

# Network Environments

## Background

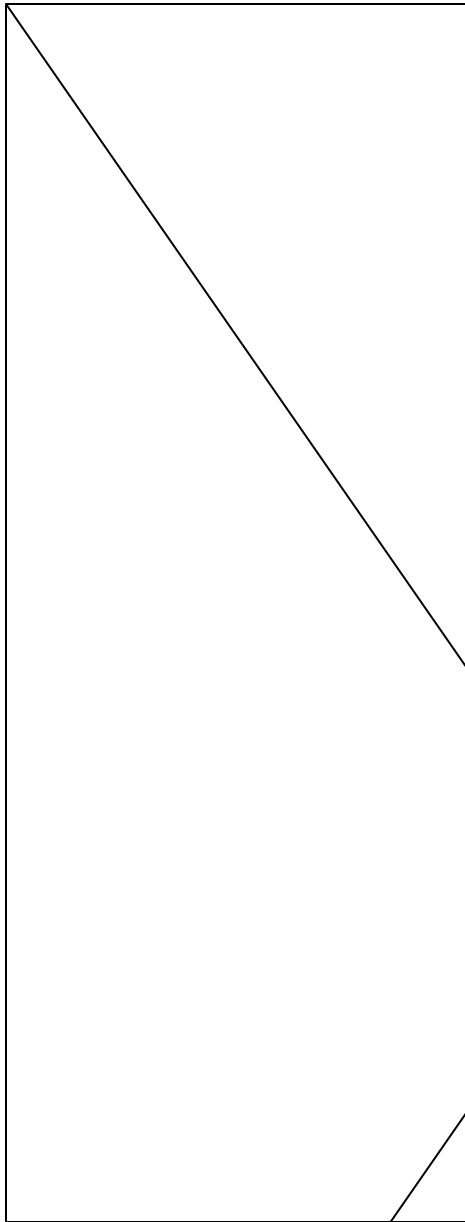
Vendors, such as Apple Computer, Novell, 3Com, TOPS, and Northern Telecom, provide the networking software and hardware that link personal computers with other computers and peripherals on a network. Most of these vendors originated in the PC industry in the early 1980s and provided solutions for linking MS-DOS computers on a local area network (LAN) to share resources such as hard disks and laser printers.

As the market changed, however, and computing environments grew more demanding, these vendors responded with more sophisticated offerings. Businesses no longer only had MS-DOS computers; they were also using Macintosh® computers and UNIX®-based workstations, and vendors needed to connect these different kinds of computers across the corporate environment. In addition, customers were no longer content with communications solely among personal computers; they also wanted access to Digital minicomputers, IBM host computers, workstations, supercomputers, and other computers.

The Apple®-proprietary network system, AppleTalk®, was the first significant step in giving the Macintosh computer user the ability to reach beyond the desktop across a network. This system is a combination of hardware (LocalTalk<sup>®</sup>) and software providing access to electronic mail applications, print and file servers, and other network services in the same manner that Macintosh users access desk accessories, hard disks, or other Macintosh computer features. The user sees familiar aspects of the Desktop Interface, yet the software modules that control those services are transparent to the user. LocalTalk is built into every Macintosh computer, underscoring Apple's commitment to communications.

The third-party networking vendors achieved remarkable growth by providing many solutions to connectivity problems. Originally, the word "networking" primarily meant sharing resources on one LAN; today, however, the names of Novell and 3Com, among others, suggest that "networking" now has a more sophisticated meaning. Novell, for example, acquired CXI, providing the company with IBM gateway technology that extended the reach of Novell's network operating system, NetWare, to IBM host computers. Recently, Novell acquired Excelan, adding strong connections into the UNIX environment. In other developments, 3Com merged with Bridge Communications to increase the reach of 3+ users to

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other environments. In 1988, 3Com formed a strategic alliance with Microsoft to develop a network operating system based on OS/2 which takes advantage of the increased power of OS/2 over MS-DOS.

#### **Integration of Multiple Environments**

These independent networking vendors have also responded to the market demand for the integration of multiple environments. Some have taken the approach that the integration of multiple environments will occur when standards such as those being developed by the International Standards Organization (ISO) are finalized. Others, such as Novell, have taken the approach that the market will continue to consist of multiple networking standards, and that the goal of trying to bring all networks under a single architecture, such as the ISO Open Systems Interconnection (OSI) reference model, may not be realized for many years to come. In the meantime, users want connectivity without compromising their basic networking capabilities and native user interface. Therefore, Novell's strategy has been to adapt NetWare to support AppleTalk rather than force-fit the Macintosh computer into the NetWare environment. NetWare, with Novell's Open Protocol Technology (OPT), fully incorporates the AppleTalk protocols, allowing PCs running NetWare to become AppleShare servers for Macintosh systems.

