

Networks and
Communications
Buyer's Guide

digital

1989 January-June

Networks

Map to the Guide

Background Information <i>Presents a general overview of networking and communications concepts and architecture.</i>	Product Information <i>Describes product features and capabilities.</i>	Configuration Information <i>Describes how products can be linked into networks.</i>	Ordering Information <i>Lists the codes required to purchase specific variations of a products.</i>
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Networks and
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1989 January-June

Networks

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Appendix B Environmental Specifications

Appendix C Software Product Description List

Appendix D Related Documentation

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DEC MicroServer

The solution whenever communication is required from an Ethernet LAN into a wide area network environment, the DEC MicroServer provides the hardware base for the new DECrouter 2000, X25router 2000, and the DECnet/SNA Gateway-ST. ▲ Refer to "802.3/Ethernet Communications Servers" in Section 2.

DECrouter 2000

The DECrouter 2000 provides high-speed (64 Kb/s to 256 Kb/s) routing for local or remote DECnet/OSI networks. Replacing the DECSA-based DECnet Router Server, it provides synchronous connections to remote DECnet systems and LANs in a wide area network using DECnet. ▲ Refer to "802.3/Ethernet Communications Servers" in Section 2.

X25router 2000

Replacing the DECnet/X.25 Gateway, the X25router 2000 has all the capabilities of the DECrouter 2000, with the additional ability to access X.25 networks. The X25router 2000 runs on the DEC MicroServer hardware and provides improved price/performance, throughput, and increased concurrent sessions over the DECnet/X.25 Gateway. ▲ Refer to "802.3/Ethernet Communications Servers" in Section 2.

DECnet/SNA Gateway for Synchronous Transport

The DECnet/SNA Gateway for Synchronous Transport (DECnet/SNA Gateway-ST) replaces the network-to-network function provided by the DECnet/SNA Gateway DECSA-FA-based product. Running on the DEC MicroServer hardware, it provides improved price/performance over the DECSA-FA-based product, and supports more lines at higher bandwidth with greater throughput. ▲ Refer to "Digital/IBM Communications Software" in Section 4.

DECnet/SNA Gateway for Channel Transport

The DECnet/SNA Gateway for Channel Transport (DECnet/SNA Gateway-CT) addresses the need for high-performance, network-to-network connections. Offering direct channel attachment to an IBM S/370, it bypasses the SNA Wide Area Network and the 37x5 Front-End Processor to provide superior throughput for file transfer and task-to-task applications. With the DEC ChannelServer as its hardware base, DECnet/SNA Gateway-CT allows users to access files, documents, and applications simultaneously on multiple mainframes in either central or distributed locations. ▲ Refer to "Digital/IBM Communications Software" in Section 4.

DECnet/SNA VMS Gateway Management, V2.0

DECnet/SNA VMS Gateway Management V2.0 can be used to monitor both DECnet/SNA Gateway-ST and DECnet/SNA Gateway-CT products, and allows the Gateway administrator to configure the software executing in the DECnet/SNA Gateway. ▲ Refer to "Digital/IBM Communications Software" in Section 4.

DECnet/SNA Data Transfer Facility Version 2.0

Version 2.0 of the DECnet/SNA Data Transfer Facility (DTF) provides improved security, supports VSAM file types, and allows record-level access to most IBM file types. When combined with the DECnet/SNA Gateway-CT or DECnet/SNA Gateway-ST, DTF provides a better than tenfold increase in performance and throughput over previously available products. ▲ Refer to "Digital/IBM Communications Software" in Section 4.

DSV11 Q-bus Synchronous Communications Controller

The DSV11 module provides up to 256 Kb/s wide area network connection for standalone MicroVAX II and MicroVAX 3500/3600 systems. The preferred MicroVAX option for host-based wide area communications, it has the flexibility to support two lines running different applications, and is supported by DECnet-VAX, VAX P.S.I., and VMS/SNA software products. ▲ Refer to "Q-bus Communications Controllers" in Section 3.

VMS/SNA, V1.3

Answering the need for a single-system interconnect product, VMS/SNA V1.3 offers a connection to the IBM front-end processor through a synchronous connection, and allows remote systems to communicate directly to an SNA environment without requiring them to be part of a LAN. VMS/SNA V1.3 supports the new DSV11 communications device, VMS V5.0, and the VAXstation II/GPX and VAXstation 3200/3500. ▲ Refer to "Digital/IBM Communications Software" in Section 4.

The ULTRIX Mail Connection

The ULTRIX Mail Connection provides connectivity between UNIX-based mail and other MAILbus products through VMS Message Router V3.0, allowing ULTRIX users to exchange mail with ALL-IN-1, VMSmail users, plus access X.400, IBM/PROFS, and IBM/SNADS gateways. The ULTRIX Mail Connection acts as a gateway between non-Digital UNIX-based systems and MAILbus. ▲ Refer to "Business Communications" in Section 5.

The VMS/ULTRIX Connection

The VMS/ULTRIX Connection allows UNIX-based systems to mount files on disks that are part of traditional VMS/VAXcluster systems. In addition to sharing the physical resource, VMS/ULTRIX Connection also facilitates the transfer of files between the operating systems. ▲ Refer to "Digital/UNIX Communications Software" in Section 4 for further information.

VAX FTAM

Based on OSI standards, VAX File Transfer and Access Management (FTAM) provides the capability for VMS systems to use an international-standard protocol (ISO 8571) to transfer files between other ISO FTAM-compliant systems in a multivendor network. ▲ Refer to "Open System Interconnect (OSI) Products" in Section 4.

VAX DEC/MAP V2.0 and DTQNA

With VAX DEC/MAP Version 2.0, Digital implements MAP (Manufacturing Automation Protocol), Version 2.1. The network management capabilities of V1.0 have been extended to all seven layers of the ISO/OSI reference model.

The DTQNA is Digital's new Token-bus-to-Q-bus Network Adapter, provided with VAX DEC/MAP V2.0. It offers the same functions as the Token-bus-to-UNIBUS Network Adapter. ▲ Refer to "Open System Interconnection (OSI) Products" in Section 4.

VAX Notes

VAX Notes is computer conferencing software that allows users to create and access online conferences or meetings. Using electronic messaging technology, VAX Notes lets users conduct meetings with people in different geographic locations via computer. Participants can join in a discussion from their own desks when they choose. ▲ Refer to "Business Applications" in Section 5.

VAX VTX

VAX VTX, software layered on VMS, provides videotex services compliant with CCITT F.300 recommendations. Videotex is a distributed information retrieval service that uses a tree-structured database through which the user navigates by selecting choices from the menu. ▲ **Refer to "Business Applications" in Section 5.**

**VAX OSI Application Kernel
(OSAK) Version 1.1**

To simplify migration to Phase V DECnet and the ordering of OSI application products, VOTS and OSAK have been combined into a single product, VAX OSAK, V1.1. ▲ **Refer to "Open System Interconnection (OSI) Products" in Section 4.**

Customers can use this guide to find the following kinds of information about Digital's networking and communications products:

- *Background Information* presents a general overview of networking and communications concepts and architecture.
- *Product Information* describes product features and capabilities.
- *Configuration Information* describes how products can be linked into networks.
- *Ordering Information* lists the codes required to purchase specific variations of a product.

To locate information in this guide, find specific topics listed below and refer to the Contents for page numbers.

Background Information

General background information about Digital networking and communications is presented in Section 1.

Product Information

Locating Products

Products are listed in the Contents and alphabetically in the Index.

New Products

New products are highlighted under *What's New to the Networks and Communications Buyer's Guide*.

Packaged Products

Network products available in prepackaged configurations are described in Section 2, under *Standard Network Packages*.

Descriptions of Software Products

Descriptions of software products are located in Sections 4, 5, and 6. Each description is followed by order codes and any prerequisite hardware and software.

Software required for 802.3/Ethernet Communications Servers is described in "802.3/Ethernet Communications Servers" in Section 2.

Full Software Product Descriptions (SPDs) are published separately. The SPD numbers for products in this guide are listed in Appendix C.

Hardware Product Descriptions

Hardware product descriptions are in Section 2, *Connectivity: 802.3/Ethernet Local Area Networks*, and Section 3, *Connectivity: Hardware Communications Controllers*. Each description is followed by specifications and order codes as well as any prerequisite hardware and software.

Network Services Products

Network Services Products are listed in Section 6, *Manageability*.

Product Comparisons

Tables comparing the features and capabilities of products are located in the following subsections: *802.3/Ethernet Communications Servers*, *Extended 802.3/Ethernet Local Area Networks*, *DECnet Communications Software*, *Digital/IBM Communications Software*, *Asynchronous Communications Controllers*, *Synchronous Communications Controllers*, and *Modems*.

Suggestions for Using this Guide

Product Performance Information

Product performance information is discussed in Appendix A.

Specifications

Specifications for hardware products are listed in individual product descriptions and in summary tables.

Prerequisite Products

Any prerequisite hardware or software necessary to use a product is listed in the individual product description.

Configuration Information

Overview configurations are described in Section 2, *Connectivity: 802.3/Ethernet Local Area Networks*.

Detailed configuration information is located in Appendix A.

Ordering Information

Order codes are listed in tables after each product description.

Order code formats are explained at the beginning of Sections 3 and 4. To order network products in prepackaged configurations, refer to *Standard Network Packages* in Section 2.

Comments and Suggestions

Use the reply card at the end of this guide to make comments and suggestions.

System Unit Space in chassis for mounting prewired backplane(s) that accepts hex- or quad-sized modules.

Double Slot Space in a prewired backplane that accepts a 13.2 cm (5.22 in) high module.

Quad Slot Space in prewired backplane that accepts a 26.51 cm (10.44 in) high module.

Hex Slot Space in prewired backplane that accepts a 39.63 cm (15.6 in) high module.

I/O Connection Panel Insert Openings for mounting I/O Connection panel inserts in the I/O connection panel on the back of the CPU cabinet. These inserts provide the transition between internal cabling and external shielded cabling. There are two types of I/O connection panel inserts—one for UNIBUS systems and one for Q-bus systems.

I/O connection panel inserts for UNIBUS options vary in type and style depending on the amount and type of connectors required by the option. Each I/O connection panel accepts multiple inserts. Q-bus options have I/O connection panel insert sizes of A (2.54×10.1 cm or 1×4 in), B (6.6×8.1 cm or 2.6×3.2 in), or C (10.1×10.1 cm or 4×4 in).

dc Amps Drawn dc current (amps) drawn by the option at 5 V, 15 V, -15 V, 12 V.

ac Watts Drawn ac current (watts) drawn by the option at 120 V, 60 Hz or 240 V, 50 Hz.

Bus loads The number of bus loads drawn from the appropriate system bus.

b/s Bits per second.

