Electronic Mail for Microcomputers: Market Overview

In this report:

Synopsis

Editor's Note
Electronic mail (E-Mail) is generally classed as a portion of the overall electronic messaging market which also includes the entire fax business, EDI, Telex, voice mail, and other ancillary products. Overall, the picture for vendors in the E-Mail market is bright. The growing acceptance of standards and the ever-growing number of microcomputers—whose users are increasingly sophisticated and networked—together create a fertile market for a variety of products running in many different environments.

E-Mail is increasingly seen as a tool for enhancing productivity and as a platform for further application development, ever-deepening its necessity in the modern information processing environment. Public messaging systems increasingly act as central message clearinghouses for messaging across incompatible systems, in addition to serving as value-added services for message distribution. Standard message exchange protocols and user directories, developed under the OSI model, further stimulate new products that will serve to build a global E-Mail network that will one day rival or perhaps surpass the telephone network in its extensiveness.

This report provides an overview of E-Mail products available in the microcomputer environment. We examine the results of our annual vendor survey, and look at an industry news digest. A thorough overview of E-Mail technology can be found in the technology overview, report number 535-201. Complete comparison column information is in report number 535-301.

Analysis

The State of the Market

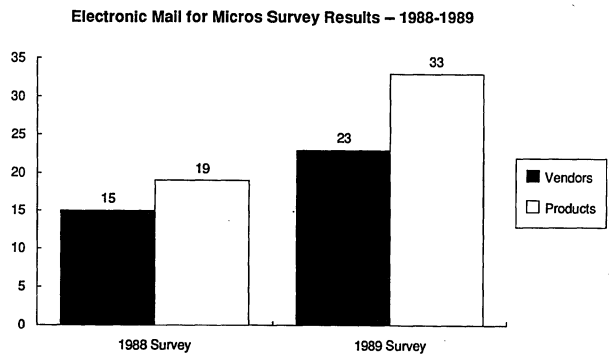
The micro-specific E-Mail package market is vital because of the LAN market's dynamism and growth. Major market research firms such as IDC, among others, uniformly predict 100-plus percent growth rates for LAN products in the period from 1988 to 1990. E-Mail is one of the key applications that is developing in the LANs environment, as it opens the door to enhancing productivity through improved communications. The rudimentary messaging capabilities included with most LAN operating system software suits some, but many require the fuller-featured products that our vendor survey includes.

The market for E-Mail products and packages consists of numerous submarkets and niches that reflect the variety of user demands and host environments. Two niche E-Mail markets with fast growth rates can be used to project the future of the entire E-Mail and messaging market.

According to EMMS, LAN-based E-Mail software was expected to grow at a 50 percent rate in 1989, approaching a $25 million market. Successful vendors, such as CC:Mail expect their installed base to grow five times in just this year alone. And given the growth rate in the LAN market, the E-Mail market will likely ride on its coattails to close to $100 million in revenue by 1992.

According to EMMS, the market for microcomputer-based dial-up software to public E-Mail services is one of the fastest growing in the entire messaging marketplace. These packages provide users with options to move through the connection and sign-on procedures, to move through the system's menus, to read any new messages, and to perform other functions. The microcomputer market continues to grow rapidly; access to public E-Mail networks has become increasingly attractive due to the expansion of the services available. These software packages, such as Lotus Express for MCI Mail, automate the connection process that otherwise would require users to dial the service through a modem and establish a session.

Figure 1.
Survey Results



The dynamic growth of the E-Mail for Micros market can be seen in the growth of the number of vendors and products from last year to the present.

Industry Trends

For LAN-based packages, the trend is entirely upward, but the path to consistent success for vendors is clouded by the confusing and quickly shifting microcomputer market. Networking in the microcomputer market will boom for the foreseeable future. New, unforeseen factors, such as a growing preponderance of UNIX-based systems, have complicated the picture with regard to standard operating and networking environments. OS/2 still presents a quandary; the first important application for OS/2 is expected to use networks in some way, but OS/2 will not live up to its potential until a full 32-bit version arrives sometime in 1990, or more likely, in 1991.

IBM's OfficeVision announcement signals renewed emphasis on integrated office automation software systems. Providing integrated cross-platform communication tools and a consistent interface across platforms, OfficeVision predicts the design of office automation software for years to come. With its emphasis on enterprise networking and its extensive LAN support, IBM has challenged the industry to provide similar functionality and interoperability. The fallout from the IBM announcement will take several years to sort out; for now it is sufficient to say that IBM has thrown

Table 1. Electronic Mail Marketplace, 1988

Market Segment	U.S. Revenue (estimates in $ millions)	Growth Rate (%)
Facsimile	3,966	120
CBMS	574	28
Telex	505	−16
Voice Mail	355	39
EDI	180	64
Alpha Pagers	50	67
Other	190	−7
Total	5,820	69

down the gauntlet with its OfficeVision tools, and the rest of the industry will no doubt follow suit in some fashion.

The Macintosh market continues to grow steadily and continues to generate more than its share of excitement by serving as the bed for most innovative applications. The Macintosh's integrated networking capabilities are used more and more in the building of ever-larger networks. Innovative E-Mail package features often debut in the Macintosh environment. The Macintosh's growing acceptance in the corporate marketplace and Apple's ties to Digital Equipment Corporation for internetworking tools promise a bright future for E-Mail vendors skillful enough to take advantage of these developments.

Most LAN control packages include some sort of mail facility. Novell's NetWare, the market leader, comes with a messaging component that does a solid, if unspectacular, job of enabling users connected to a network to send and receive messages. Some LAN software vendors, notably 3Com include a more-fully-featured store-and-forward component. If LAN vendors decide to add features to their mail components to make them more attractive, they may squeeze third-party vendors out of the market. At the same time, some mail package developers have bundled their programs with LAN hardware and software packages. This strategy builds in an outlet for the developers and brings more features to the mail portion of LAN packages.

Survey Results

Although the E-Mail for microcomputers market is small, thus not easily tracked by traditional market research methods, comparing the results of this year's survey with those from last year's inaugural survey yields some insight into the market's dynamism. The number of vendors represented in the survey is up 53 percent and the number of products represented is up 74 percent Clearly this indicates booming vendor interest driven, no doubt, by user demand.

Connection to outside services and protocol observance seems to be emerging as one of the most important competitive factors in this market. Most of the products surveyed are full-featured, and package pricing falls within a fairly narrow range. Users, however, face an increasingly interconnected environment, and the ability to connect a LAN-based mail system to a mainframe-based, SNA- compliant mail network running IBM's PROFS is increasingly important. Thus we broke down the connectivity capabilities of the various packages.

Protocol or Outside Service Support	Mainframe, Mini, & Dedicated Indicating (%)	Microcomputer-Based Indicating (%)
ALL-IN-1	29	38
DISOSS/PROFS	57	41
FAX	52	62
Internet	10	15
MHS	0	12
SMTP	0	9
Telex	57	35
X.400	52	33

The other survey results are no surprise: MS-DOS dominates the market, although Macinhosh support is strong, and growing; OS/2 is nowhere to be found; system resource requirements are increasing; and Novell's NetWare garners the most support of the LAN operating environments mentioned.

Major Vendors

We present a sketch of the activities and strategies of some of the most important vendors in the E-Mail industry. These firms have the most important products in their respective markets, and are also generally the sales leaders. We have focused

Table 2. Electronic Messaging Marketplace, 1988

Market Segment	U.S. Revenue (estimate in $ millions)	Growth Rate (%)
Computer-Based Message Systems		
Public E-Mail Network Service	†330	15
Host E-Mail MHS Software	165	38
LAN E-Mail MHS Software	15	50
Microcomputer UA Software	35	130
Host Gateway Software		
Proprietary Protocols	25	79
X.400-Based Gateways	4	300
Electronic Data Interchange		
EDI Network Service	100	65
EDI Software	80	60
Alphanumeric Pagers		
Receiver Equipment	20	100
Message Delivery Service	30	50
Telex, TWX, & Teletex Network Service		
Domestic	110	−27
U.S. to International	340	−11
Hardware & Supplies	55	−31
Facsimile		
Fax Machine Sales & Rentals	1,650	220
Long-Distance Fax Calls	2,250	125
PC Fax Boards & Software	11	57
Service Bureaus	55	21
Voice Mail		
Equipment Sales	320	42
Service Bureaus	35	17
Other		
Postal, Courier Deliveries	150	−6
Private Wire Services	40	−12

more on the strategic importance of products than on sales, as this is a market in its infancy with relation to its ultimate predicted outcome.

The microcomputer mail market is wide-open, and divided in two natural camps: MS-DOS/Intel (IBM PC-compatibles) and Apple Macintosh. Some of the leading vendors and their recent activities include the following.

- Action Technology—released Version 2.0 of its Coordinator groupware package, featuring a reworked interface, and continued to extend the applicability its MHS message handling protocol.
- cc:Mail—has established itself as the major E-Mail contender in the MS-DOS-based LAN messaging market. cc:Mail continues to be upgraded, with interoperability across MS-DOS, Macintosh, and OS/2 networks in the announced stage.
- CE Software—continued enhancing its QuickMail product, which is popular in the Apple Macintosh environment.
- Da Vinci Systems—received funding from LAN industry titan Novell, and has impressed users with its unique DDE (dynamic data exchange) feature that its package, running under MS Windows, allows users to transfer data in real time from Windows applications into and out of the Mail application.
- Microsoft—released Version 2.0 of its Mail package for AppleTalk networks. Microsoft is working to establish itself as a major mail vendor with this product.
- Retix. Retix is the acknowledged leader in the X.400 gateway product market and has continued to extend the range of its products across multiple environments.

Industry News

The following digest of E-Mail industry news from the first three quarters of 1989 confirms some of the trends that we have reported previously.

3Com Corp. Announced 3PlusOpen Mail E-Mail system, and 3PlusOpen Internet, which uses telephone lines for communications among multiple 3PlusOpen networks. Both are for MS-DOS, Macintosh, and OS/2 workstations and cost $1,190 and $1,500, respectively.

Banyan Systems Inc. Announced the Vines Version 3.10 network operating system, which includes the Vines Applications Toolkit for developing E-Mail gateways, network administration tools, and calendaring systems.

Cbis Inc. Introduced Network-OS EMAIL, a communications software package that combines E-Mail plus conferencing for Network-OS and other DOS-based LANs, which provides a bulletin board, private memos, and group conferencing and costs $395.

cc:Mail Corp. Announced a rollout strategy for the cc:Mail LAN Package for the Macintosh and has plans to ship an interface to VMSmail, Digital's E-Mail system for VAXes. It also demonstrated its E-mail systems' full multimedia capabilities across the Macintosh, DOS, and OS/2 platforms.