#### **Information Sharing with AppleShare**

Through the AppleTalk network system and the AppleShare® file server, Apple offers transparent, intuitive information sharing for work groups.

AppleShare File Server software converts any Macintosh computer into a high-performance file server. And since the AppleShare File Server was designed together with the Macintosh Finder<sup>®</sup> and system software, the interface between user and server is seamless and transparent.

The user works with information on the server as if it were stored on his or her own hard disk. Individuals have the ability to control who has access to documents that they create and store on the server. In addition, single-user and multi-user applications can be run directly from the server.

#### **Networking Through the Telephone System**

Northern Telecom takes a different approach to networking: It provides data communication through its digital PBX systems located on the customer's premises or through its family of central-office switching systems, located on the premises of the local phone company. Both of these systems have outstanding benefits. Public telephone networks link a wide array of equipment and computers, remote as well as local. Data can be passed over the same wiring that is used for voice communications, eliminating the expense of separate cabling.

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Integrating the Macintosh computer into the PBX is as easy as plugging in a telephone, and data transmission is fast. The Macintosh computer can communicate at speeds of 19.2 kilobits per second (Kbps) with other Macintosh and IBM personal computers, host computers, and other centralized computing resources; and speeds as high as 64 Kbps can be reached using the central-officeswitching systems.

### Novell

Novell Inc., based in Provo, Utah, is the LAN market leader. Its NetWare operating system is an established industry standard, with an estimated 40 to 50 percent market share. Today, there are more than 500,000 copies of NetWare installed worldwide, connecting more than 2 million workstations.

Novell's NetWare for Macintosh is a server-based software solution that provides NetWare connectivity to Macintosh computers. Because the Macintosh version of NetWare fully supports the Macintosh Hierarchical File System (HFS), the Macintosh user sees files stored on the server in standard Macintosh folders. The user has full access to IBM or Macintosh files stored on a NetWare server. Macintosh files are also accessible by MS-DOS and OS/2 workstations on the same NetWare network. And when users work with IBM PC, IBM PC-compatibles, and Macintosh computer applications that share the same application file format (such as Microsoft Excel for the Macintosh and for the IBM PC), no conversion need to be made by the Macintosh computer to access MS-DOS files.

### 3Com

3Com Corp., based in Santa Clara, California, manufactures and markets network hardware such as network adapter boards and file servers, as well as network software such as its 3+ network operating system. Founded in 1979 by Bob Metcalfe, one of Ethernet's inventors, 3Com grew rapidly by basing its products around the evolving Ethernet standard.

3Com offers a system that integrates PC compatibles and Macintosh computers. The system consists of one or more 3Com multifunction servers, the 3+ network operating system, a group of MS-DOS or OS/2-compatible computers on an Ethernet or token ring network, and a group of Macintosh computers on either LocalTalk or Ethernet cabling.

### Northern Telecom

Northern Telecom is the leading manufacturer of fully digital PBX-based communication systems. The U.S. company, which employs more than 20,000 people, has over 6 million lines installed in more than 20,000 customer sites.

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Northern Telecom offers Macintosh users a number of options for networking their computers. The Meridian SL-1 and Meridian SL-100 digital PBXs are used for customer-premises networking. The Northern Telecom DMS-100 central-office switch allows networking through the phone company's central office, providing access to wide area networks. In addition, Northern Telecom offers a LAN (LANSTAR/AppleTalk) that was developed cooperatively with Apple. This network implements the AppleTalk protocol on Northern Telecom's high-speed, twisted-pair network. Macintosh users have access to standard AppleTalk services, such as AppleShare and LaserShare<sup>5</sup>, and to third-party servers such as Novell NetWare, TOPS or MacServe.

#### **Additional Solutions To Be Found**

This chapter by no means represents all of the network solutions available today. There are additional solutions that were better placed in other chapters of this Guide and contacting the suppliers mentioned in this and other chapters will certainly lead the reader to other solutions. The following pages are intended to be a network sampler showing the major alternatives from which to choose in today's market.