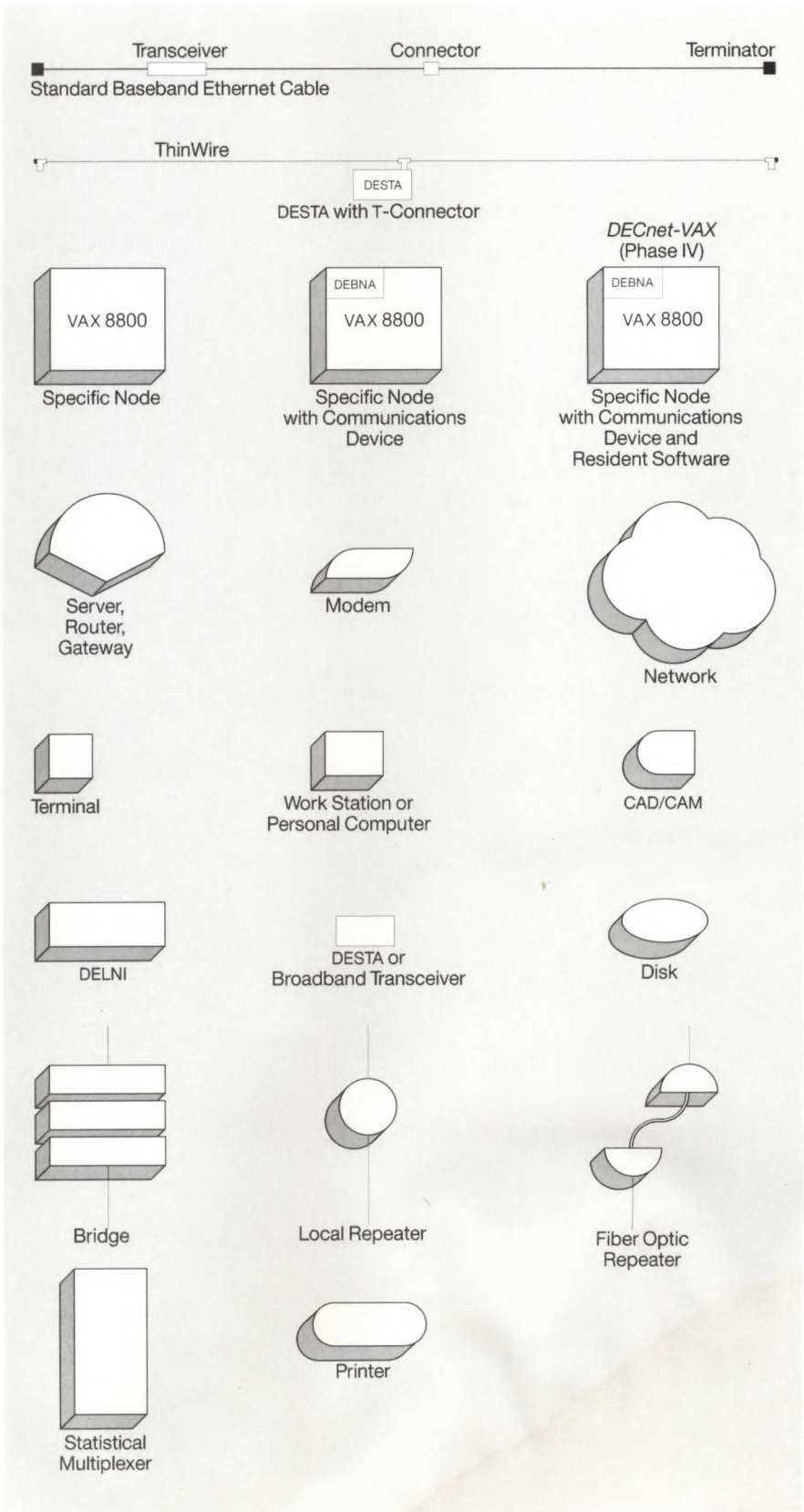
Kb/s Kilobits per second. (K = 1,000)

KB/s Kilobytes per second. (K = 1,024)

MB/s Megabytes per second. (M = 1,048,578)

Mb/s Megabits per second. (1 Mbit = 1,000,000 bits)

Key to Symbols Used in This Guide





Introduction

Digital Equipment Corporation is the leading producer of networking products, services, and capabilities that deliver computing power directly to an individual's work space. Our computing philosophy is based on the concept of distributed processing, which means locating powerful applications where users need them—in offices, laboratories, factory floors, or any work space that can benefit from sharing information or computing resources. Digital distributes computing power effectively through a broad range of products and services that allow computers to communicate via networking.

Organizations gain a number of benefits from arranging their computer systems into networks. Networks enable all computer users to take advantage of the organization's total computing capabilities through information exchange and sharing of resources. Small systems can access the resources and greater computing power of large systems, while large systems can off-load applications best handled by personal workstations.

Networks encourage the free flow of information throughout an enterprise by providing individuals (who have the proper security clearance) ready access to data, applications, and people. Any computing resource can become a resource to the entire organization simply by attaching it to the network.

Typically, computers are arranged into local area networks (LANs) when organizations need high-speed data transfer and communication within a building or a cluster of buildings—such as a campus or office complex. LANs may also be coupled to other nearby LANs to extend their distance or to improve performance; these are called extended LANs.

Network nodes can be distributed in different cities, or even to different countries. For transmitting data over long distances and across oceans, a network usually employs a combination of long-distance communication media including telephone lines, public data networks, satellite signals, and microwave. An organization with worldwide offices is likely to configure its computers into such a wide area network (WAN). Whether the network forms a LAN, an extended LAN, or a WAN, the user sees the network function as a single entity.

An important goal of any network should be to enable equipment manufactured by different vendors to work together. Communication between heterogeneous systems is only possible if the multiple vendors agree on a set of conventions or standards for information exchange. That is why Digital is committed to building products that comply with the Open Systems Interconnection (OSI) model recommended by the International Standards Organization (ISO).

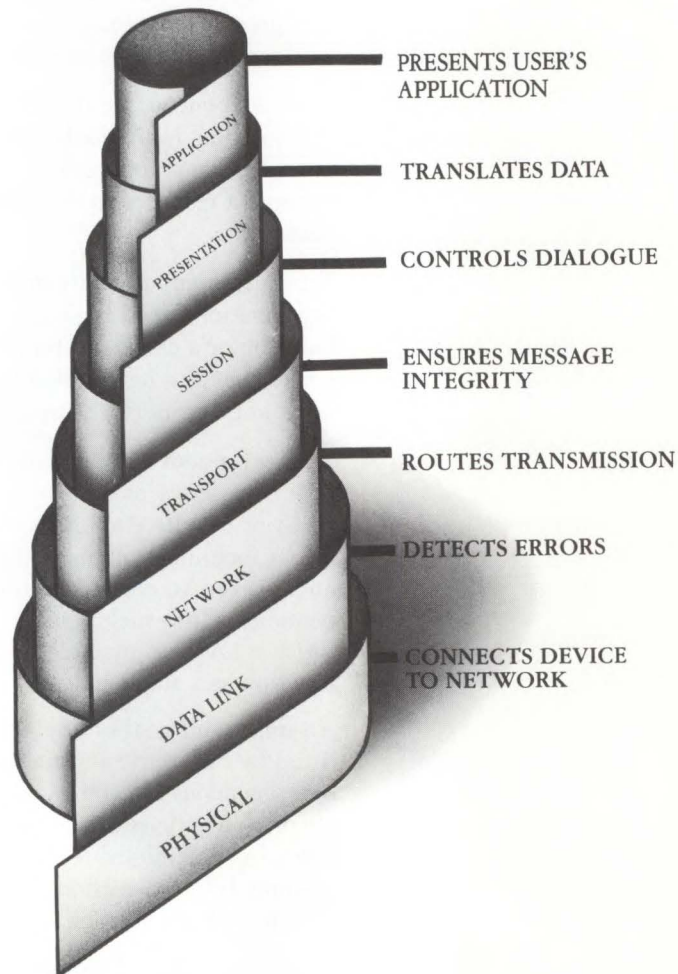
In addition, Digital supports multivendor networks by providing gateways to networks developed by other vendors, such as IBM's SNA networks and X.25-compliant systems. These gateways allow the functions of one vendor's network to be converted into functions recognizable by another vendor's network. In cases where Digital does not offer an off-the-shelf method for communicating with a different vendor's product, Digital's Computer Special Systems group can build customized hardware and software to create such a link.

Digital Network Architecture

Digital's networking capabilities arise from the Digital Network Architecture (DNA). Digital has adhered to DNA since 1975; it serves as the blueprint for virtually all past, present, and future communications products. Historically, the DNA model, like the Open Systems Interconnection (OSI) reference model, is arranged in independent layers. Each layer can be changed without significantly affecting other layers. And in each layer, the protocols govern communication with other layers.

As DNA progresses to its next phase, it will comply with the OSI reference model.

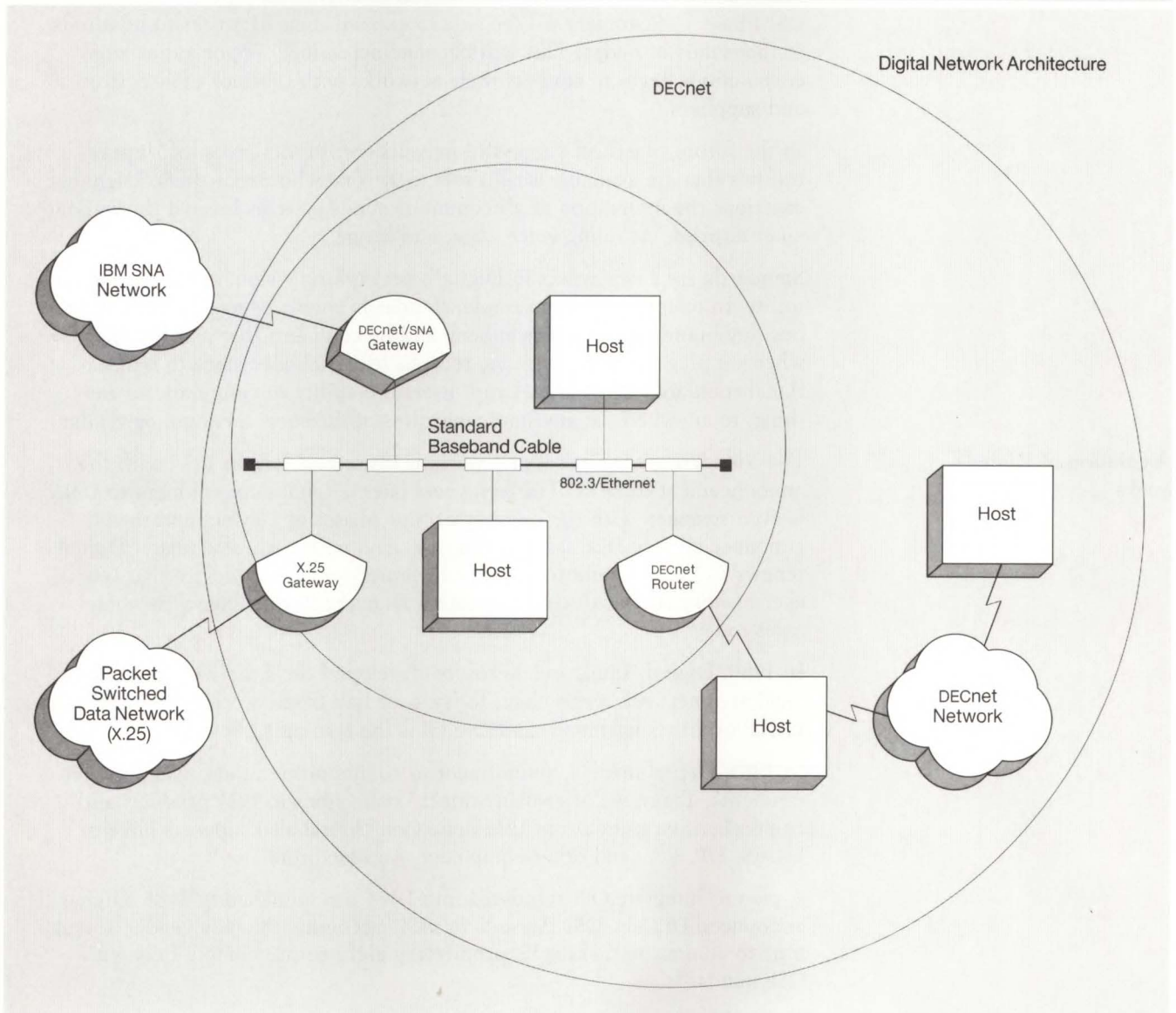
Open Systems Interconnection Model



Digital's implementation of DNA is DECnet—a family of software and hardware products that link systems into a single network. DECnet software is layered on each of Digital's operating systems, allowing all Digital systems to communicate across the network with compatible functions.