CE Software Inc. Announced the following: QM Remote 2.0 software which provides dial-in access to QuickMail, creates new messages, sends QuickMail-created messages, and transmits files or applications; the QM-Connect Bridge which lets QuickMail users access the CONNECT Professional Information Network or MacNet, sends up to 16 files per message, and costs $99.95; and the QM-Database Bridge, which lets QuickMail users access data files on the network, and costs $149.95 per server. It also began shipping QuickMail 2.0, its Macintosh E-Mail product, through its dealer/distributor channel. The software offers store and forward technology, realtime conferencing, and a mail log for tracking, retrieving, and unsending messages.

Coker Electronics. Announced tPOST Forms, a form filler program designed to speed the filling out and electronic mailing of business forms.

Consumers Software Inc. Enhanced its Network Courier E-Mail software with Version 2.0, which runs on IBM PCs and compatibles operating on LANs and offers more than 60 new features, including the ability to create a personal address list. Prices start at $295.

Fischer International Systems Corp. Introduced the Personal Emc^2/TAO LAN program, which provides E-Mail and information management services for networked PCs operating in a standalone environment.

Hewlett-Packard. Introduced HP AdvanceMail III, a PC-based electronic mail product which lets users transmit and receive text, graphics, video and sound.

IBM. Introduced OfficeVision, a suite of SAA-compliant applications for OS/2 which is made up of software that performs document preparation, filing, E-Mail, and calendar scheduling.

Microsoft Corp. Introduced Microsoft Mail Version 2.0 for AppleTalk networks, an E-Mail product which features support for the Macintosh and AppleTalk networks and permits Macintoshes to communicate with IBM PCs across networks; cost—$395.

Novell Inc. Acquired a minority interest in Da Vinci Systems, an E-Mail developer.

Pacer Software Inc. Announced PacerPost, a software package that enables a Digital VAX system running the VMS operating system to function as a Microsoft Mail compatible server and gateway. Prices start at $2,000.

Retix. Introduced OSIX, which is an OSI line of hardware and software products that let users on UNIX-based systems access E-Mail and file-transfer applications.

Soft Switch Inc. Along with Microsoft Corp., announced the SNADS Gateway/MSMail which enables Macintosh users to exchange electronic messages, documents, and files transparently with other interconnected E-Mail networks. It costs $4,995.

Sun Microsystems. Its Tops division announced that users of its recently acquired InBox product will be able to interconnect with UNIX Mail and IBM PROFS E-Mail systems via two gateway products scheduled to ship in the fourth quarter.

Simpact Associates Inc. Introduced Securit-E-Mail, electronic mail application software, which allows PC users on a Novell LAN to send and receive information with greater security than offered by standard electronic mail applications, and is priced at $7,500.

Touch Communications Inc. Announced an agreement with Microsoft Corp. under which Touch will develop an X.400 gateway capability enabling Microsoft Mail users to send messages outside of their local workgroup to any other messaging system that supports X.400.

Waterloo Microsystems. Announced its PORT Lite Mail E-Mail messaging option to be used with the PORT Lite entry-level LAN system.

Western Union Corp. Introduced OfficeAccess software, which is designed to run on Wang, Digital, and IBM PCs and allows users to send E-Mail over Western Union's EasyLink E-Mail network.

Also of interest: The **Electronic Mail Association**, Suite 555, 1555 Wilson Boulevard, Arlington, Virginia 22209; telephone (703) 522-7111, serves as a clearinghouse for industry and technical information. ■

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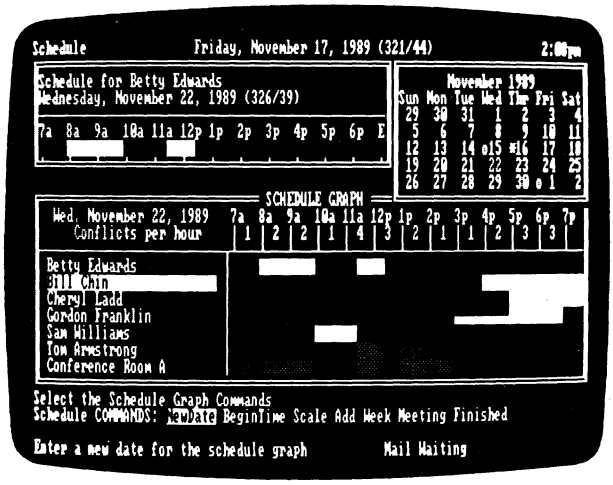
Editor's Note
Electronic mail is transforming office communications. The growth of standard interchange methods such as the X.400 standard promises to eliminate the barriers to message interchange erected by proprietary vendor strategies. The growth of microcomputer-based networks continues to establish Local Area Networks (LANs) as the key office communications platform. New applications are making E-Mail a crucial technology for information resource sharing. This report explores the variety of technologies and communications methodologies that together comprise E-Mail for microcomputers.

The explosive growth of the microcomputer industry and the increasing number of Local Area Networks (LANs) are factors in electronic mail growth. The nature of intraoffice communications is being reshaped by the ability to communicate on departmental LANs. The expansion of the microcomputer's role as both a terminal and as a desktop tool has expanded the market for electronic mail products. This report presents a technology overview, an outline of market trends, and the chief characteristics of available products.

This report sketches all of the E-Mail's technical aspects. A market overview is contained in report 535-101. Comparison columns detailing specifications for 33 computer-based messaging systems from 23 vendors follow the comprehensive vendor list on page 505-301.

Analysis



E-Mail packages continue to add features to extend their usefulness as Office Automation tools. Enable Software's Higgins package is among a new breed of packages that add group scheduling to store-and-forward messaging capabilities.

The New Face of E-Mail

Electronic mail (E-Mail), once a peripheral communications technology with limited uses, has moved to the center of many office automation strategies. Spurred by the growth of desktop computing, data communications, and application software standardization, electronic mail has shifted from a standalone resource used by small groups to an important technology for information processing, resource sharing, and group coordination.

No longer considered simply an alternative to conventional mail services, E-Mail has become an entirely new way of sharing documents, graphics, and applications. Using E-Mail and applications integrated with it, office workers can adopt a new style of direct communications with one another. Managers gain extraordinary tools for referencing and recalling information and monitoring subordinates' communications. These developments point toward increased personal and departmental productivity.

What Is Electronic Mail?

The term electronic mail encompasses various technologies that support electronic transmission of text and graphics. E-Mail technology, in its broadest sense, encompasses all types of electronic messaging, including facsimile, telex, mailgrams, and voice. In recent years, however, E-Mail has increasingly been used more narrowly to describe messages transmitted between users of networked computers.

According to the Electronic Mail Association, electronic mail is the generic name for noninteractive communication of text, data, image, or voice messages between a sender and designated recipients by systems using telecommunications links. Information deliverable via E-Mail can generally also be sent by such conventional means as:

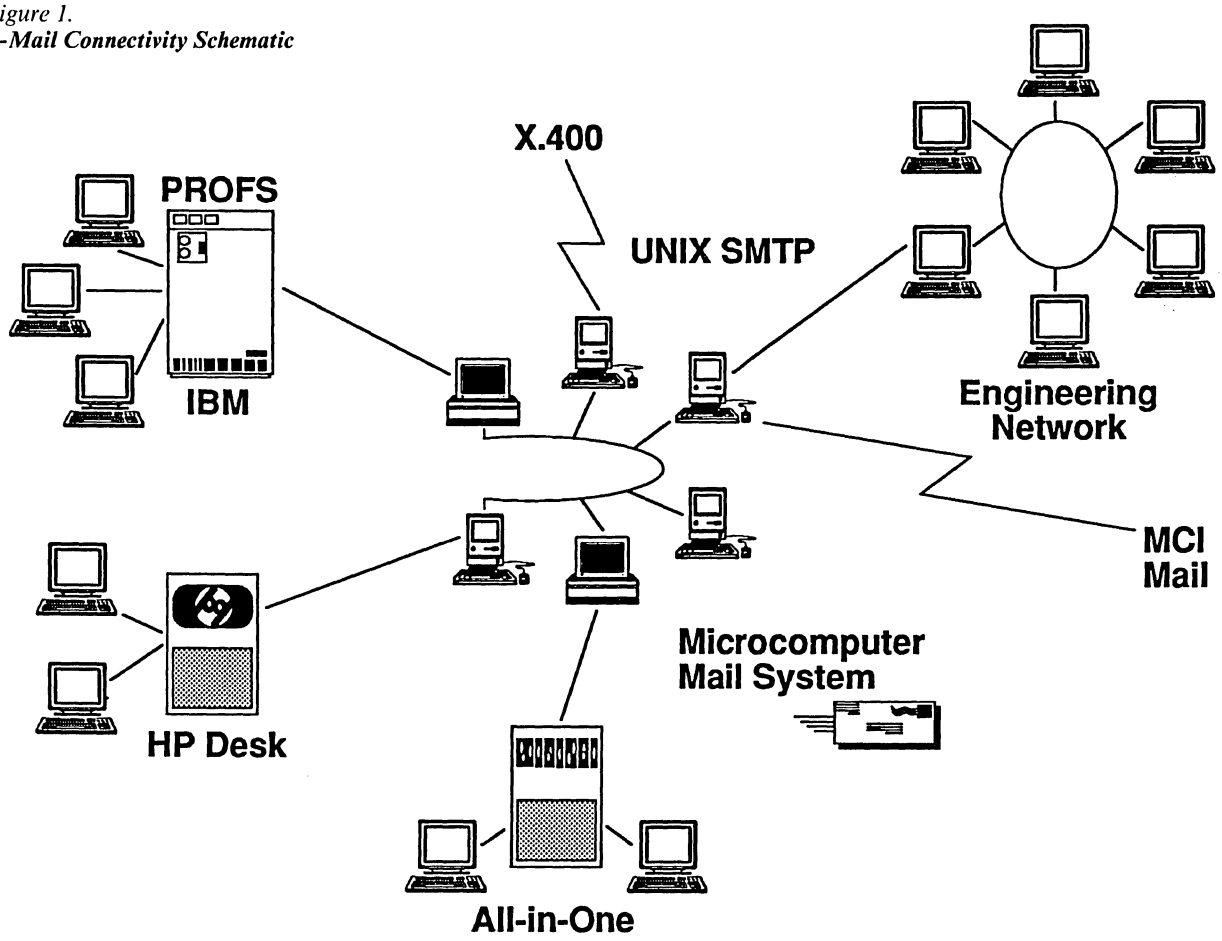
- The public postal service,
- A special courier service (e.g., Federal Express, Purolator),
- Inter- or intracompany mail, and
- Telephone voice messages.

