsibilities within the model, and different protocols can be implemented for each layer.

Standard protocols defined using the OSI model include X.25 packet switching, X.400 E-mail, IEEE 802 Token-Ring and Connectionless Network Protocol used in factory-floor manufacturing operations.

TCP/IP is widely used to support Ethernet LANs; the OSI model is frequently used for X.25 packet-switched networks.

It's likely that the OSI model will grow in importance relative to TCP/IP.



John Avakian

Supporting Communications

The three applications environments shown in the figure—SAA, AIX and non-IBM applications—generally support one or more of the communications environments shown in the figure—SNA, TCP/IP and OSI. The communications-support capabilities of the three applications environments are summarized below.

SAA applications utilize the SNA networking architecture to provide connectivity between PS/2, AS/400 and System/370 computers. TCP/IP and OSI protocols are used to support communications with non-IBM machines.

IBM's AIX is a variant of Unix that supports a basic multiuser, multitasking environment. In addition, it provides support for virtual memory, enhanced file management, dynamic configuration, support in the DOS environment for multiple users, multiple interactive session management and National Language Support.

Communications support for AIX includes TCP/IP, X.25 packet switching, Sun Network File System (NFS), Ethernet and Token-Ring LANs, and electronic-mail protocols. These communications facilities enable AIX applications under Unix to integrate well with SAA applications under OS/2.

Broader integration between IBM and non-IBM machines may be obtained through support of TCP/IP and OSI network architectures. Many computers, such as engineering workstations and Digital VAX systems, provide support for TCP/IP and OSI protocols. The use of standard communications protocols and standard data-access conventions should be strongly encouraged to provide interoperability between widely diverse computer environments.

Next week, I'll discuss how these major trends in computer hardware, software, database and communications environments are affecting the evolution of computer architectures. ■

Many corporations have greatly increased the strategic value of their computer systems through intercorporate networks used for electronic data interchange.

The concepts embodied in this article are described in the High-Productivity Technology volume in The James Martin Report Series. For more information on this volume, call (617) 639-1958. For information on seminars, contact (in the United States and Canada) Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402 (213) 394-8305. In Europe, contact Savant, 2 New St., Carnforth, Lancs., LA5 9BX United Kingdom (0524) 734 505.