Introduction to Digital's Networks

DNA, DECnet, and 802.3/Ethernet Relationships



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DNA's layered structure has provided DECnet software with a unique adaptive quality. Since DECnet was first announced, it has progressed through four phases, with each phase providing increased capability. Now Digital has announced the next progression, DECnet/OSI Phase V, which promises compliance with international standards by merging DECnet and OSI. This will enable Digital customers to enjoy the benefits of multivendor communication without compromising system quality.

Digital offers freedom to users who wish to integrate computers from a variety of manufacturers into their networks through international standards. And users are assured that DECnet networks allow them to incorporate new technologies without the expense of rewriting existing applications or retraining staff.

Introduction to Digital's Networks

DECnet also offers flexibility in planning. Networks can start with two nodes and expand to 64,000 nodes. And as Digital incorporates DECnet/OSI Phase V, customers will be able to expand their networks to hundreds of thousands of nodes. This will become increasingly important as large corporations begin to connect their networks with those of their customers and suppliers.

In the future, the most successful networks will function as information utilities that are available at all times to anyone who needs them. Digital envisions the integration of all communications systems located throughout an enterprise, including voice, data, and image.

Standards are a key aspect in Digital's networking vision, as they are in any utility. In telephones, for example, standards enable us to go to any store, buy any brand or form of telephone and be confident that it will work when we plug it in to any phone receptacle. Strict adherence to international standards will give network users the ability to communicate anything, to anywhere, at anytime, regardless of distance, medium, or vendor.

The foundation for Digital's networking vision was laid in 1975 with the announcement of DNA. Thirteen years later, Digital's commitment to DNA is even stronger, with the delivery of four phases of DECnet and the announcement of DECnet/OSI Phase V. And with each new phase, Digital renews its commitment to investment protection: Every device that Digital ever manufactures will communicate with every device Digital manufactures today.

In 1980, Digital, Intel, and Xerox co-developed the Ethernet protocol for local area network technology. Today, over half of the worldwide installed LANs are Ethernet-based, and Digital is the leading LAN vendor.

In 1983, Digital made a commitment to communicate in multivendor environments. Today, we offer many direct connections to IBM products and comprehensive gateways to IBM networks. Digital also supports links to Unisys, HP, ICL, and other equipment manufacturers.

A plan to integrate OSI standards into DNA was launched in 1985. Digital announced DECnet/OSI Phase V in 1987, becoming the only vendor at that time to commit to making its proprietary architecture comply fully with OSI standards.

Networking has made great strides in recent years, fueled by dramatic changes in the marketplace. For example, the "globalization" of business has created a need to sell and service products worldwide. This has led to a dependence on technology and a rethinking of the whole idea of communication.

The ability to master technology has become an important factor in keeping a company competitive. Companies that invested heavily in computers to increase efficiency now realize that unconnected islands of computers can lead to information bottlenecks. Distributed computing can solve this problem by allowing for more decision making at the hands-on level. And networks can help companies respond more rapidly to the shifting demands of the marketplace by making more timely and accurate information available to decision makers.

The Evolution of Digital's Networks

What People Expect from Networks Today

At the same time that computers have proliferated, technological development has accelerated. Managers want to know what direction technology will take in order to incorporate constantly changing technology into their planning cycles. They want the freedom to purchase systems from multiple vendors. Furthermore, they need to match new technology with the corporation's past and present investments in hardware, software, and applications.

To accommodate these pressures, users and managers want networks that are easy to install, change, and operate. They want a lateral, open, and flexible flow of information to help managers cope with changes.

Digital's massive companywide network, EASYnet, is a good illustration of the functions people now expect from networks. Digital's network was established in 1978 with fewer than 10 nodes. Today EASYnet is the world's largest private data network, with 75,000 users in nearly 300 locations on three continents. It connects more than 27,000 computers worldwide, and is growing at the rate of 200 new nodes per week. EASYnet plays an important role in Digital's product development and testing, manufacturing, distribution and marketing. Digital employees use the electronic mail application to communicate with Digital facilities all over the world. And, while network users exchange critical information, they need not be concerned about how data physically passes through the network, because it is transparent.

Digital's Strategic Networking Vision for the Future

Digital's Strategic Networking Vision for the future can be summed up as the ability to communicate anything, to anywhere, at anytime. In the future, companies will expect the functional integration of all communications systems throughout the enterprise.

The framework that organizes the technologies required to implement Digital's Strategic Networking Vision distinguishes networking functions into four areas: Connectivity, Interoperability, Distributed Applications, and Manageability. This buyer's guide organizes Digital's products and services into categories that reflect these four functional areas. All of our past, present, and future products can be fit into this framework.

Connectivity

Connectivity is the ability of the network to move any piece of information from Point A to Point B, regardless of the media or transmission technologies. Digital offers products to simplify the physical and logical connections in a network and enable every device to utilize the power of the entire network. Digital's connectivity solutions include

- 802.3/Ethernet LAN products.
- The DECconnect structured cabling system (which supports voice, data and video transmission).
- Links to public and private data networks using X.25 protocols.
- Specific interfaces to other vendors' equipment using gateways and routers.
- NETplan network planning service.

Products included in the Connectivity category enable networking devices to participate in an overall system and utilize the full power of a network.

Introduction to Digital's Networks

Interoperability

Interoperability enables all system elements to exchange information between equipment from the same vendor, or from a collection of vendors who support the integrity of the network. Users need

- Bidirectional exchange of information and files.
- Support for major equipment vendors.
- Compliance with standards.

Digital products such as DECnet, IBM Interconnect, DECnet/OSI, and PC communications packages with DECnet-DOS allow users to operate in a multivendor environment. Products included in the Interoperability category give users the power of DECnet along with the advantages of industry standards.

Distributed Applications

Distributed Applications are the measure of the value and usefulness of the network and are a primary reason the network exists. Distributed applications can be accessed via a network as easily as if they were on a single system. People use Digital networks to access and utilize enterprisewide applications such as

- Electronic mail.
- DECnet System Services.
- Computer-integrated Telephony (CIT).
- ALL-IN-1.
- Videotex/electronic conferencing.
- File transfer.

In the Distributed Applications category are the products and services that enable network managers to deliver high performance to users, regardless of network topology. These products also provide consistent interfaces for resources on the network. For example, electronic mail unites an enterprise by connecting disparate mail systems such as IBM/SNADS, IBM/DISOSS, X.400, and UNIX.

Manageability

Manageability provides the network capabilities as well as the product and service mix that

- Enables customers to design, implement, and control the performance of the entire network.
- Manages change in a responsive and flexible manner.

Manageability is inherent in Digital networks because the intelligence is built into the network architecture: The network handles day-to-day operations, automatically adjusting to changes in the system and circumventing failed components. In addition to the built-in capabilities, Digital network management solutions—including life cycle management services, Remote System Manager, the DESNC Enhanced Ethernet Security system, DECnet Monitor, and LAN Traffic Monitor—help network managers better support the enterprisewide network.

Services and products in the Manageability category provide information and capabilities to ensure high network availability, ease of use, security, and resource management.

Future Directions

As Digital fulfills the Digital Strategic Networking Vision, the framework of Connectivity, Interoperability, Distributed Applications, and Manageability will extend to meet industry needs. Digital customers will continue to implement 802.3/Ethernet-based solutions over all standard media including baseband cable (standard, ThinWire, and unshielded twisted-pair), broadband cable, fiber optic cable, and microwave links. Digital's enterprisewide networks will provide the functional integration of voice, data, and video across the entire network.

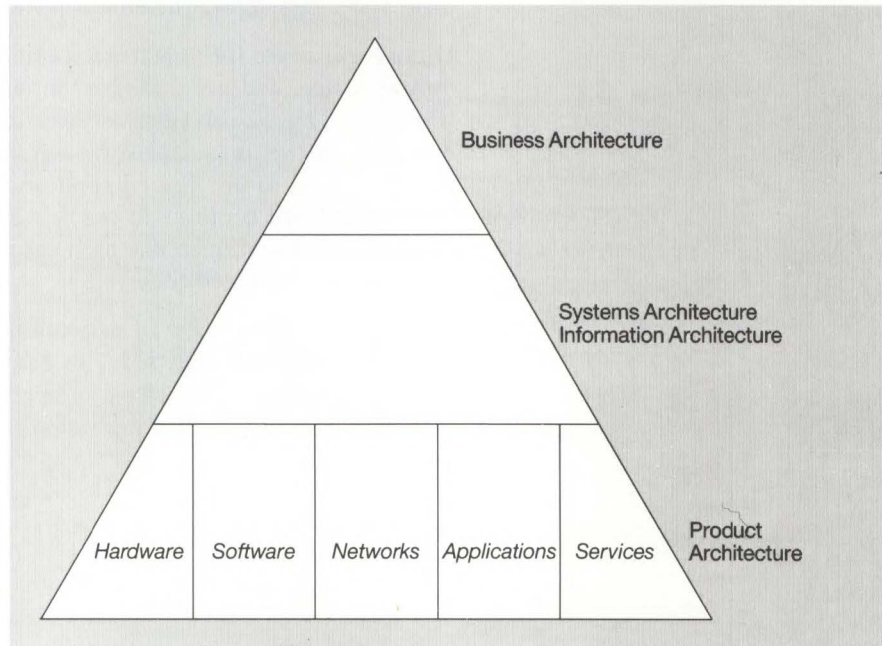
Digital will strive for unrestricted interoperability with multivendor computing devices and networks by continuing its commitment to integrate OSI standards. Digital also plans to enhance functional gateways to non-OSI networks and vendors. Network users will have consistent user interfaces for easy access to distributed applications such as DECnet System Services. And Digital will continue to provide comprehensive network management through OSI-based open management interfaces for multivendor support and through enhanced life-cycle network-management services.

An organization's success in networking directly affects its ability to respond to new business, redeploy resources, and aggressively seize competitive advantages. Digital has defined its vision today to help customers plan networks that fulfill their vision tomorrow.

Analyzing an Enterprise's Needs

A network is the outgrowth of the way an enterprise conducts business, and is implemented to facilitate the productivity of the organization, the department, and the individual. To succeed, an enterprise must examine its business, information, and systems architectures; its product architecture must support successful information flow.

Business Architecture



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Within the product architecture are segments—hardware, software, services, applications, and networks—that support the information architecture. The network is part of the total solution: To get the most from any network implementation, you must satisfy current and future requirements at every level of the organization.

For instance, you must examine how and where information moves through an enterprise, and consider the present and future requirements of the people who communicate and share information, as well as those who access common resources that support the information architecture.

To plan and design a new network, or to integrate an existing network, you should examine:

- The way you do business.
- Your future requirements.
- The way a data communications network can foster intra-organizational cooperation.

You must weigh the productivity of any networking solution against the cost of that solution, and you must consider the performance and reliability of alternatives. You should know the impact of each technology, now and in the future, and couple the decision to support a technology with a sensitivity for business and organizational issues. ▲ Refer to “Services for the Planning and Design Phase,” Section 6.

Building the Network

Digital's Networking Products

Because the network architecture supports the information architecture—which in turn supports the enterprise business architecture—you must select the technology that will succeed:

- What networking or communications standards fit your needs
- How fast each department requires data
- Which communications wiring scheme provides functional growth, flexibility, and cost efficiency

Digital examines each business situation from the customer's point of view and provides a comprehensive solution—whether it's a specific product, a wiring scheme, connections to Digital and non-Digital hosts, or local or geographically dispersed networks.