The decision whether to use E-Mail or one of these conventional means turns primarily on the *time factor.* A message's priority determines how much time there is to deliver it. Priority, in turn, restricts the possible methods for getting the material to its intended location on time when using conventional services. It is in this area—delivering messages rapidly while preserving the option of hard copy—that E-Mail offers its greatest advantages.

Increasingly, E-Mail is hailed as an important "enabling technology" for office communications. By combining electronic messaging systems with other applications, information workers obtain tools to disseminate information for comment quickly, coordinate meetings and scheduling, hold meetings on-line electronically, and design applications that use messaging features to automate such office processes as requisitioning supplies.

As E-Mail becomes increasingly integrated with a host of other office automation tools, it becomes easier and more cost effective to add value to information quickly and route it in any form desired. In organizations with a strategic vision for

Figure 1.
E-Mail Connectivity Schematic



E-Mail gateways provide broad connectivity by allowing the microcomputer-based mail system to communicate with other messaging systems—both internal and external.

managing information resources, E-Mail can become a platform for swift, value-added information processing involving many individuals.

Electronic Mail Technology

E-Mail is not a technology in and of itself. It combines software and hardware invoked at a given place and time for communication. E-Mail software, which provides the ability to transmit and receive messages, is useless without the necessary hardware to create, receive, and transmit messages. Thus, it is difficult to isolate software and hardware from the overall perspective of message creation and transmission.

Basic Technology

Regardless of operating environment, E-Mail systems share some basic technologies that support message creation, transmission, and reception. The individual E-Mail applications provide these technologies. The network that supports this application carries out the communication functions. E-Mail systems do not necessarily use all of the following technologies, but most full-featured mail systems include provisions for each of them.

Mailboxes. Most currently available E-Mail systems provide user mailboxes for message reception. A mailbox is a work space provided by the E-Mail application where users manage correspondence. The functions for managing the mailbox range from a simple read function through menu-driven cutting and pasting of stored messages to formulate responses.

Editors. Most E-Mail systems today provide at least a simple text editor for message creation.

Not all systems are integrated with an editor, however. Some systems still require users to create a text message separately before using E-Mail to transmit it.

Store and Forward. E-Mail systems based on this technology send messages to a central storage point or repository. The addressee is then notified of the pending message and reads the message from the central repository into his or her work space. Store-and-forward messaging eliminates the need for receiving parties to be connected to the system when mail is routed to them. The system stores the message and notifies the recipient when he or she logs on.

Most mail systems use store-and-forward technology. Only rudimentary messaging systems require direct connection between the sender and receiver, as in telephone communications.

Directories. Most E-Mail systems employ a user directory to simplify message addressing. The directory lists all accessible user names or numbers and their logical address on the network. The user can call up the directory and choose the intended receiving party(ies) from the list. As mail systems become more widespread, a universal E-Mail address, similar to a telephone number—accessible from almost all points—has emerged as a goal. The CCITT's X.500 series of recommendations specify standards for such a universal directory.

Distribution Lists. These lists go hand-in-hand with directories. Distribution lists allow users to group recipients into lists and forward messages automatically to all users on a chosen list. Some systems include carbon copy and blind carbon copy facilities to automatically forward message copies to other involved parties.

Bulletin Boards. Another distribution technology, bulletin boards provide access to common communicating areas that allow each user to read the messages stored there. Bulletin boards provide a more interactive means for communicating among members of a group than do traditional, individually routed messaging methods.

Message Headers. Each E-Mail system uses its own method to identify outgoing and incoming messages. The header is the initial information that a recipient views about a given message. Some E-Mail systems give users control over a variety of available header contents. Others simply provide a time and date stamp. Some message headers indicate appropriate follow-up actions such as response requested; other headers generate a receipt record for receipt-requested messages.

Message Storage. Once a message is received, most E-Mail systems provide some facility for storing it for further reference. Storage may be automatic or require executing a command. Some systems also provide tools for managing stored messages. These range from simple acknowledgment functions to sophisticated text retrieval functions involving Boolean operators.

Security. The features that E-Mail systems provide for security vary greatly. Some systems make few security provisions; anyone could walk up to a terminal and read a user's mail. Other systems provide password access to the mail application. Still others support separate definitions of read and write access levels. The E-Mail system security features must be placed in the context of overall communications security, which may involve encrypting or scrambling message transmissions to thwart unauthorized access.

Access to Outside Systems. Optimally, an electronic mail system allows users to access all messages addressed to them and send mail to whomever they want. For users in large organizations, this implies that the local mail system must be connected to other systems to supply complete electronic access. Many packages now include gateways to various on-line services, facsimile, and popular Integrated Office Systems such as IBM's DISOSS and PROFS and Digital's ALL-IN-1.

Message Agent Software

Third-party software to automate the linking process has also flourished with the emergence of wide demand for on-line access. This microcomputer software allows customized "scripts" that instruct telecommunications software how to establish an on-line link. Such packages are not absolutely necessary; in most cases any asynchronous communications program can make the necessary connection.

Costs for establishing access to these networks are generally low. The major expenses begin after the initial investment in communications hardware and software. The major cost is the constantly metered connect-time fees that these services charge. Rates are based on amount of use, time of day, initial connection fees, and special information resources accessed during the on-line session. This report does not cover these packages.

In-House Systems

The potential for running E-Mail applications on microcomputer local area networks (LANs) is becoming ever greater because of increasingly sophisticated hardware and software. Microcomputer LAN applications now include some of the best features of larger implementations.

A special type of in-house system, the integrated office system, uses centralized and/or networked computing resources to provide a set of office applications. All these systems feature E-Mail, often as a cornerstone application used to tie other applications together. The emergence of new, network-based office tools, such as IBM's recently announced OfficeVision, signals a new round of interest in these integrated tools.

Integrated office systems combine departmental computing technology with office software applications. In addition to E-Mail, these systems combine other support functions such as word and data processing, graphics/image processing, and voice processing. They provide a consistent user interface to all these facilities. This consistency implies an ease of use that makes them attractive for linking office workers.

The E-Mail component of these systems usually incorporates features that simulate business communications. Options include forms simulating memos such as "While You Were Out" slips, distribution lists, and carbon copies. Message receipts are easily logged. In addition, third-party and user-developed add-ons extend E-Mail functionality by combining the messaging functions with graphics or financial analysis tools to automate certain processes. Other systems support on-line conferencing that allows meetings to be held with the participants never leaving their offices. Many integrated office systems also combine electronic messaging with an interface to voice-based messaging.

System Components

E-Mail technology depends on two fundamental hardware components: a terminal or user workstation and a communications network. Workstations on LANs are most typically desktop PCs, capable of executing E-Mail software locally. The other part of the E-Mail system resides on a *server*, which is usually a centrally placed computer running the LAN operating system, and which serves as a central repository for E-Mail and other applications. The E-Mail software provides an application-level interface between the user and the workstation.

Workstations

Microcomputers are by far the most prevalent communications device available for electronic mail input and output. Microcomputers are used as terminals for connection to remote computing services and to in-house systems, and electronic mail is a vital application in the burgeoning market for microcomputer LAN applications. The concepts underlying the development of LAN mail software are on the cutting edge of the evolution of the electronic office. Mail software enables people using a departmental LAN to share documents, graphs, and even applications. The design of these applications draws on new understanding about the nature of communications in the information-age workplace.

Professionals with personal computers are most likely to take advantage of the benefits of electronic mail. Microcomputers are used throughout the workplace and run a variety of applications besides electronic mail. Today, microcomputers are networked, connected to mainframes, minis, and to each other in all conceivable arrangements, and they can be equipped to emulate most standard communicating terminals. Virtually all the major office automation vendors provide microcomputers that act both as standalone application processors and workstations for their mini- or mainframe-based integrated office software which includes the electronic mail application.

Printers for creating hard copy are another vital part of the workstation picture. Other peripheral devices, such as modems to connect workstations to on-line services, image scanners, fax machines, and host gateways or LAN interfaces, are among the components that define the E-Mail workstation.

Communications Network

The communications network that transmits messages is the largest variable in electronic mail. The physical medium and communications controller can be the public telephone system, a private or semiprivate data communications or telecommunications network, a hard-wired connection to a host mainframe, a collection of small networks in a

wide area network (WAN) connected by a dedicated backbone, or a single local area network (LAN) with its own wiring and connections. A system-level provision for communicating over the network is necessary. E-Mail software interfaces with this system-level communications control resource to transmit messages. For more information of Local Area Network Technology, see report CM23-005-901, *All About Local Area Networks.*

Hierarchical networks, which were the initial environment for electronic mail implementation, are now being supplemented with departmental systems based on local network technology. The key component in a hierarchical network is often the communications processor, a computer dedicated to the control of electronic data and text traffic in a company's data communications network. This communication processor generally handles the operations of the electronic mail application. In a distributed network, some of this controlling power may be decentralized, but the function of the communications processors is the same.

A communications processor comprises the processor itself, an interface to the host computer, a communications multiplexer for the control of incoming and outgoing information, interfaces to terminals and peripherals, storage facilities, and control software. The primary functions of a communications processor are line control, character and message assembly, data and protocol conversion, error control, message switching, and application-oriented functions programmed by the user. Communications processors can be limited to data transmission in a computer network or can be more general devices, such as digital PBXs, that support both voice and data traffic.

Communications processors or switches often employ store-and-forward message switching. In order to add electronic mail, the following considerations are important:

- Can the code conversion capabilities of the communications processor be upgraded to handle a wider variety of workstation types, as well as telex terminals and facsimile?
- Can the on-line storage capability of the host computer or intelligent workstations be upgraded and linked to the communications processor to provide additional electronic filing space for mailboxes and records?

A local area network serving the electronic mail application obviates the need for a communications processor. Several LANs of the same type can be connected via bridges or combined with other types of networks (foreign LAN, SNA, X.25, X.400) via gateways to create a larger area of service. Electronic mail software can be maintained and distributed from one system designated for this purpose. This system can range from a PC on a departmental LAN to a minicomputer on several bridged LANs to mainframe host systems on an SNA network. Of course, the larger the network, the more complicated it is to implement and maintain. One of the advantages of LAN processing is the inherent advantage of distributed systems—eliminating the possibility of total network failure.

Messaging Standards and Gateways

One reason E-Mail is coming to occupy a more important place in business communications is that the work of standards committees has come to fruition in the past few years. Two major E-Mail standards exist: X.400 and AT MHS.

X.400. The Consultative Committee on International Telephony and Telegraphy (CCITT) formally approved its Recommendation X.400 for Message Handling Systems (MHSs) in 1984. The goal of the recommendation was to specify a set of standards that users and vendors alike could adopt and thereby ensure global compatibility for electronic mail and other message-oriented information exchanges. Among its desired effects is a uniformity in communications protocols that would break down barriers imposed by varying standards used by different software vendors.