Digital has the hardware, software, and service products to cover many environments (depicted in the topology at the end of this section). Digital ensures that its products are compatible—designed and tested to run together, applied in a consistent manner, managed with a consistent interface, and supported by consistent service and support. Because of this approach, the whole is greater than the sum of the parts.

The networking products described in this Buyer's Guide are compatible, have consistent interfaces, are well tested, readily adjust as the network grows, and provide one of the most flexible solutions in the industry.

Product Testing

Invisible to the user are Digital's very strict testing standards consisting of a multi-month—sometimes multi-quarter—test sequence that places a product in many types of networks—starting on a small level, then growing in size, distance, and complexity.

For example, a terminal server is tested with all of Digital's products, in all sizes of networks, and with varied data loads, thus assuring customers that it meets their needs today and in the future. This is a key reason Digital's networking products meet the customers' long-term management and reliability goals.

Product Solutions That Adjust to the Scale of the Network

Because Digital's networking products perform within a consistent architecture, they scale well, that is, they adjust to communications requirements as the network grows and changes. This feature allows you to implement a network as little or large as your enterprise requires—even starting with a one- or two-computer terminal-server network. You can scale up, adding the incremental cost of just one piece of equipment and be assured that everything works properly. You don't have to add a half-million-dollar front-end processor to acquire the next terminal.

Matching your organization's growth with networking capabilities is a result of the product design and testing, and products that scale well. You can systematically add incremental equipment and implement a long-term strategy to build and expand your network, comfortable that all components will continue to work together.

Products that adapt well provide users with the flexibility to react quickly and easily to changes in an organization. If there's a sudden change in your strategic plan—your enterprise adds a department or division, or adds an entire building—the network adjusts to that change immediately.

Building the Network

An Example of a Network Solution Using Open Systems Interconnect

Digital's commitment to integrate Open Systems Interconnect (OSI) standards into the DECnet architecture provides a truly open architecture—another key benefit that protects an enterprise's investment and helps long-term planning. Digital's customers can build an enterprisewide network that easily accommodates all OSI-compliant equipment—including equipment from other vendors.

As an example of Digital's enterprise network capabilities—which include OSI-based solutions—consider the hypothetical Baker Company, which uses the networking products depicted in the topology at the end of this section.

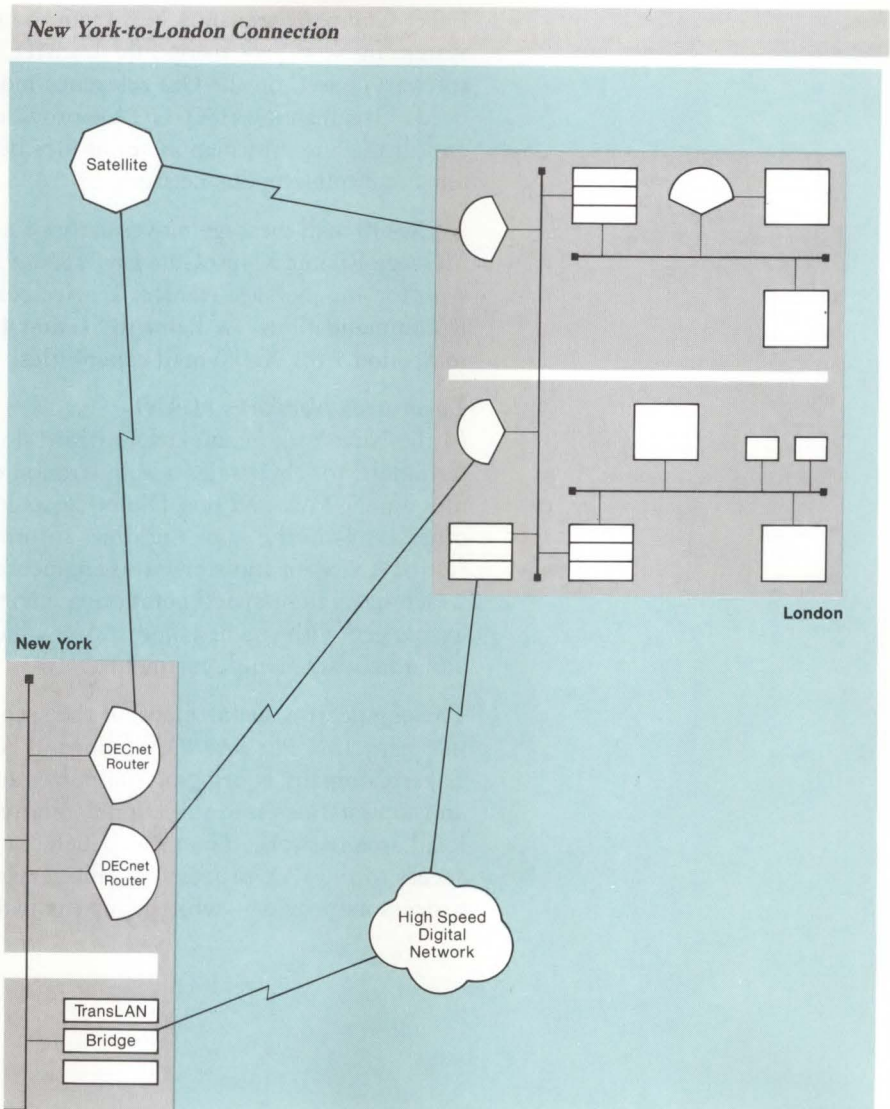
Baker Company operations have:

- Centrally located headquarters in New York with another building located across the river in New Jersey.
- Many remote sales and distribution sites across the United States.
- A European headquarters in London.
- A Pacific Basin headquarters in Sydney, Australia.

A critical factor for Baker Company's success is to share data files and electronic mail among all sites.

Baker Company's London office has two non-Digital, OSI-based mainframes that communicate with departments in the New York headquarters to exchange files and mail.

Building the Network



The data can be communicated through:

- The DECnet routers using leased lines.
- Another pair of DECnet routers using an X.25 link.
- The TransLAN bridge involving a high-speed digital network.

With this redundancy, Baker Company can choose the technology to best handle the required data volume or speed.

Because 802.3/Ethernet is part of the OSI network, the communications logical link can connect with any OSI device on the 802.3/Ethernet local area network (LAN). Baker Company knows that any two pieces of OSI-based equipment can interoperate because they are based on the same international standards, and they can readily communicate across the 802.3/Ethernet LAN.

Building the Network

Baker Company transfers files from the London OSI mainframe to the VAX system in New York using File Transfer, Access, and Management (FTAM) software, based on the OSI reference model from the International Standards Organization (ISO). FTAM provides for copying and deleting files, and displaying information about files between ISO FTAM-compliant systems in a multivendor network.

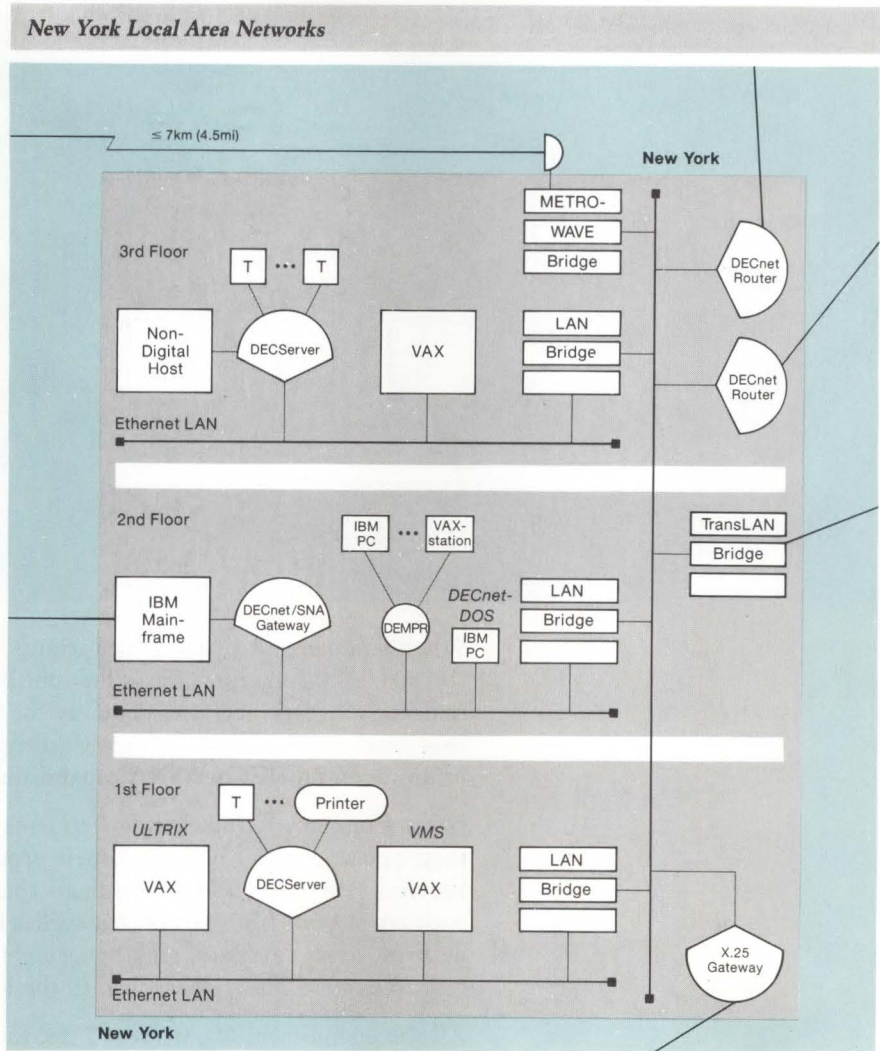
An X.400 mail message moves across a similar path utilizing the VAX Message Router X.400 Gateway MRX, a layered application that provides a path for any message transfer service conforming to the CCITT X.400 Recommendations. **▲ Refer to Section 4 for OSI and FTAM products, and to Section 5 for X.400 mail capabilities.**

Local Area Networks (LAN)

In the New York headquarters (third floor), Baker Company has many terminals, for their sales administration department, that are used to share files among VAX and non-Digital hosts located on the same LAN, and with other LANs in the same building. Information is processed on the third-floor LAN, then transferred to engineering operations on the second floor, which has a high-speed computing environment. The data files are also exchanged with the first-floor LAN, which houses Baker Company's finance and administration department.

The engineering department on the second floor of the New York building has many IBM PCs and VAXstations. A tremendously important function for Baker Company is bringing the power and convenience of multivendor PCs and workstations into the Digital environment to share the benefits of the local area network. The clear benefit to the engineering department is the access to the VAX processors—file services and other applications the VAX processors provide—while using the installed PCs and workstations.