Most major computer system vendors have already announced or demonstrated basic high-level interconnectivity based on X.400 protocols. Even IBM has dropped its former proprietary stance and announced X.400 capability for its PROFS office system product. In addition, a growing number of domestic network facilities vendors have added X.400 interfaces to their set of basic product offerings in anticipation of new user demand. Together, these developments have provided network managers and integration specialists with enough functionality to construct private, multivendor networks for electronic mail exchange.

For devices to communicate, they must be compatible on various levels. These level are outlined in the International Organization for Standardization (ISO) Open Systems Interconnection (OSI) reference model for data communications, which consists of a seven-layer hierarchy that defines the electrical characteristics, communications standards, and software applications for computer systems. This model does not define a single system and should not be regarded as a specification for any data communications system. Rather, it is a reference point for the establishment of a data communications system.

AT MHS. Action Technology's Message Handling System (MHS) has achieved near-standard status as a result of Novell's adoption of it as the messaging protocol for its market-leading NetWare LAN operating system. MHS is defined as a platform for the development and operation of groupware products, integrated Material Requirements Planning (MRP) in manufacturing, and other communications applications. MHS provides standard X.400 gateways, a centralized store-and-forward architecture, application program interfaces (APIs) for building on the MHS services, standardized addressing conventions, and communicating bridges (e.g., to SNADS or MCI Mail).

Advanced Features and Applications

In addition to the basic set of technologies that facilitate electronic messaging, the emergence of advanced features has paralleled the growing sophistication of all application software. The twin trends toward increased ease of use and increasing numbers of added features have transformed E-Mail packages into sophisticated applications. Also, the demands of the emerging office of tomorrow have produced new classes of software to organize and manage office communications. This has further extended the concept of E-Mail as a modern office technology.

Application Programming Interfaces (APIs). APIs provide tools for extending E-Mail software by accessing the underlying communications and filing technology employed by the package. "Open" APIs imply that a package can be extended either by sophisticated end users capable of programming, or by third-party developers, who can use the E-Mail package as a platform for further development. APIs have especially important implications for building bridges among heterogeneous networks, providing the same application functionality for a package across multiple platforms.

Attachments. Another popular E-Mail feature allows users to attach files to messages or otherwise include information available at the user's workstation in a message. Advanced systems allow inclusion of binary (program) files, and others allow attachment of graphics to messages which can then be viewed at the recipient's workstation.

Bulletin Boards. Another distribution technology, bulletin boards allow users to access common communicating areas and provide a more interactive means for communicating.

Document Interchange. E-Mail can be used for document interchange, and some E-Mail systems conform to the emerging document interchange specifications. E-Mail is much more widely established in the communications infrastructure than are some data and document interchange standards. One can foresee a marriage between E-Mail and Electronic Data Interchange (EDI) formats, for example, as a natural outgrowth of E-Mail's use.

Facsimile. Another significant electronic messaging technology, facsimile, has become widespread to the point of being nearly universal in the business environment. Fax interfaces to E-Mail systems are natural extensions of both sets of installed bases. E-Mail packages with fax interfaces allow an electronic message to be sent to any fax machine, combining timeliness with immediate hard copy.

Forms. An emerging E-Mail feature is the ability to create and use custom forms for messaging. Office work often revolves around managing forms, and using an in-place E-Mail network for forms transmission is a natural application. Forms-based applications are widely touted as an application of the future, and integrating form creation with the ability to transmit them electronically is an idea in its infancy, but spreading fast.

Gateways. The growth of internetworking technology to extend links between heterogeneous systems has opened a market for both standard and dedicated gateways among these systems. Providing the means to simply exchange messages is a basic application and one that has generated an entire submarket for internetwork message passing

products. As the X.400 standard spreads, more gateway products will appears.

Graphical User Interfaces (GUIs). Apple's Macintosh began the GUI revolution in earnest, changing the face of microcomputer applications, and ultimately all applications. Naturally, E-Mail packages running on the Macintosh use a GUI, as do others that run under Microsoft Windows. Eventually, most applications will evolve away from text orientation and use graphical elements in their interface with users.

Interprocess Communications. Another extraordinary concept in modern applications is the sharing of data by two or more applications running either at a single workstation or at more than one workstation. An emerging concept, multiuser interprocess communications will allow users to use the same file simultaneously, with the communications handled transparently to the user. This concept is part of the OS/2 operating system and of Apple's System 7.0 for the Macintosh.

Memory Residence. Memory residence, primarily in reference to microcomputers, implies that the E-Mail application runs as a background task, while the user runs another application in the foreground. Users can then call the mail application and send messages while the foreground application continues to run, and the mail application is available to receive mail and then notify the user when a message is received.

Computer Supported Cooperative Work

Computer supported cooperative work (CSCW) is an emerging concept based, like E-Mail, on communications resources. The software tools that implement this concept, generally referred to as "groupware," consist of products that provide the means to create and share information as well as some framework for managing and documenting its interchange.

Groupware tools, at minimum, automate the logging of a document's movement from one worker to another. Some groupware tools provide on-line group calendars that allow meetings to be scheduled when the entire group is available. Most groupware applications include store-and-forward E-Mail modules.

Some groupware products are specifically intended for use in design environments. Designs in process are circulated among group members. The package manages the movement of documents from one step to another and automatically creates an audit trail that indicates what was done at each step in the design.

Other groupware products are designed for editorial environments and include tools for critiquing and editing text documents. Still others manage office communications, providing a framework for exchanging information and allowing managers to monitor this exchange.

Implementing groupware entails some risks. Privacy issues must be resolved, since the flow of information in groupware applications is public. If used too strongly for group control, groupware may inhibit group creativity and teamwork. The public nature of groupware also entails security risks. Breaking into another user's calendar and changing a schedule would undermine the cooperation that groupware can provide. A manager must ensure that all group members are trustworthy before granting them access to groupware tools.

Electronic Mail's Advantages and Restrictions

When properly implemented, E-Mail has measurable advantages over alternative messaging methods such as:

Telephones—The telephone is a poor substitute for E-Mail. It is very unreliable as a means for delivering high-priority messages. A telephone conversation is not concrete enough to consummate many business transactions because it lacks hard copy and thus cannot document verbal agreements. Voice communications content is much less compact than text communications. Reading a 10-page document over the phone for someone to copy by hand would take much longer than sending it through some form of E-Mail or by courier service.

The Postal Service—The initial motivation for developing E-Mail sprang from dissatisfaction with the postal service. The postal service is designed to handle mail of low priority by today's standards. The age of electronic telecommunications has vastly increased our expectations concerning the speed of information delivery. E-Mail is popular because it satisfies this emerging need for instant delivery of information.

Courier Services—Local, regional, and national couriers often transport packages of information that must be delivered overnight. A

combination of airplanes and trucks is usually employed for the swift movement of packages from city to city. While these services have proven reliable and swift by conventional standards, they are costly and cannot usually provide anything better than overnight delivery in most city-to-city situations. For companies engaged in the regular, heavy use of couriers, the cost of E-Mail can usually be justified by the elimination of the courier costs. Even so, when E-Mail is not possible between two points, services such as Federal Express, Purolator, or the U.S.P.S. Express Mail service can be effective delivery tools.

Intracompany Mail—The delivery of messages and documents within an organization can sometimes be the most aggravating bottleneck of all. Stories about interoffice mail taking days to circulate in some large companies abound and, once it gets there, no guarantee exists that the recipient will immediately look at it. Internal E-Mail systems seek to eliminate this problem by sending messages instantly and by notifying the recipient that a message has arrived.

A growing body of experience and a booming market testify to E-Mail's potential benefits. In a business environment increasingly fixated on speed, E-Mail builds rapid message turnaround into an organization's information infrastructure.

Restrictions

Despite the allure of E-Mail as a strategic information management and communications tool, it is not a panacea. E-Mail's restrictions involve the following issues:

- The network's scope. The network should serve mail to a sufficient number of people so that the timeliness advantage is not overshadowed by the number of inaccessible people. Often, where some sort of mail network is in place, not everyone may be connected, and not all who are connected may use the network for mail. Electronic mail is not likely to be as universally accepted as the telephone until the next century.
- Ease of use. A great majority of people can use a telephone and mail a letter. The same cannot be asserted for computers and related networks. Because extensive user training is usually required, the goal of universal electronic mail remains far in the future.
- Cost. Certainly the cost of a microcomputer connected to a network is greater than that of a telephone or the postage necessary for one person's correspondence. Can efficiency gains justify the large start-up costs implied by microcomputer-based messaging systems? Because the microcomputer has uses other than for mail, the benefits of the mail component must be separated and stated explicitly.
- Security. Threats to individual privacy are great with the widespread introduction of computer technology. Once a computer is connected to a network, the information stored by an individual becomes accessible by others, and control over this access is generally out of that individual's hands. All electronic mail applications must make some provision for security.

Cost Justification

Traditional cost justification methods miss the mark in the case of E-Mail. Defining the up-front costs on a per-user basis does not account for the possible traffic volume, and focusing on message volume does not factor in the intangible benefits of enhanced communications. An accounting of both per-user and message volume costs still neglects *value added* to information work. Thus justifying E-Mail is difficult in terms of traditional methods. Not having it, however, is now practically impossible to justify. Why is this so?

The time savings offered by E-Mail are of central importance to its justification in an organization. E-Mail facilitates a new kind of work, one that allows users to create and receive messages while in the midst of other tasks. Ideas shared electronically in a workgroup can accelerate quickly, and all of the intermediate steps in the creation process are documented automatically. Actual time spent in the E-Mail process is usually negligible. Thus messaging becomes an extension of the *thinking* process as opposed to the automation of some process otherwise handled in some other medium (such as face-to-face or telephone communications). This is where users realize the real benefits of E-Mail.

It must be recognized that any benefits are in direct proportion to their planning. Thus, in a situation where implementing E-Mail is considered a cost rather than as an investment, the benefits are likely to be marginal. Alternatively, where the system's expected benefits are carefully planned from

the outset, then the system is likely to take on a life of its own and to benefit the organization in positive, unforeseen ways.

Those responsible for information systems justification are developing their own special set of tools. Surveying user needs and opinions provides a starting point for determining actual benefits. Once perceived benefits are stated explicitly, users can establish the means to test and measure the perceptions. By treating and managing E-Mail as an investment and an asset, strategic payoffs—in terms of productivity gained and value added—can be far greater than explicit benefits such as decreased courier costs. This is the perspective required to make E-Mail pay off many times the amount invested in it. ■

Electronic Mail for Microcomputers: Comparison Columns

In this report:

Synopsis

Editor's Note
This report contains comparison tables that provide key characteristics for electronic mail packages for microcomputers. Recent trends in the market for this technology are presented in the Market Overview (Report 535-101). A separate Technology Overview (Report 535-201) describes the technology and its applications.