Building the Network



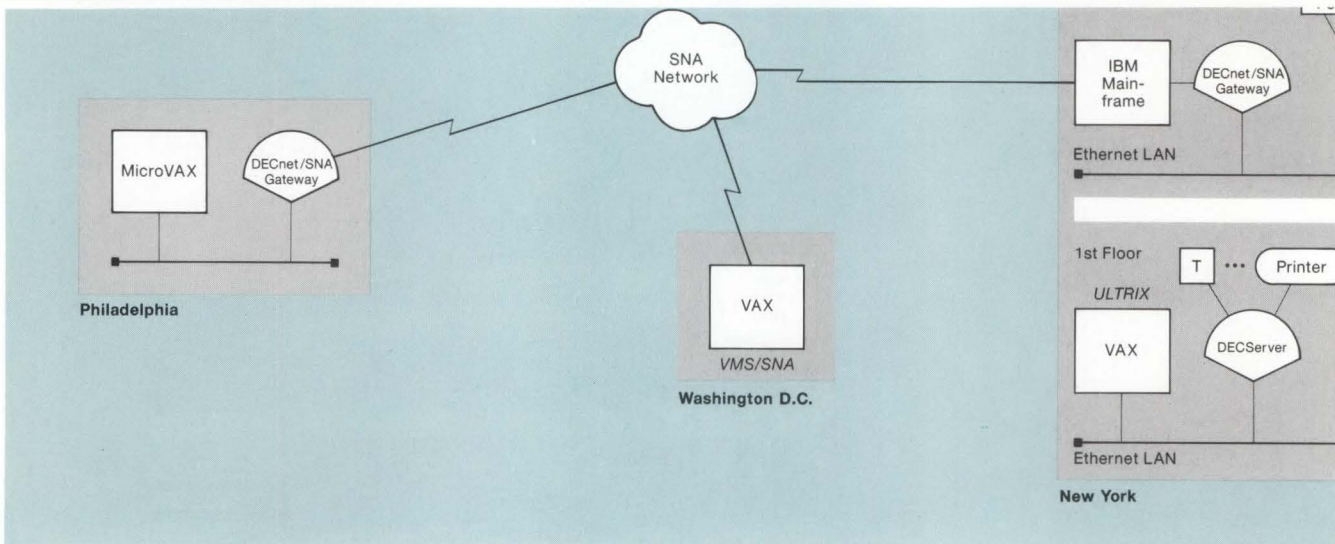
Baker Company has optimized their IBM/Digital connection by using their Digital desktop workstations to run application programs that reside on the IBM host, and by taking advantage of DECnet/SNA transport services.

For instance, VMS/SNA software allows the remote engineering site in Washington, D.C., which computes engineering data on a VAX, to communicate directly with the IBM mainframe on the second floor of the New York building.

Baker Company also found they could have a network-to-network connection (Digital's DECnet software to IBM's SNA environment) with high-volume output on existing equipment from the Philadelphia site using a DECnet/SNA Gateway (DECnet/SNA Gateway-ST).

Building the Network

New York-Washington-Philadelphia Connection



When volume and throughput warrants, Baker Company can upgrade the DECnet/SNA communications link on the second floor of the New York building to a DECnet/SNA Gateway for Channel Transport to handle more users and more sessions at higher throughput. ▲ Refer to Section 4 for information on DECnet/SNA capabilities.

Baker Company found that departments such as engineering, enhanced their operations and improved their productivity by using DECnet System Services (DSS), networking products that facilitate distributed processing with consistent, transparent, network-wide services. From anywhere in the network users can share and manage network resources as if these resources were directly attached to the local system.

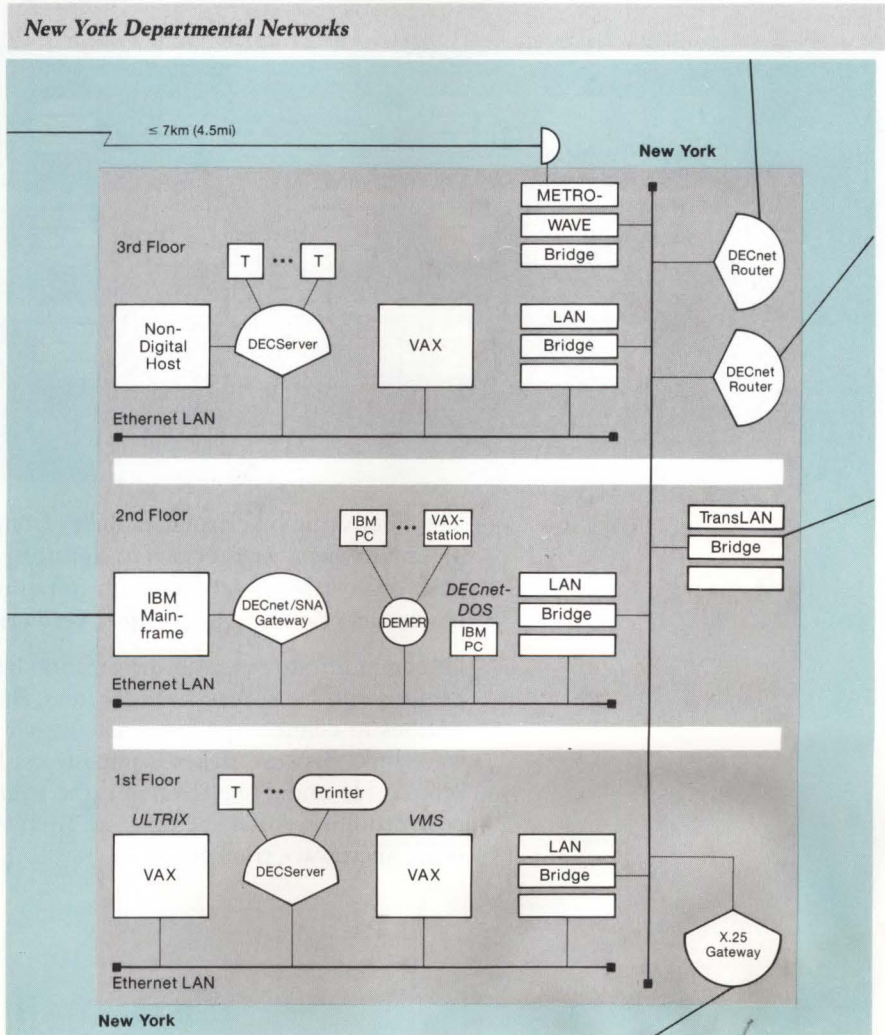
All the engineering department sites, for example, use engineering specifications updated nightly in a master file. Using DSS, once the master file is updated, the local engineering sites have access to current engineering specifications. DSS provides a seamless, transparent means of accessing printing, file-access, and software-management services for centralized or decentralized systems. ▲ Refer to Section 5 for information on DECnet System Services.

Building the Network

Extended LANs

Each floor of the New York building has its own LAN—a LAN Bridge connects each LAN segment to the vertical backbone. These departmental LANs connected by LAN Bridges, called Extended LANs, provide the same data-throughput benefits as a LAN, plus extend the geographic reach of the network.

By connecting the departmental LANs in the New York building to the vertical backbone, Baker Company can direct their business and topological requirements throughout the network. The engineers on the second floor have high data flow within their departmental LAN, as well as to other LANs. The intelligence of the LAN Bridge allows it to act as a filter: Information destined for the same department stays within that LAN, while information destined for other departments is transmitted across the Extended LAN.

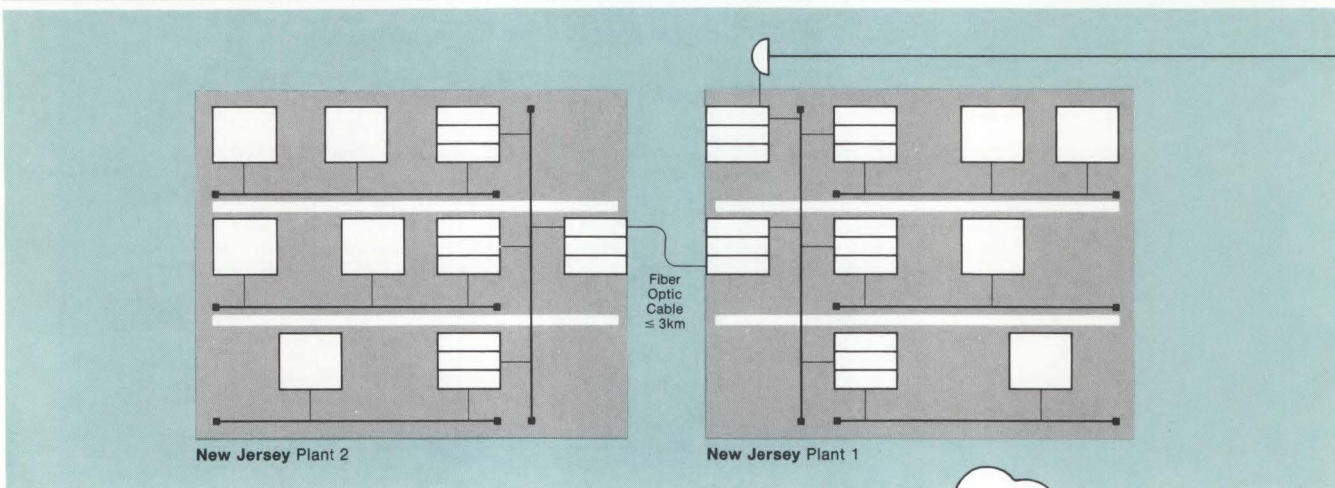


Building the Network

The filtering of data traffic allows Baker Company to have very high network performance on each floor and within each departmental LAN. The company retains the high performance of a single LAN without impacting the other LANs on the backbone.

Baker Company has a research campus in New Jersey. Two of the campus buildings need to communicate with the same functions and benefits as a single LAN within a single-management entity. These buildings are connected with fiber optic cable attached to LAN Bridges on either end. This allows Baker Company to connect two buildings up to 3,000 meters apart with the same high performance as any Ethernet LAN. The LAN Bridge provides traffic isolation between the buildings and Baker Company benefits from fully functional 802.3/Ethernet networking.

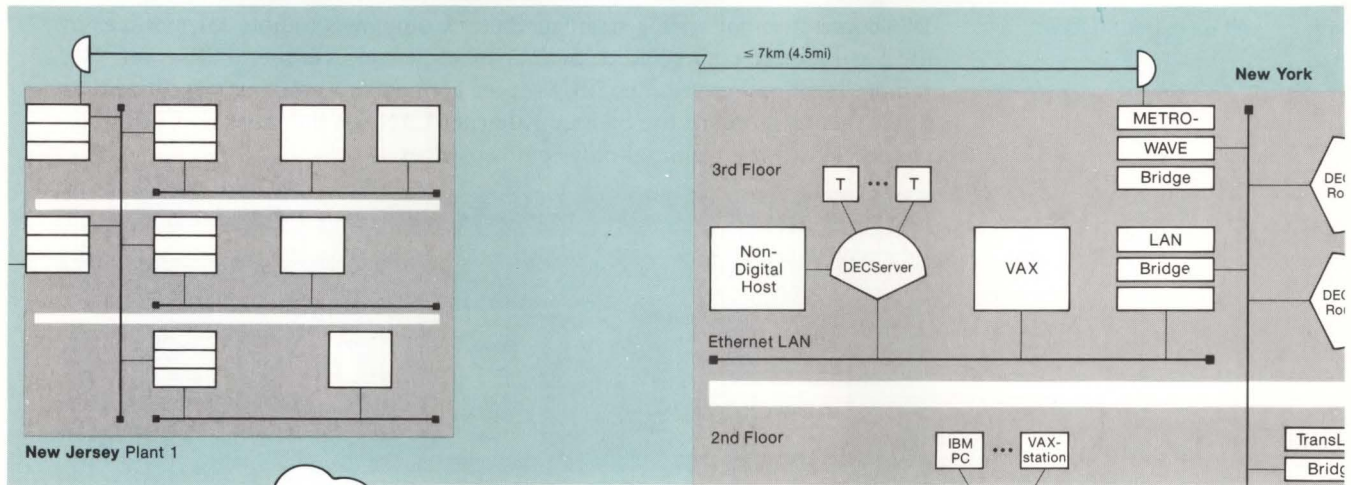
New Jersey Buildings Connected via Fiber Optic LAN Bridges



The fiber optic link provides Baker Company's research department with an environment impervious to lightning and electrical interference. Also, fiber optic cable is very difficult to tap into, providing a secure environment—something that is very critical to the research department.

To communicate research information between its New Jersey research campus and New York headquarters, Baker Company had communications options to connect the building sites via leased lines, fiber optics, or microwave link. Because Baker Company could not obtain the rights to lay fiber optic cable under the river, and the volume over leased lines might be cost-prohibitive, it selected a METROWAVE Bridge, which uses line-of-sight microwave transmission.

New York-to-New Jersey Connection



The METROWAVE Bridge provides a microwave connection in an Extended LAN environment, using the LAN Bridge 100 to deliver the same high performance, filtering capability, and reliability as other LAN Bridge products. ▲ Refer to “METROWAVE Bridge,” Section 2.

Wide Area Networks (WAN)

Baker Company found, as many businesses have, that long-term success depends on wide area networking using the appropriate communication of data, voice, graphics, and image.

Digital provides an integrated set of wide-area-network products, several of which are depicted in the topology. One of the most frequently used connections is via a public PSDN (Packet Switched Data Network), which sends packets of information over leased telephone lines.

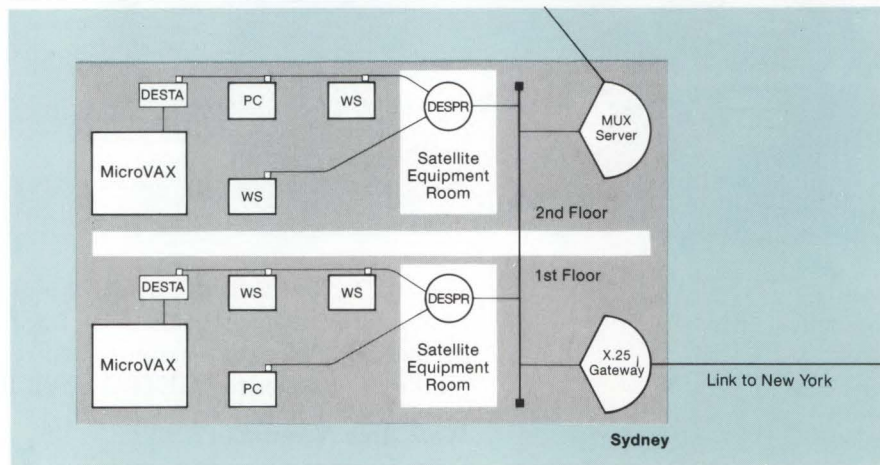
For example, when moving information from London to New York with OSI-based equipment, VAX P.S.I. (Packetnet System Interface) provides a means of returning packets to London across leased lines. The DECnet Router (DECrouter 2000)-to-satellite (or leased-line) connections, or TransLAN-Bridge-to-leased-line connection involves DECnet software and provides different value in flexibility, technology, and cost. ▲ Refer to Section 4 for information on Packetnet Communications.

When Baker Company expanded its business to the Far East, it established the Sydney headquarters for sales administration, promotions, and distribution administration. Baker essentially decentralized a heavy desktop/office automation environment to Sydney, and extended the use of computers to the Sydney workforce.

Building the Network

Within the Sydney building, Baker Company installed the networking computers using satellite equipment rooms (SERs) that adhere to the DECconnect radial-wiring strategy. Baker Company's remote sales offices in the Far East are connected to Sydney headquarters via the MUXserver remote terminal server. The MUXserver connects to modems over leased lines, then directly to the Sydney Ethernet LAN for the most cost-effective connection to the terminal-only remote offices.

Sydney Building and Remote Office Connected to New York via X.25 Link



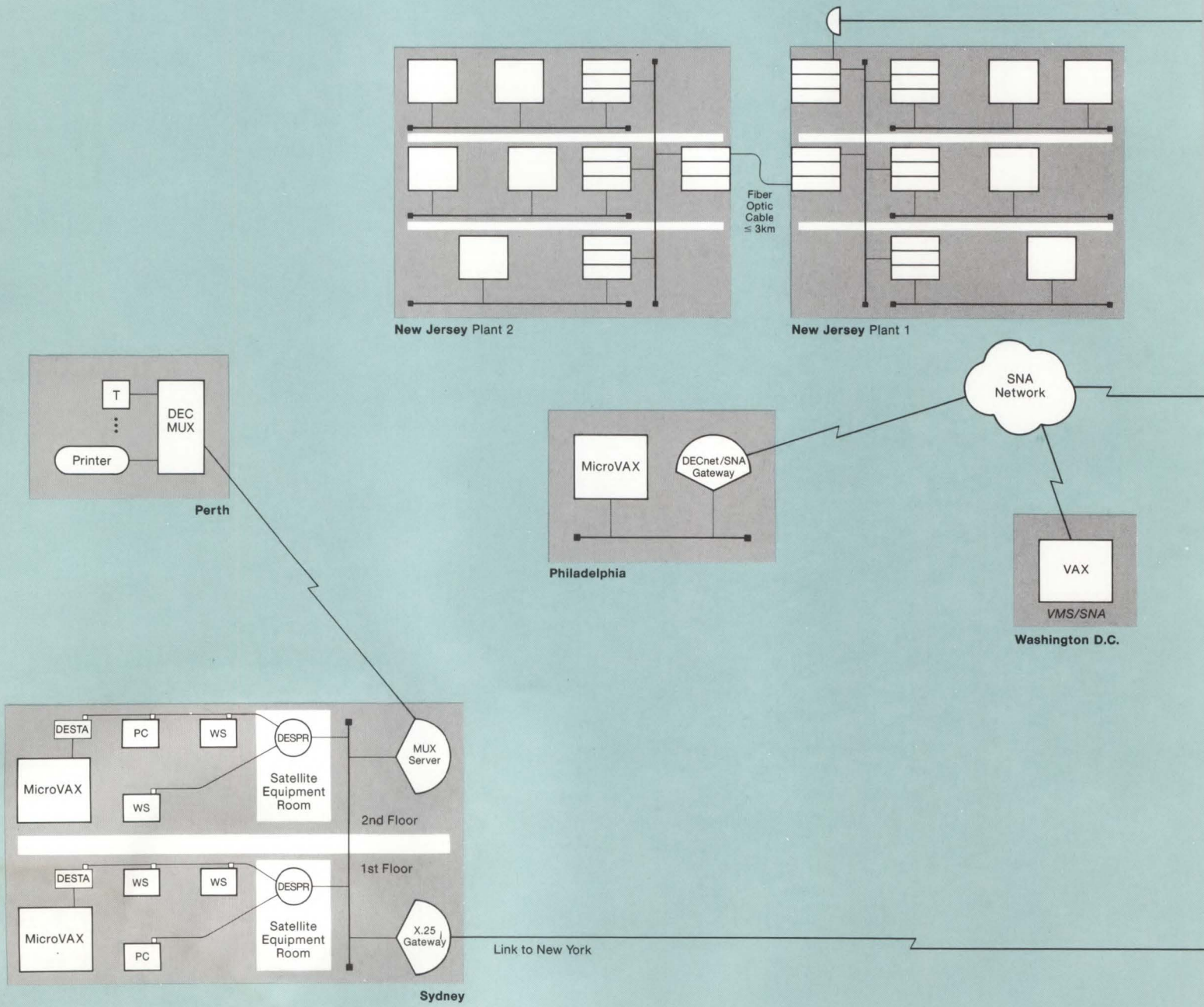
The Ethernet LAN in the Sydney building communicates with New York headquarters via an X.25 Gateway (X25router 2000) connected through the Packet Switched Data Network (PSDN). The X25router 2000 provides the optimum bandwidth-efficient solution with high-speed data communications based on the required data flow and volume.

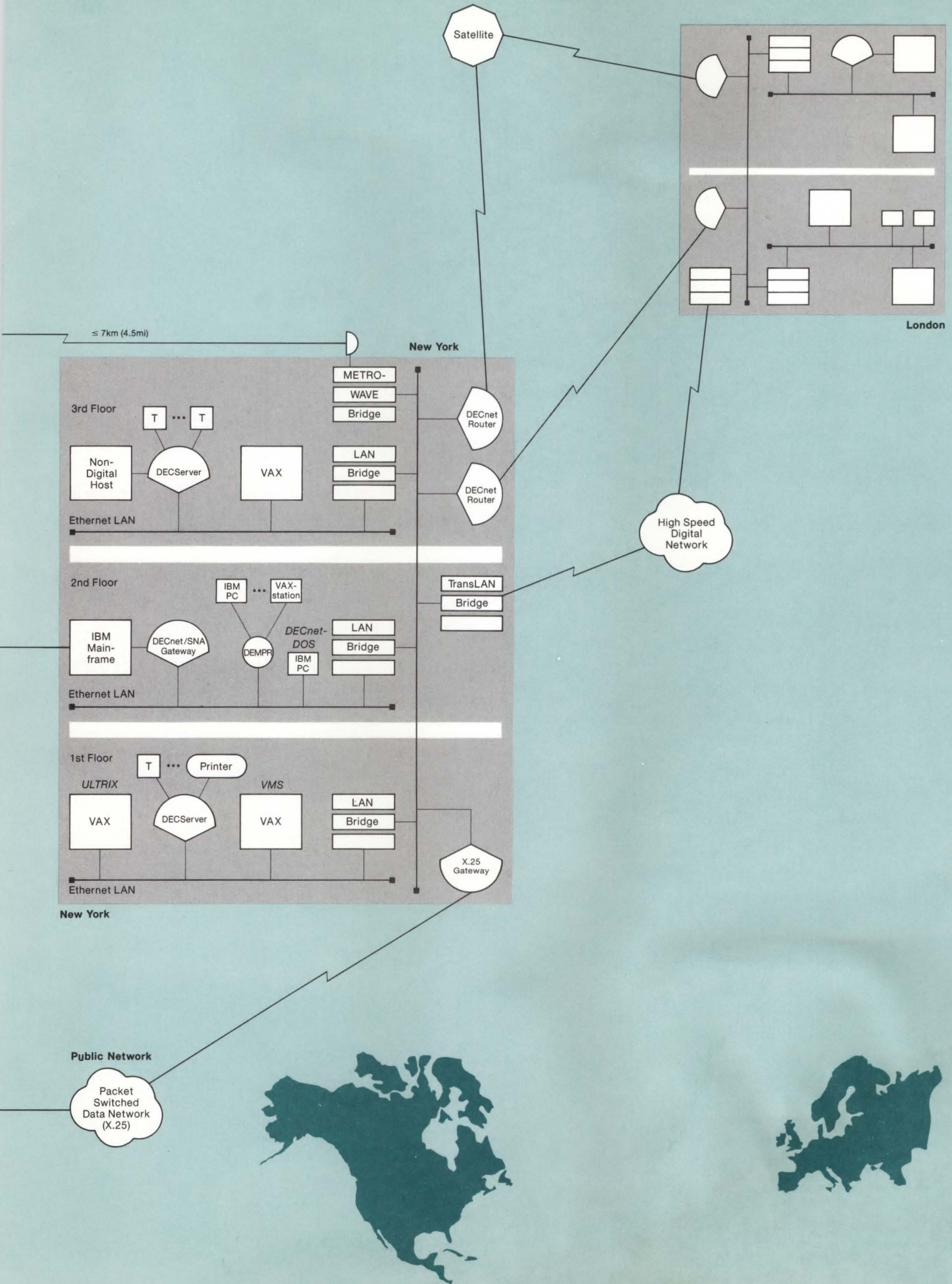
Digital provides a comprehensive product set that meets the needs of any enterprise, in any environment, using compatible hardware, software, and service products that have been tested to perform together within a consistent architecture, a consistent service strategy, and a consistent management interface.