This report presents 34 electronic mail for microcomputers packages from 23 vendors. The survey was conducted in August and September of 1989. Datapro mailed product inquiries to 34 vendors and followed each request with telephone calls. Datapro's editorial staff greatly appreciates the cooperation of the vendors that responded to the survey.

We believe these columns represent a comprehensive overview of the current voice mail market. *The absence of a company or a product from the comparison columns indicates the company failed to respond to our repeated requests for information, the product is no longer actively marketed, or the company is no longer in business.*

Since last year's survey, the number of vendors is up 53 percent, and the number of products is up 74 percent. These statistics underscore the rapid growth this market is experiencing.

Vendors

Action Technology, Inc.
2200 Powell Street
Emeryville, CA 94608 (415) 654-4444

AT&T
55 Corporate Drive
Room 34A16
Bridgewater, NJ 08807 (201) 658-6000

Cappcomm Software, Inc.
26 Journal Square
Suite 1003
Jersey City, NJ 07306 (201) 795-1500

CC:Mail, Inc.
385 Sherman Avenue
Palo Alto, CA 94306 (415) 321-0436

CE Software
1854 Fuller Road
P.O. Box 65580
West Des Moines, IA 50265 (515) 224-1995

Coker Electronics
1430 Lexington Avenue
San Mateo, CA 94402 (415) 573-5515

Consumers Software, Inc.
73 Water Street
Vancouver, BC, Canada V6B 1A1 (604) 688-4548

Cross Information Co.
1881 9th Street
Suite 311
Boulder, CO 80302 (303) 444-7799

Da Vinci Systems
P.O. Box 5427
Raleigh, NC 27650 (919) 839-2000

Data Access Corp.
14000 SW 119th Avenue
Miami, FL 33186 (305) 238-0012

Dayna Communications
50 S. Main Street
Suite 530
Salt Lake City, UT 84144 (801) 531-0600

Emissary Systems
130 Bloor Street, West
Suite 1002
Toronto, ON, Canada M5S 1N5 (416) 920-9001

Enable Software
Northway Ten, Executive Park
Ballston Lake, NY 12019 (518) 877-8600

Fischer International Systems, Inc.
4073 Mercantile Avenue
Naples, FL 33942 (813) 643-1500

LanQuest Group
1251 Parkmoore Avenue
San Jose, CA 95126 (408) 727-9446

Microsoft Corp.
16011 NE 36th Way
Box 97017
Redmond, WA 98073 (206) 882-8080

NBI, Inc.
3450 Mitchell Lane
P.O. Box 9001
Boulder, CO 80301 (303) 444-5710

Retix Corp.
2644 30th Street
Santa Monica, CA 90405 (213) 399-2200

Telenet Communications Corp.
12490 Sunrise Valley Drive
Reston, VA 22096 (703) 689-6000

3COM Corp.
3165 Kifer Road
Santa Clara, CA 95052 (408) 562-6400

Tops, A Sun Microsystems Co.
950 Marina Village Parkway
Alameda, CA 94507 (415) 769-9669

Verimation, Inc.
P.O. Box 154
Northvale, NJ 07047 (201) 767-4795

Waterloo Microsystems Inc.
3597 Parkway Lane
Suite 200
Norcross, GA 80092 (404) 441-9252

Electronic Mail for Microcomputers
Comparison Column Entry Descriptions

The following definitions are a guide to the computer-based messaging system comparison column entries that follow the vendor listing.

The **Vendor Name** and **Product Name/Version** identify the vendor/manufacturer and the name of the specific computer-based messaging system.

Operating Environments. This refers primarily to the host operating system and/or network operating system under which the messaging software runs as a process or application.

Type. There are a number of classifications for the types of messaging systems listed. We have concentrated on **LAN-based messaging packages** which run as separate applications on LANs and at the host workstations. **LAN mail software with extensions** reflect products that carry out store-and-forward functions on LANs and that also have other features such as group calendaring. **Bridges** between LANs and mainframes provide interconnection between microcomputer-based messaging systems and messaging systems based on other centralized resources.

Messaging

Prompting. This refers to the system's capability to step a user through a specific task.

Editing. Editing refers to the ability to alter a message before it is sent to a recipient.

Help Facility. This describes the different system commands and how to use them.

Withdraw. This function permits a user to cancel a message that has been sent but not received (read) by the recipient.

Message Length Restriction. This is generally expressed in lines or characters.

Distribution. Once a message has been composed, the user must determine to whom the message is to be sent. In general, messages can be sent to specific individuals, to groups of individuals, and/or to yourself. Some systems offer other variations including the ability to send messages to persons not on the system.

Scan the Mailbox for Incoming Messages. This refers to the ability to enter the mail application to view cursory information about pending messages.

Scan the Mailbox for the Status of Previously Sent Messages. Some systems allow the user to view the status information available about previously sent messages (those messages sent but not read by the recipient).

Registered Messages. This feature provides the user with confirmation that a message so designated has in fact been received.

Acknowledges the Message Receipt. Some systems acknowledge the receipt of every message sent.

Message Status. This refers to the type of information the system provides about each message prior to reading the actual text of the message. Some possible responses include message header (providing details such as the name of the originator, the subject of the message, and the date and time it was sent), urgency, and the privacy level of the message.

Filing

Directory. A directory provides a listing of the users available to message on the system.

Message Storage. This specifies the time period that previously read and filed messages are stored on the system. Storage can be for an indefinite period of time and/or for a specified period of time in which case the files are purged automatically of any messages stored longer than the time allowed by the system (e.g., 180 days).

Text Retrieval. This refers to the way in which messages can be searched for in the system (i.e., key word, full search, subject category, author, date sent, originator).

Tickler File. Tickler files are maintained to provide reminders to the user that are triggered by certain conditions, such as matching the date.

Electronic Wastebasket. Most systems provide users with an area where unwanted messages can be sent. There is usually a specified period of time during which the message is stored in this area before it is purged from the system.

Features

Security. This refers to the methods provided to users to secure message access, and to system-level methods to protect messages in transit or in storage.

Management Tracking. This feature provides management reports such as the total number of messages sent on a particular day, how many messages a certain originator sent, etc. Some systems even track message traffic from one user to another.

Able to Access Outside Services and **Outside Services Accessed.** Most systems are designed to allow users to access certain outside services. The

outside services include public messaging services and networks (e.g X.400), widely implemented messaging systems (e.g., IBM PROFS), and other device standards, such as Group 3 facsimile.

Protocols Observed. Many mail systems observe some standard message exchange or communication protocol that facilitates message exchange.

Customization. Developers make the source code to the E-Mail application available to users or other developers to allow the extension of the systems and the tailoring of certain features to meet its particular needs.

Configuration

RAM Required on Server. Many mail systems run as applications on the LAN server. How much memory, in bytes, does the E-Mail application occupy?

RAM Required on Workstation. E-Mail software also runs as an application resident at the user's workstation. How much memory, in bytes, does the E-Mail application occupy on the workstation?

Maximum Number of Nodes/Workstations. Some packages limit the number of users to which mail service can be provided.

Pricing

We have attempted to provide pricing information on all of the various operating environments for which packages are available. We also requested that vendors include a per workstation price that includes all hardware and software costs necessary to implement the messaging system. GSA contract availability has been indicated where applicable.

Vendor	Action Technology, Inc.	AT&T Bell Labs	AT&T	AT&T Bell Labs
Product	**The Coordinator 2.0**	**Premises Message Exchange/PC (PMX/PC) 2.01**	**Premises Message Exchange/Starmail (PMX/Starmail) 2.1**	**Premises Message Exchange/Term (PMX/Term) 2.02**
Operating Environments	MS-/PC-DOS, NetWare, IBM PC LAN, MS-nets such as 3Com	UNIX/Xenix	MS-/PC-DOS, NetWare, IBM PC LAN, 10Net, UNIX/Xenix, 3COM 3 Plus	UNIX/Xenix
Type	LAN-based messaging package, bridge between LAN & remote computing service, LAN mail software with extensions, bridge between LAN & mini/mainframe, standalone	For 80386 processors	LAN-based messaging package, bridge between LAN & mini/mainframe	For 80386 processors
Messaging				
Help Facility	Vendor did not specify	None	None	None
Withdraw	Vendor did not specify	Standard	Standard	Standard
Message Length Restriction	Vendor did not specify	None	None	None
Distribution	To individual, groups, self, persons not logged on to system	To individual, groups, self, bulletin board, global, persons not logged on to system, U.S. Postal Service, FAX, Telex, Overnight Courier Serv.	To individual, groups, self, bulletin board, global, persons not logged on to system, U.S. Postal Service, FAX, Telex, Overnight Courier Serv.	To individual, groups, self, bulletin board, global, persons not logged on to system, U.S. Postal Service, FAX, Telex, Overnight Courier Serv.
Scan Mailbox for Incoming Message	Standard	Standard	Standard	Standard
Scan Mailbox for Status of Previously Sent Messages	Standard	Standard	Standard	Standard
Registered Messages	None	Standard	Standard	Standard
Acknowledges Message Receipt	None	Standard	Standard	Standard
Message Status	Originator, date/time, message header, scan summary, response requested, response required	Originator, date/time, urgency, message header, length, IDs message as text, binary, form or multipart	Originator, date/time, urgency, message header, length, IDs message as text, binary, form or multipart	Originator, date/time, urgency, message header, length, IDs message as text, binary, form or multipart
Filing				
Directory	Vendor did not specify	Standard	Standard	Standard
Message Storage	Vendor did not specify	Indefinite	Indefinite	Indefinite
Purging	Vendor did not specify	User/supervisor defined	User/supervisor defined	User/supervisor defined
Text Retrieval	Subject, date, date ranges, originator, keyword, destination, respond by/due by date, copied-in	Subject, date, originator, keyword, destination	Subject, date, originator, keyword, destination	Subject, date, originator, keyword, destination
Tickler File	Standard	None	None	None
Electronic Wastebasket	Standard	Standard	Standard	Standard
Features				
Security	Password, access codes, database controlled, answerback verification	Password, encryption	Password, encryption	Password, encryption
Management Tracking	Standard	None	None	None
Access to Outside Services	Standard	Standard	Standard	Standard
Outside Services Accessed	TELEX, MCI Mail, CompuServe, DISOSS/PROFS, ALL-IN-1	TELEX, MCI Mail, DDD, DISOSS/PROFS, FAX, X.400 networks	TELEX, MCI Mail, DDD, DISOSS/PROFS, FAX, X.400 networks	TELEX, MCI Mail, DDD, DISOSS/PROFS, FAX, X.400 networks
Protocols Observed	MHS, SAA CUA	X.400	X.400	X.400
Customization	Vendor did not specify	Definable object types (attachments) known to PMX; automatically invokes an application program	Definable object types (attachments) known to PMX; automatically invokes an application program	Definable object types (attachments) known to PMX; automatically invokes an application program
Other Features	Append text, binary files, sorts and files mail, reminds you of due dates	Public and private network; multi-vendor connectivity; consistent, user-friendly interface; heterogeneous workgroup connectivity; background mail notification	Public and private network; multi-vendor connectivity; heterogeneous workgroup connectivity; personal and organizational directories; human-name addressing	Public and private network; multi-vendor connectivity; consistent, user-friendly interface; heterogeneous workgroup connectivity
Configuration				
RAM Required on Server (bytes)	Minimum requirement	256K	384K	Vendor did not specify
RAM Required on Workstation (bytes)	640K	256K	384K	Vendor did not specify
Max. Number Nodes/Workstations	Unlimited	Vendor did not specify	Vendor did not specify	Vendor did not specify
Pricing				
Package Price ($)	495 - standalone; 995 - 10 user; 1,995 - 30 user	995	995	1,295
Price per User/Node ($)	Less than 100	85 - 150	Vendor did not specify	Vendor did not specify
GSA Contract	No	Vendor did not specify	Vendor did not specify	Vendor did not specify

Vendor	Cappcomm Software, Inc.	Cappcomm Software, Inc.	CC:Mail, Inc.	CE Software
Product	**Mail Call - EM**	**Mail Call - VMS**	**Cc:mail**	**QuickMail**
Operating Environments	MS-/PC-DOS	MS-/PC-DOS	MS-/PC-DOS, TOPS, NetWare, IBM PC LAN, 10Net, OS/2 LAN Manager	Macintosh OS
Type	PC Front-End to ALL-IN-1	PC front end to VMS mail	LAN-based messaging package, bridge between LAN & remote computing service, LAN mail software with extensions, bridge between LAN & mini/mainframe, server-to-server	LAN-based messaging package, bridge between LAN & remote computing service, LAN mail software with extensions, bridge between LAN & mini/mainframe
Messaging				
Help Facility	Standard	Standard	Standard	Standard
Withdraw	Vendor did not specify	Vendor did not specify	Vendor did not specify	Vendor did not specify
Message Length Restriction	Vendor did not specify	Vendor did not specify	Vendor did not specify	Vendor did not specify
Distribution	To individual, groups, self, global, persons not logged on to system	To individual, groups, self, global, persons not logged on to system	To individual, groups, self, bulletin board, global, persons not logged on to system, printers and other peripherals	To individual, groups, self, bulletin board, persons not logged on to system
Scan Mailbox for Incoming Message	Standard	Standard	Standard	Standard
Scan Mailbox for Status of Previously Sent Messages	Standard	Standard	None	Standard
Registered Messages	Standard	Standard	Standard	Optional
Acknowledges Message Receipt	Standard	Standard	Standard	Optional
Message Status	Message header, response requested, response required, receipt requested	Message header, response requested, response required, receipt requested	Originator, date/time, length, receipt requested, type of file	Originator, date/time, urgency, message header, scan summary, privacy level, confidential, receipt requested
Filing				
Directory	Standard	Standard	Standard	Standard
Message Storage	Optional periodic purging	Vendor did not specify	Indefinite	Indefinite
Purging	Vendor did not specify	Automatic periodic purging	User/supervisor defined	User/supervisor defined
Text Retrieval	Subject, date, date ranges, originator, destination, filename or number	Subject, date, date ranges, originator, destination, filename or number	Subject, date, date ranges, originator, keyword, destination, filename or number	Subject, date, date ranges, originator
Tickler File	Vendor did not specify	Vendor did not specify	None	Standard
Electronic Wastebasket	None	None	Standard	Optional
Features				
Security	Password, encryption	Password, encryption	Password, encryption, database controlled	Password
Management Tracking	Vendor did not specify	Vendor did not specify	Standard	Standard
Access to Outside Services	Vendor did not specify	Standard	Optional	Standard
Outside Services Accessed	DDD, ALL-IN-1	DDD	TELEX, DDD, Internet, DISOSS/PROFS, ALL-IN-1, FAX, Telemail, Easylink	MCI Mail, CompuServe, FAX, Genie
Protocols Observed	Vendor did not specify	Vendor did not specify	Vendor did not specify	Vendor did not specify
Customization	Tailored screen layout, message headers, functionality	Tailored screen layout, message headers, functionality	API available	Custom forms, options selectable
Other Features	Tailoring for organizations as needed, on-going support with source code available	Tailoring for organizations as needed, on-going support with source code available	Graphics editor, bulletin boards	Conferencing, third-party bridges to outside systems
Configuration				
RAM Required on Server (bytes)	512K	512K	None	512K
RAM Required on Workstation (bytes)	512K	512K	280K	512K
Max. Number Nodes/Workstations	Vendor did not specify	Vendor did not specify	65,000	100,000
Pricing				
Package Price ($)	500 - 30,000	500 - 30,000 (site license & corporate mail license)	695 for first 25; 595 for additional 65,000	300 for 10 users
Price per User/Node ($)	30 - 60 per user	30 - 60 per user	Vendor did not specify	Vendor did not specify
GSA Contract	Vendor did not specify	Vendor did not specify	Vendor did not specify	No

Vendor	Coker Electronics	Coker Electronics	Coker Electronics	Coker Electronics
Product	**PC tPost**	**tPost Central**	**tPost FAXforward**	**tPost Forms**
Operating Environments	MS-/PC-DOS	MS-/PC-DOS	MS-/PC-DOS	MS-/PC-DOS
Type	E-mail for standalone PLS	E-mail for standalone PCs	E-mail to FAX for standalone PCS	Electronic forms mailing via tPost E-M
Messaging				
Help Facility	Standard	Standard	Standard	Standard
Withdraw	Standard	Standard	Standard	Standard
Message Length Restriction	None	None	None	400 lines
Distribution	To individual, groups, self, bulletin board, global	To individual, groups, self, bulletin board, global	To individual, groups, global, persons not logged on to system, Group 3 FAX	To individual, groups, self, bulletin board, global, persons not logged on to system, FAX
Scan Mailbox for Incoming Message	Standard	Standard	None	None
Scan Mailbox for Status of Previously Sent Messages	Standard	Standard	Standard	Standard
Registered Messages	None	None	None	None
Acknowledges Message Receipt	Standard	Standard	Standard	Optional
Message Status	Originator, date/time, message header, length	Originator, date/time, message header, length	Originator, date/time, message header	Originator, message header
Filing				
Directory	Standard	Standard	Standard	Standard
Message Storage	Vendor did not specify	Optional periodic purging	Vendor did not specify	Vendor did not specify
Purging	User/supervisor defined	Vendor did not specify	User/supervisor defined	User/supervisor defined
Text Retrieval	Originator, destination, filename or number	Filename or number	Filename or number	Filename or number
Tickler File	None	None	None	None
Electronic Wastebasket	Standard	Standard	Standard	Standard
Features				
Security	Password, access codes	Password, access codes, answerback verification	Password, access codes	Security built in to tPost E-Mail soft
Management Tracking	Standard	Standard	Standard	Standard
Access to Outside Services	None	None	Optional	Optional
Outside Services Accessed	Not applicable	Not applicable	FAX	FAX
Protocols Observed	Not applicable	Not applicable	Group 3 CCITT	Vendor did not specify
Customization	Vendor did not specify	Customizable through application interface	Vendor did not specify	Vendor did not specify
Other Features	Electronic Mailbox software for modem equipped laptop or desktop PCs; PC-tPOST allows compositions addressing, sending, receiv. and management of electronic mail	Host post office for system of remote standalone laptop and desktop PCs running remote module; runs unattended	Allows remote tPost users to send E-mail to FAX machines utilizing share FAX modem at tPost; central automatic coversheet generated, delivery confirmation, FAX	Form-filler utility for use with the tPost E-Mail system; creates forms database; math functions, time and date stamp, user defined data key, multiple line fields
Configuration				
RAM Required on Server (bytes)	640K	640K	640K	128K
RAM Required on Workstation (bytes)	256K	Vendor did not specify	Vendor did not specify	128K
Max. Number Nodes/Workstations	200 per server	200 each	Unlimited	Unlimited
Pricing				
Package Price ($)	129	229	129	49
Price per User/Node ($)	99 for 2 or more	99	Installed on server only	49
GSA Contract	No	No	Vendor did not specify	No