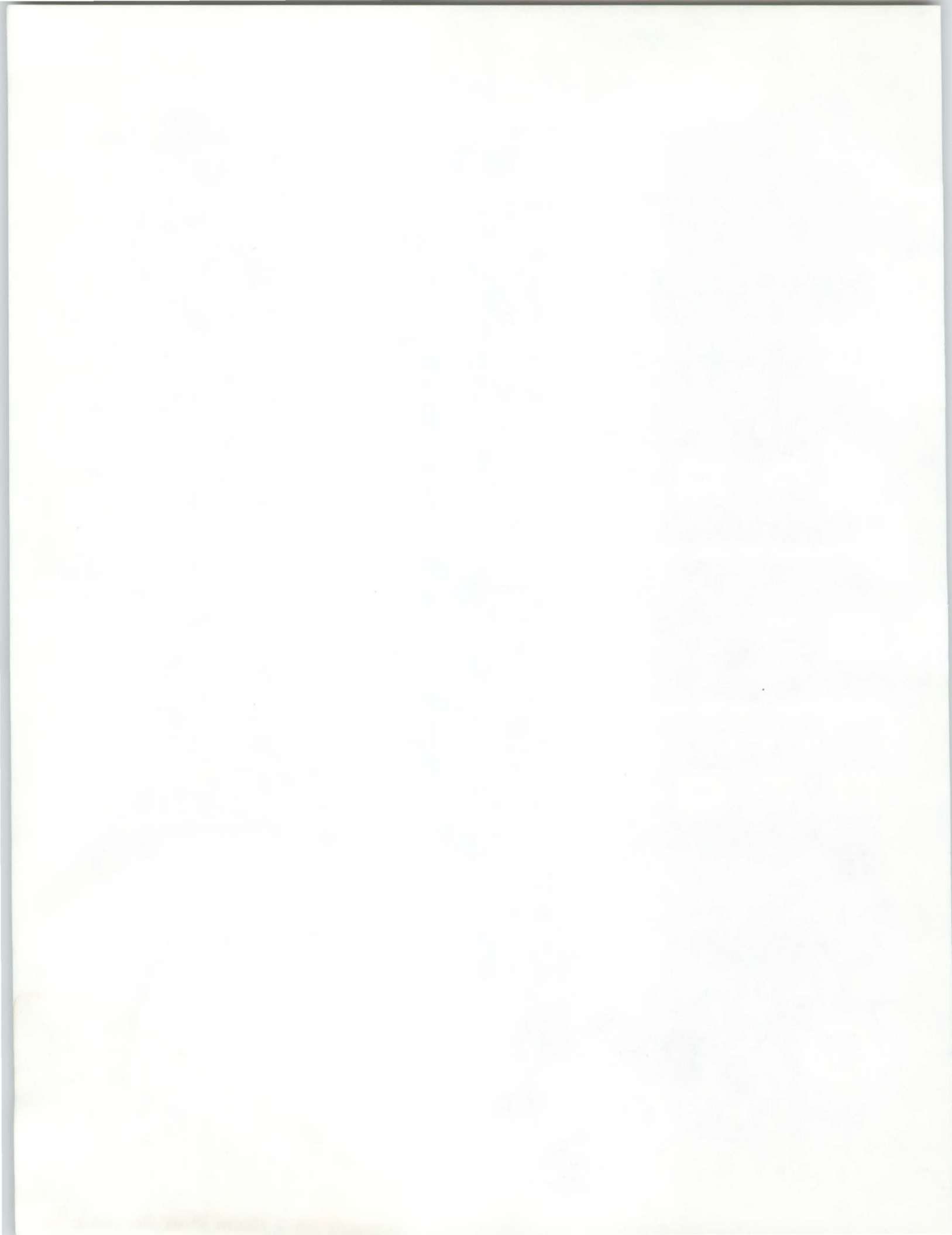
Building the Network

Network Management

Digital provides DECnet software with network self-management capabilities, as well as network management tools that perform network monitoring and complex management tasks. The combination of the inherent capabilities of DECnet software and the network management applications provide a very high level of up-time and network availability. ▲ **Refer to Section 6 for information on Network Management Products and Services.**







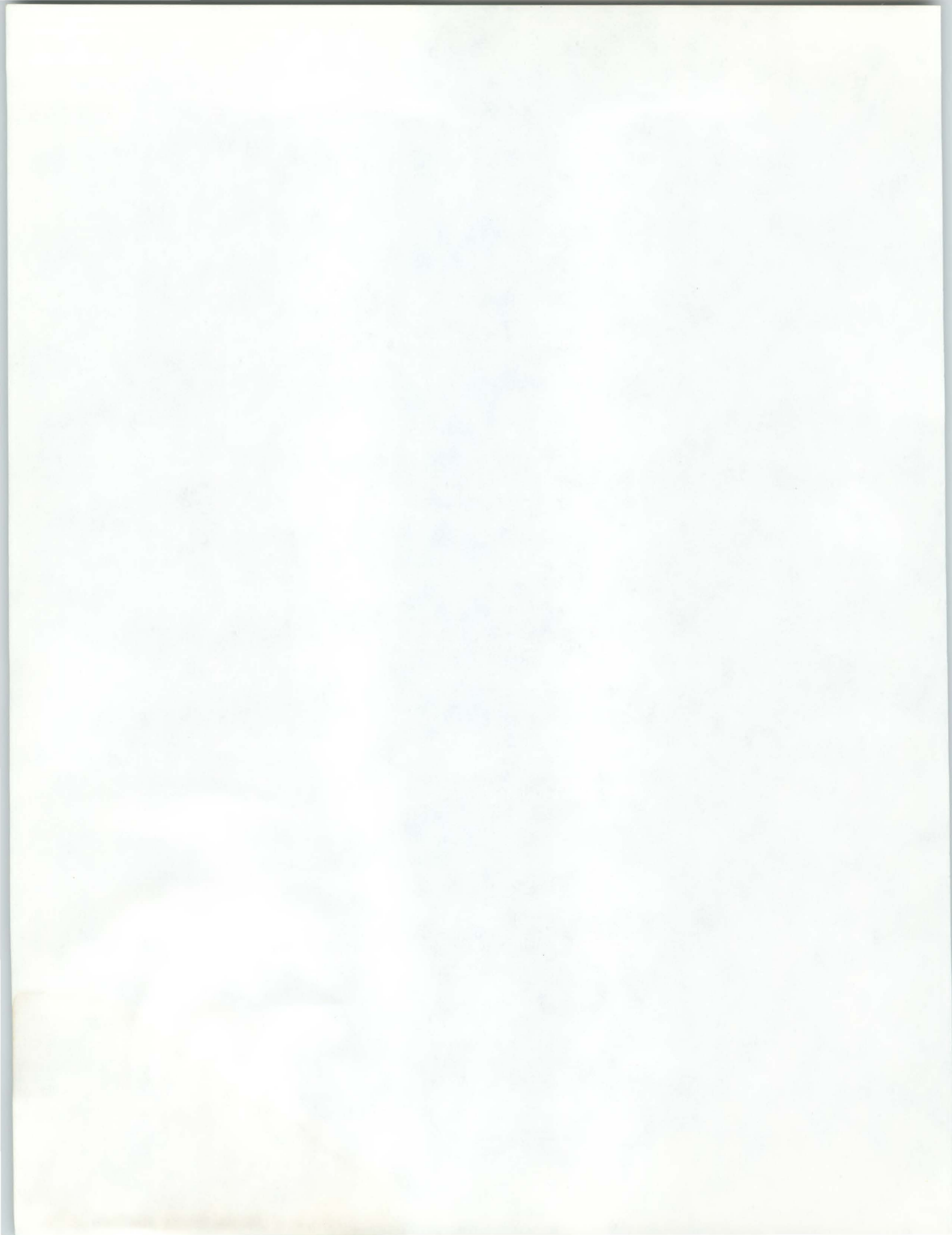
2 Connectivity: 802.3/Ethernet Local Area Networks

3 Connectivity: Communications Hardware

4 Interoperability: Communications Software

5 Distributed Applications

6 Manageability



Section 2

Connectivity: 802.3/ Ethernet Local Area Networks

This section contains the following topics...

Overviews: 802.3/Ethernet, DECconnect, Standard Network Packages

802.3/Ethernet Applications

Baseband 802.3/Ethernet Products

ThinWire 802.3/Ethernet Products

Unshielded Twisted-pair 802.3/Ethernet Products

DECconnect Products

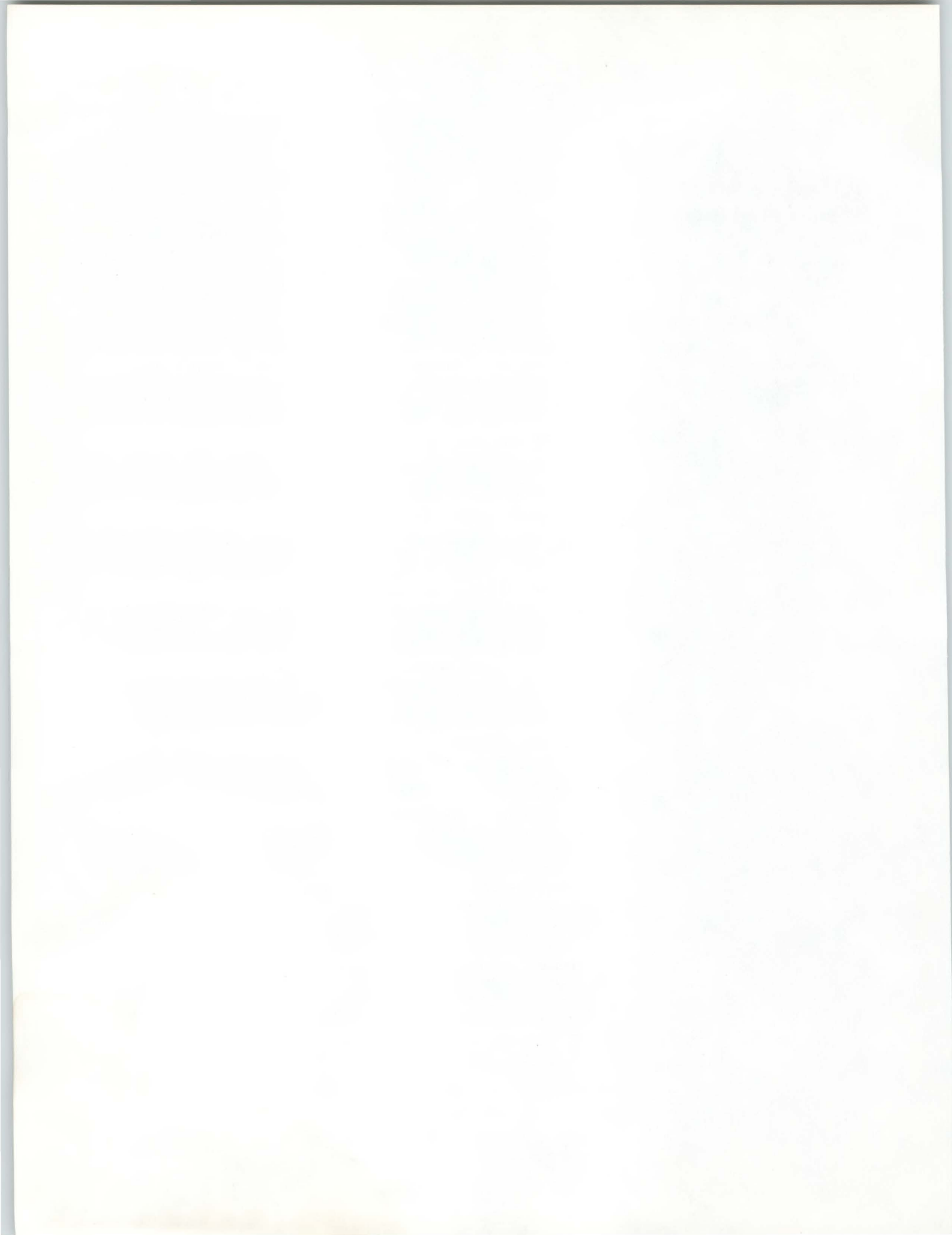
Broadband 802.3/Ethernet Products

802.3/Ethernet Communication Controllers

Extended Local Area Network Products

802.3/Ethernet Communications Servers

Standard Network Packages



Connectivity: 802.3/ Ethernet Local Area Networks

A local area network (LAN) is a privately owned data communications system that offers high-speed communications channels optimized for connecting information-processing equipment. A LAN usually serves a section of a building, an entire building, or a cluster of buildings.