Vendor	**Coker Electronics**	**Consumers Software, Inc.**	**Cross Information Company**	**Da Vinci Systems**
Product	**tPost LAN**	**The Network Courier 2.0**	**Cross & Point 5.10**	**Da Vinci eMAIL**
Operating Environments	MS-/PC-DOS	MS-/PC-DOS, NetWare, Microsoft Windows, IBM PC LAN, 10Net, OS/2 LAN Manager	MS-/PC-DOS, TOPS, NetWare, IBM PC LAN, 10Net, Vines	MS-/PC-DOS, TOPS, NetWare, Microsoft Windows, IBM PC LAN, 10Net
Type	LAN-based messaging package, LAN mail software with extensions	LAN-based messaging package, bridge between LAN & remote computing service, LAN mail software with extensions, bridge between LAN & mini/mainframe	LAN-based messaging package, bridge between LAN & remote computing service, LAN mail software with extensions, bridge between LAN & mini/mainframe	LAN-based messaging package, LAN mail software with extensions
Messaging				
Help Facility	Standard	Standard	Standard	Vendor did not specify
Withdraw	Standard	None	None	Vendor did not specify
Message Length Restriction	None	None	None	Vendor did not specify
Distribution	To individual, groups, self, bulletin board, global, persons not logged on to system, FAX	To individual, groups, self, bulletin board, global	To individual, groups, bulletin board, global, persons not logged on to system	To individual, groups, self, persons not logged on to system, bulk mail server
Scan Mailbox for Incoming Message	Standard	Standard	Standard	Standard
Scan Mailbox for Status of Previously Sent Messages	Standard	Standard	Standard	Standard
Registered Messages	None	Standard	None	Optional
Acknowledges Message Receipt	Standard	Standard	None	Standard
Message Status	Originator, date/time, message header	Originator, date/time, urgency, message header, confidential, receipt requested	Originator, date/time, urgency, message header, scan summary, length, privacy level, confidential, response requested, response required	Originator, date/time, urgency, message header, response requested, response required
Filing				
Directory	Standard	Standard	Standard	Standard
Message Storage	Optional periodic purging	Indefinite	Indefinite	Indefinite
Purging	User/supervisor defined	User/supervisor defined	User/supervisor defined	User/supervisor defined
Text Retrieval	Originator, filename or number	Subject, keyword	Subject, originator, keyword, filename or number	Subject, date, date ranges, keyword, carbon copy, blind carbon copy
Tickler File	None	None	Standard	Optional
Electronic Wastebasket	Standard	None	None	None
Features				
Security	Password, access codes, answerback verification	Password, encryption, database controlled	Password, encryption, access codes	Password, encryption, 2-level access codes
Management Tracking	Standard	Standard	Standard	Vendor did not specify
Access to Outside Services	Optional	Standard	Standard	Vendor did not specify
Outside Services Accessed	FAX, tPOST remote users	MCI Mail, DISOSS/PROFS, FAX, X.400 networks	MCI Mail, CompuServe, Internet, FAX	ALL-IN-1, X.400 networks
Protocols Observed	Xmodem, CRC	X.400, SNADS, SAA CUA	Not applicable	MHS
Customization	Add-ons available	Vendor did not specify	Available	Communications API is in public domain
Other Features	LAN E-mail with built-in gateway for linking to other LANs and remote standalone PCs; optional FAX forward module allows workstations to send text E-mail to Group 3 FAX	Vendor did not specify	Vendor did not specify	Appends text, binary files, graphics
Configuration				
RAM Required on Server (bytes)	488K (640K recommended)	256K	140K	250K
RAM Required on Workstation (bytes)	224K (512K recommended)	Vendor did not specify	140K	384K DOS; 512K Windows
Max. Number Nodes/Workstations	100 per server	Vendor did not specify	Unlimited	Unlimited
Pricing				
Package Price ($)	495/5 stations; 695/25 stations; 995/100 stations	995 each	Contact vendor	295 - 5 users; 795 - 20 users
Price per User/Node ($)	Bundled (as package price)	995 each	Vendor did not specify	Vendor did not specify
GSA Contract	No	No	Vendor did not specify	No

Vendor	Data Access Corp.	Dayna Communications	Emissary Systems	Enable Software
Product	**Office Works**	**DaynaMail**	**Herald Mail**	**Higgins**
Operating Environments	MS-/PC-DOS, NetWare, IBM PC LAN, 10Net, Vines, NETBIOS-compatible network	MS-/PC-DOS, Macintosh OS, TOPS, NetWare, MultiFinder, OS/2 LAN Manager, DaynaNET	MS-/PC-DOS, NetWare, IBM PC LAN, OS/2 LAN Manager	MS-/PC-DOS, NetWare, IBM PC LAN, Vines, OS/2 LAN Manager, all MS-DOS networks
Type	LAN mail software with extensions, group productivity software	LAN-based messaging package, LAN mail software with extensions	LAN-based messaging package, LAN mail software with extensions, bridge between LAN & mini/mainframe	LAN mail software with extensions, LAN office system
Messaging				
Help Facility	Standard	Vendor did not specify	Standard	Standard
Withdraw	Standard	Vendor did not specify	Vendor did not specify	None
Message Length Restriction	4 pages - 4,200 characters	Vendor did not specify	Vendor did not specify	21 lines plus attachments
Distribution	To individual, groups, self	To individual, groups, self, persons not logged on to system	To individual, groups, self	To individual, groups, self, global, persons not logged on to system, fax, printer output, wide-area network
Scan Mailbox for Incoming Message	Standard	Standard	Standard	Standard
Scan Mailbox for Status of Previously Sent Messages	None	None	Standard	Standard
Registered Messages	Standard	Standard	Standard	Standard
Acknowledges Message Receipt	Standard	Standard	Standard	Standard
Message Status	Originator, date/time, urgency, privacy level, confidential	Originator, date/time, urgency	Originator, date/time, urgency, message header, receipt requested, document profile, recipient list	Originator, date/time, urgency, message header, meeting request, meeting confirmation
Filing				
Directory	Standard	Standard	Standard	Standard
Message Storage	Indefinite	Indefinite	Indefinite	Indefinite
Purging	User/supervisor defined	User/supervisor defined	Vendor did not specify	User/supervisor defined
Text Retrieval	Subject, date, date ranges, originator, keyword, destination, filename or number, location, reference	Subject, date, date ranges, originator	Date, date ranges, originator, keyword, destination	Keyword
Tickler File	Standard	Vendor did not specify	None	Optional
Electronic Wastebasket	Vendor did not specify	Vendor did not specify	None	None
Features				
Security	Password	Password	LAN-supplied security	Password, encryption, 2-levels of passwords
Management Tracking	None	Standard	Standard	Standard
Access to Outside Services	Standard	Optional	Standard	Optional
Outside Services Accessed	TELEX, FAX	MCI Mail, CompuServe, DISOSS/PROFS, ALL-IN-1,	DISOSS	MCI Mail, DISOSS/PROFS, FAX, X.400 networks, via Softswitch to other
Protocols Observed	Not applicable	MHS	SNADS, APPC/LU6.2, DIA, DCA	X.400, MHS, SNADS
Customization	Vendor did not specify	Vendor did not specify	Vendor did not specify	API for custom programming and gateways
Other Features	Calendar module for time management and group meetings, telephone messaging system, on-line tutorial	Vendor did not specify	Vendor did not specify	Available as a standalone application, integrated with groupware and scheduling functions
Configuration				
RAM Required on Server (bytes)	Vendor did not specify	Vendor did not specify	640K	640K
RAM Required on Workstation (bytes)	365K available	Vendor did not specify	512K	640K
Max. Number Nodes/Workstations	Unlimited	Vendor did not specify	Unlimited	Index
Pricing				
Package Price ($)	195 - single system license (standalone); 495 - entry level license (6 user ID max.); 1,395 - unlimited	Contact vendor	6,995, volume pricing available	695
Price per User/Node ($)	Vendor did not specify	Vendor did not specify	Vendor did not specify	87
GSA Contract	Yes	Vendor did not specify	No	Yes

Vendor	**Fischer International Systems, Inc**	**Fischer International Systems, Inc**	**LanQuest Group**	**Microsoft Corp.**
Product	**Personal EMC2/TAO LAN**	**Personal EMC2/TAO**	**Lan: Mail Monitor**	**Microsoft Mail 2.0**
Operating Environments	MS-/PC-DOS, IBM PC LAN	MS-/PC-DOS	MS-/PC-DOS, TOPS, NetWare, IBM PC LAN, 10Net, Vines, OS/2 LAN Manager, any NETBIOS-based NOS	MS-/PC-DOS, Macintosh OS, TOPS, MultiFinder, VAX VMS 5.0 (for Mail Server)
Type	LAN-based messaging package, bridge between LAN & mini/mainframe	PC-to-host-based EMC2/TAO	LAN-based messaging package, LAN mail software with extensions, LAN-to-LAN; PC remote-to-LAN	LAN-based messaging package, bridge between LAN & remote computing service, LAN mail software with extensions, bridge between LAN & mini/mainframe
Messaging				
Help Facility	Standard	Standard	Standard	Standard
Withdraw	Standard	Standard	Standard	Standard
Message Length Restriction	None	None	None	32K
Distribution	To individual, groups, self, bulletin board, global	To individual, groups, self, bulletin board, global, persons not logged on to system	To individual, groups, self, global, persons not logged on to system, remote PCs, remote LANs	To individual, groups, self, global, persons not logged on to system
Scan Mailbox for Incoming Message	Standard	Standard	Standard	Standard
Scan Mailbox for Status of Previously Sent Messages	Standard	Standard	Standard	None
Registered Messages	Vendor did not specify	Vendor did not specify	None	Standard
Acknowledges Message Receipt	Vendor did not specify	Vendor did not specify	Standard	Standard
Message Status	Originator, date/time, message header	Originator, date/time, message header	Originator, date/time, message header, privacy level, response requested	Originator, date/time, urgency, message header, mesg. type, file attchmnt., read/unread
Filing				
Directory	Standard	Standard	Standard	Standard
Message Storage	Indefinite, optional periodic purging	Indefinite, optional periodic purging	Indefinite	Indefinite
Purging	Vendor did not specify	Vendor did not specify	User/supervisor defined	User has to delete messages
Text Retrieval	Subject, date, filename or number	Subject, date, filename or number	Subject, date, date ranges, originator	Vendor did not specify
Tickler File	Vendor did not specify	Vendor did not specify	Vendor did not specify	None
Electronic Wastebasket	Standard	Vendor did not specify	Vendor did not specify	Standard
Features				
Security	Password, access codes, database controlled	Password, access codes, database controlled	Password, encryption, database controlled	Password, message stored in message database
Management Tracking	Vendor did not specify	Vendor did not specify	Standard	Standard
Access to Outside Services	Standard	Standard	Standard	Optional
Outside Services Accessed	TELEX, DISOSS/PROFS, ALL-IN-1, FAX, X.400 networks	TELEX, DISOSS/PROFS, ALL-IN-1, FAX, X.400 networks, Wang Office, AT&T Mail	Remote PCs & remote LAN	MCI Mail, Internet, DISOSS/PROFS, ALL-IN-1, FAX, X.400 networks, UNIX SMTP, GE Quik Comm
Protocols Observed	Vendor did not specify	X.400, SNADS	Vendor did not specify	X.400 & SNADS supported
Customization	Vendor did not specify	Vendor did not specify	Vendor did not specify	Gateway SDK for writng cust. gateways from MS Mail, Appl. SKD for integrating Mac applic. w/MS Mail & SDK for Hypercard for intgr w/MS Mail
Other Features	File folders, display attribute configuration, script langauge, hot-key access to DOS, keystroke macro definition, edit key configuration	File folders, display attribute configuration, script language, hot-key access to DOS, keystroke macro definition, edit key configuration	Available in English, French or German	Supports enterprise-wide, multi-vendor connectivity; global directory support, support for Mac & PC clients & Mac & VAX servers, integration w/applications such as MS
Configuration				
RAM Required on Server (bytes)	640K	Vendor did not specify	240K	1M
RAM Required on Workstation (bytes)	256K	256K	200K	100K for Mac; 512K for PC
Max. Number Nodes/Workstations	255	Vendor did not specify	150	No restriction
Pricing				
Package Price ($)	Contact vendor	150	995	395 Microsoft Mail Server; 125 Mac Workstation Package; 125 PC Workstation Package
Price per User/Node ($)	Vendor did not specify	Vendor did not specify	495 for additional 10 stations	1,495 Mac Workstation 20-Pak
GSA Contract	Vendor did not specify	Vendor did not specify	Vendor did not specify	No

Vendor	NBI, Inc.	Retix Corp.	Telenet Communications Corp.	3COM Corp.
Product	**Office Works 2.0**	**RetixMail**	**Telemail**	**3+Mail 1.3.2**
Operating Environments	MS-/PC-DOS, Macintosh OS, Microsoft Windows, NBI Office Works Network	MS-/PC-DOS, Mac OS, TOPS, 10-Net, NetWare, MS Windows, MultiFinder, IBM PC LAN, OS/2 LAN Mgr., UNIX/Xenix, Vines,	MS-/PC-DOS	MS-/PC-DOS, Macintosh OS, MultiFinder, OS/2 LAN Manager
Type	LAN-based messaging package, bridge between LAN & mini/mainframe	LAN-based messaging package, bridge between LAN & remote computing service, bridge between LAN & mini/mainframe, X.400-based messaging system	Vendor did not specify	LAN mail software with extensions
Messaging				
Help Facility	Standard	Standard	Standard	Standard
Withdraw	None	Standard	Standard	None
Message Length Restriction	2 pages, 10 10 doc/files attch	None	2,000,000	20,000
Distribution	To individual, groups, self, global	To individual, groups, self, global, persons not logged on to system, Fax, Telex, Teletext outputs	To individual, groups, self, bulletin board, persons not logged on to system	To individual, groups, self, global, persons not logged on to system
Scan Mailbox for Incoming Message	Standard	Standard	Standard	Standard
Scan Mailbox for Status of Previously Sent Messages	None	Standard	Vendor did not specify	None
Registered Messages	None	Standard	Standard	Standard
Acknowledges Message Receipt	Standard	Standard	Standard	None
Message Status	Originator, date/time, file type for attachments	Originator; date/time; urgency; msg. header, scan summary; length; privacy level; confidential; response requested, required, recpt. requested, msg. read notification	Originator, date/time, urgency, message header, scan summary, length, privacy level, confidential, response requested, response required, receipt requested	Originator
Filing				
Directory	Optional	Standard	Standard	Standard
Message Storage	Optional periodic purging	Optional periodic purging	Indefinite, optional periodic purging	Indefinite
Purging	Vendor did not specify	Per-message automatic expiration	Automatic periodic purging, user/supervisor defined	Supervisor manual purge
Text Retrieval	Subject, date, date ranges, originator, keyword	Date, date ranges, originator, keyword, destination, filename or number, priority of message	Subject, date, date ranges, originator, keyword, filename or number	Subject, date, date ranges, originator, keyword, notes field, entire text search
Tickler File	None	Standard	Standard	None
Electronic Wastebasket	Standard	Standard	Vendor did not specify	Standard
Features				
Security	Access codes, database controlled	Password, encryption, access codes, answerback verification, ISO encrypted data types	Password, privacy password	Password, encryption
Management Tracking	Standard	Standard	Standard	Standard
Access to Outside Services	Optional	Standard	Standard	Optional
Outside Services Accessed	DDD, Internet	TELEX, MCI Mail, DDD, Internet, DISOSS/PROFS, ALL-IN-1, FAX, X.400 networks	TELEX, MCI Mail, DDD, DISOSS/PROFS, ALL-IN-1, FAX, X.400 networks, Wang, ATT Mail, H-P, VM	TELEX, MCI Mail, DDD, CompuServe, Internet, DISOSS/PROFS, ALL-IN-1, FAX, X.400 networks
Protocols Observed	RFC 821, 822, transport	Vendor did not specify	X.400	X.400, SNADS, through optional gateway
Customization	Intrusive notification mail arrival	All functions configurable on a per-user basis; private - labelling available to OEMs	Available	API available
Other Features	Vendor did not specify	Native-mode X.400 implementation on PC-LANs; meets all CCITT and ISO profiles worldwide, plus U.S. GOSIP and U.K. GOSIP; supports APIs for access by other programs	Scripts (user defined or library) send and receive controls by user, hierarchical organization	Transparently send mail between Macintosh and PCs; send up to 25 binary or text file attachments with each message; access mailbox remotely/off-net via modem dialup
Configuration				
RAM Required on Server (bytes)	4M	640K	Vendor did not specify	130K
RAM Required on Workstation (bytes)	2M	640K; 32,000 (virt. ntwk.)	Vendor did not specify	270K
Max. Number Nodes/Workstations	Unlimited	7,000 - 100-user syst. approx.	Vendor did not specify	Unlimited
Pricing				
Package Price ($)	2,000 - 5,000 for Office Works	50 - 70 based on network size	Contact vendor	595 - 1-5 user license (per server); buy 2 packages for unlimited user license (per server)
Price per User/Node ($)	Vendor did not specify	Via third party leasor	Vendor did not specify	Vendor did not specify
GSA Contract	Yes	Vendor did not specify	Vendor did not specify	No

Vendor	3COM Corp.	3COM Corp.	Tops	Verimation, Inc.
Product	**3+Mail for Macintosh 1.5**	**3+Open Mail 1.0**	**InBox 3.0**	**Memo/PC 1.3**
Operating Environments	MS-/PC-DOS, Macintosh OS, MultiFinder, OS/2 LAN Manager	MS-/PC-DOS, Macintosh OS, MultiFinder, OS/2 LAN Manager	MS-/PC-DOS, Mac. OS, TOPS, NetWare, MultiFinder, IBM PC LAN, UNIX/Xenix, Windows & OS/2 spprt	MS-/PC-DOS
Type	LAN mail software with extensions	Vendor did not specify	LAN-based messaging package, LAN mail software with extensions	Bridge between LAN & mini/mainframe
Messaging				
Help Facility	Standard	Standard	Standard	Standard
Withdraw	None	None	Standard	Standard
Message Length Restriction	20,000	20,000	None	None
Distribution	To individual, groups, self, global, persons not logged on to system	To individual, groups, self, global, persons not logged on to system	To individual, groups, self, bulletin board, global	To individual, groups, self
Scan Mailbox for Incoming Message	Standard	Standard	Standard	Standard
Scan Mailbox for Status of Previously Sent Messages	None	None	Standard	Standard
Registered Messages	Standard	Standard	Standard	Standard
Acknowledges Message Receipt	None	None	Standard	Standard
Message Status	Originator	Originator	Originator, date/time, urgency, message header, length, receipt requested	Originator, date/time, message header, confidential, response required
Filing				
Directory	Standard	Standard	Standard	Standard
Message Storage	Indefinite	Indefinite	Vendor did not specify	Indefinite
Purging	Supervisor manual purge	Supervisor manual purge	Option to store locally user defined	Vendor did not specify
Text Retrieval	Subject, date, date ranges, originator, keyword, notes field, entire text search	Subject, date, date ranges, originator, keyword, notes field, entire text search	Subject, date, originator, keyword	Subject, date, originator, keyword, destination
Tickler File	None	None	Standard	None
Electronic Wastebasket	Standard	Standard	Standard	None
Features				
Security	Password, encryption	Password, encryption	Password, encryption	Through mainframe interface
Management Tracking	Standard	Standard	Standard	None
Access to Outside Services	Optional	Optional	Standard	None
Outside Services Accessed	TELEX, MCI Mail, DDD, CompuServe, Internet, DISOSS/PROFS, ALL-IN-1, FAX, X.400 networks	TELEX, MCI Mail, DDD, CompuServe, Internet, DISOSS/PROFS, ALL-IN-1, FAX, X.400 networks	PROFS and SMTP	Not applicable
Protocols Observed	X.400, SNADS	X.400, SNADS, through optional gateway	Vendor did not specify	SNADS, SAA CUA, not applicable
Customization	API available	API available	Vendor did not specify	Vendor did not specify
Other Features	Transparently send mail between Macintosh and PCs; send up to 25 binary or text file attachments with each message; access mailbox remotely/off-net via modem dialup	Transparently send mail between Macintosh and PCs; send up to 25 binary or text file attachments with each message; access mailbox remotely/off-net via modem dialup	PEsonal address books and localized storage files; no restricted to an applicable network system; runs over all network platforms	Allows uploading and downloading of mail from mainframe MSMO system
Configuration				
RAM Required on Server (bytes)	130K	130K	137K	Vendor did not specify
RAM Required on Workstation (bytes)	270K	270K	220	Vendor did not specify
Max. Number Nodes/Workstations	Unlimited	Unlimited	100 per message center	Vendor did not specify
Pricing				
Package Price ($)	1,190 per server, unlimited users	595 - for Macintosh Ver. 1.5 for 1-5 user license (per server); buy 2 packages for unlimited user	Contact vendor	15,000 site license
Price per User/Node ($)	Vendor did not specify	Vendor did not specify	Vendor did not specify	Vendor did not specify
GSA Contract	No	No	Vendor did not specify	No

Vendor	**Waterloo Microsystems Inc.**	**Waterloo Microsystems Inc.**
Product	**Port Internet Mail**	**Port Lite Mail**
Operating Environments	MS-/PC-DOS, Port Network	MS-/PC-DOS, Port Lite Network
Type	LAN-based messaging package, bridge between LAN & remote computing service	LAN-based messaging package
Messaging		
Help Facility	Vendor did not specify	Vendor did not specify
Withdraw	None	Vendor did not specify
Message Length Restriction	None	None
Distribution	To individual, groups, self	To individual, groups, self
Scan Mailbox for Incoming Message	Standard	Standard
Scan Mailbox for Status of Previously Sent Messages	Standard	Standard
Registered Messages	Standard	Standard
Acknowledges Message Receipt	Standard	Standard
Message Status	Originator, date/time, message header, length, privacy level	Originator, date/time, message header, length, privacy level
Filing		
Directory	Standard	Standard
Message Storage	Indefinite	Indefinite
Purging	User/supervisor defined	User/supervisor defined
Text Retrieval	Filename or number	Filename or number
Tickler File	None	None
Electronic Wastebasket	None	None
Features		
Security	Password	Password
Management Tracking	None	None
Access to Outside Services	None	None
Outside Services Accessed	Not applicable	Not applicable
Protocols Observed	Not applicable, not applicable	Not applicable, not applicable
Customization	Vendor did not specify	Vendor did not specify
Other Features	Message filing; relays mail among LANs; defines nicknames for user destinations; msg. attachments of up to 4GB; access restrictions; carbon copies, blind carbon copies, registered mail	Message filing and organization; copies and registered mail; message attachments; automatic correspondence history; use of nicknames; on-line directory of mail users
Configuration		
RAM Required on Server (bytes)	512K	512K
RAM Required on Workstation (bytes)	64K	640K
Max. Number Nodes/Workstations	255	10
Pricing		
Package Price ($)	495	295
Price per User/Node ($)	Vendor did not specify	Vendor did not specify
GSA Contract	No	No