Local area networks provide a fast, efficient means of exchanging information. They allow many varieties of information processing equipment to be easily connected and they provide resource sharing, which allows users to share expensive peripheral devices and databases. Local area networks expand the possibilities for global resource sharing by offering standards for communication between equipment of different vendors and between local and remote networks.

Digital uses the IEEE 802.3/Ethernet standard for its local area network. IEEE 802.3/Ethernet networks provide rapid access to data with a high data-transfer rate that makes information and resource sharing practical.

IEEE 802.3/Ethernet LANs can be implemented on baseband (coaxial) or broadband (CATV) cable: Baseband LANs replace the numerous connecting cables in traditional data networks with a single network cable; broadband LANs offer customers the ability to put 802.3/Ethernet on the same network wiring system with video, voice, and other data communications.

Baseband and broadband 802.3/Ethernet LANs represent long-term savings in lower wiring costs and reduction of system downtime when reconfiguring or replacing equipment. Corporations are able to optimize their networks easily because additional capability can be added without disturbing network operation.

IEEE 802.3 Compliance

All Digital second-generation LAN products are designed to comply with the IEEE 802.3 specification. In addition, Digital LAN products are backward compatible with first-generation Ethernet version 2.0 products. This ensures connectivity between products and a smooth transition to 802.3-based LANs. The IEEE 802.3 standard has been adopted by the International Standards Organization (ISO), defining layers one and the MAC layer portion of layer two. Digital is committed to international standards, allowing customers the benefit of multivendor networking and flexibility in choosing networking products.

802.3/Ethernet Channel Access

The technique used to access the baseband or broadband 802.3/Ethernet channel is called Carrier Sense Multiple Access with Collision Detection (CSMA/CD). CSMA/CD can be defined as follows:

- Carrier Sense (CS)—A device listens for a clear channel before transmitting. If the channel is in use (carrier sensed), the device delays transmission.
- Multiple Access (MA)—Many devices can be connected to one common wire, and when the channel is clear, all devices have equal access to it.
- Collision Detection (CD)—Two or more devices may sense a clear channel and simultaneously try to transmit. This results in data collision. The channel senses the collision condition, stops the transmission, and automatically retransmits the data after waiting a randomly selected amount of time.

802.3/Ethernet Overview

Baseband 802.3/Ethernet Cabling

Digital supports 802.3/Ethernet transmissions over three types of baseband cables:

- Standard, recommended for communications between satellite equipment rooms and floors of a building. This cable is sometimes called the "backbone" cable.
- ThinWire, recommended for communications between workstations, personal computers, and low-end systems in local work areas on a floor
- Unshielded twisted-pair, recommended for those customers who have already installed telephone-type twisted-pair cabling, and who want to minimize the cost and network disruption of installing new network cable

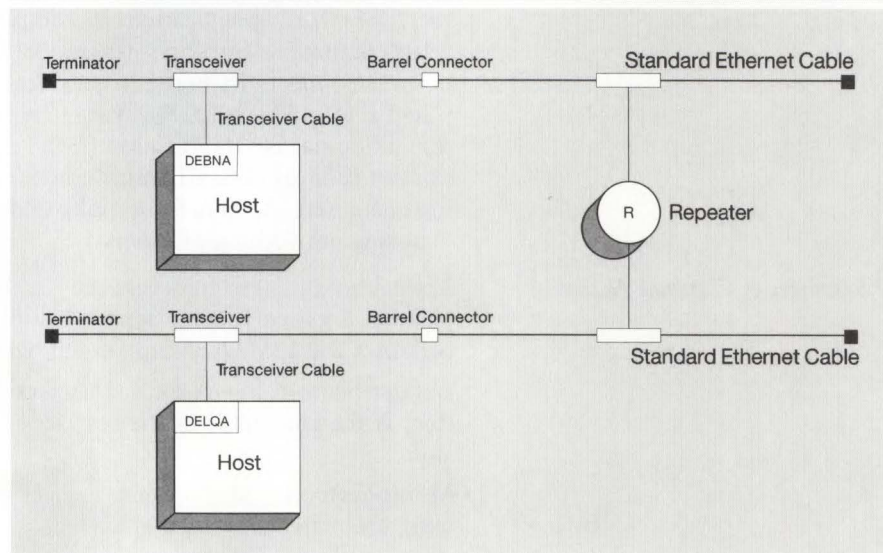
Standard Baseband 802.3/Ethernet Cabling

Using standard baseband cabling, an 802.3/Ethernet communications controller in a network system connects to a transceiver using a specialized four-shielded-twisted-pair wire transceiver cable. The transceiver is clamped onto the standard baseband cable without cutting the cable or interrupting data transmissions.

A maximum of 100 transceivers can be used on a standard 802.3/Ethernet cable segment. A single cable segment can be up to 500 meters (1,640 feet) long. Multiple cable segments can be linked together with barrel connectors. Multiple segments of transceiver cable can be linked together by slide-latch connectors on the ends of standard transceiver cable.

A repeater or bridge connects segments of standard baseband 802.3/Ethernet cable, creating a larger local area network.

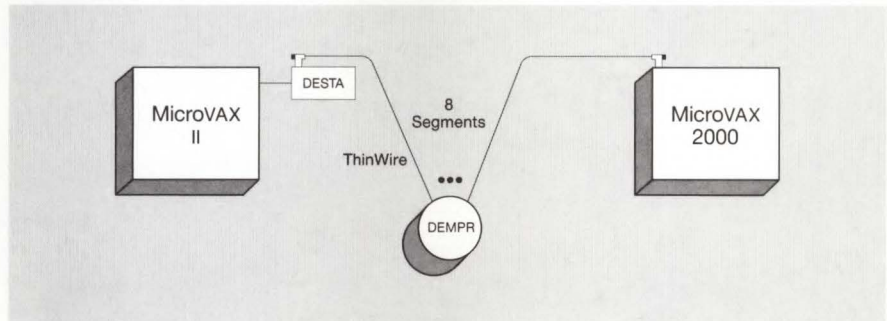
Baseband Ethernet Cabling Layout



NBG-120-00

ThinWire Baseband 802.3/Ethernet Cabling

ThinWire 802.3/Ethernet cabling, an inexpensive industry-standard coaxial cable with BNC connectors, enables the configuration of low-cost local area networks in the work area. ThinWire coaxial cable delivers 10 Mb/s 802.3/Ethernet performance, like standard baseband coaxial cable, and is specifically designed for horizontal wiring of a work area because of its ease of installation and lower cost. This provides full 10 Mb/s speed to the desktop for PCs and other intelligent workstations.

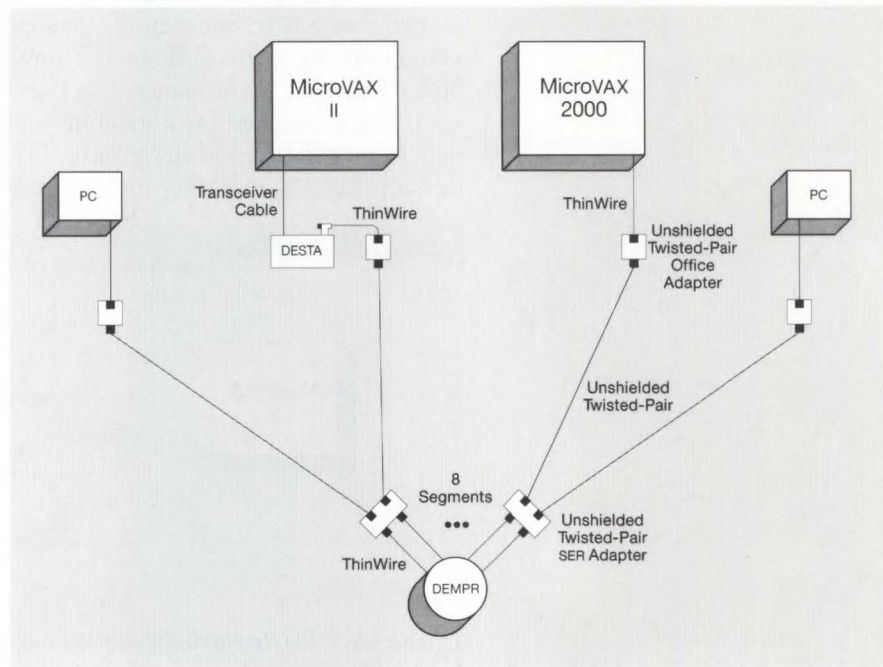
ThinWire Cabling Layout

NBG-121-00

Unshielded Twisted-pair Baseband Cabling

Unshielded twisted-pair cabling brings full 802.3/Ethernet capability to the desktop using unshielded twisted-pair adapters. These adapters, one located in the office and the other located in the satellite equipment room (wiring closet), convert ThinWire communications to unshielded twisted-pair communications. The adapters supply all required electrical and physical translation from active ThinWire devices such as DEMPRs and VAXmates, providing a complete segment between the local area network and the office device via twisted-pair cabling. Unshielded twisted-pair 802.3/Ethernet adapters complement existing 802.3/Ethernet media options, and can be used with many leading structured cabling systems.

Unshielded Twisted-pair Cabling Layout



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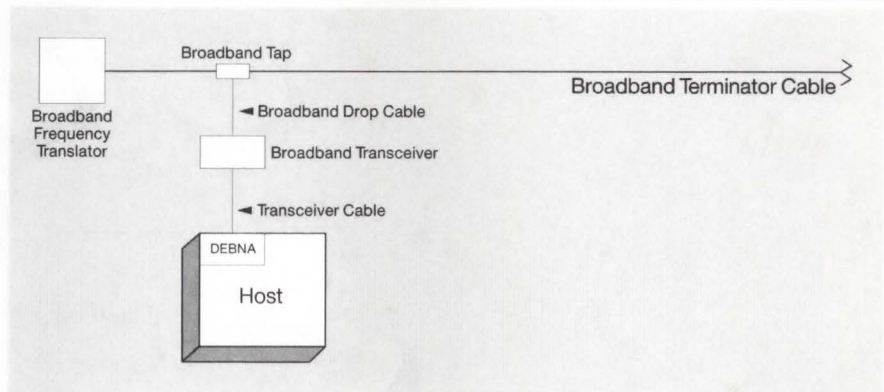
Broadband 802.3/Ethernet Cabling

Broadband 802.3/Ethernet offers customers the ability to put 802.3/Ethernet on the same network wiring system with video, voice, and other data communications. It is most feasible for customers who must distribute multiple information services to a large user population over an extensive local area.

With broadband cabling, the 802.3/Ethernet communications controller in the node connects to the broadband transceiver using the same four-twisted-pair wire transceiver cable as standard baseband. In turn, the broadband transceiver is connected to a tap in the broadband network cable via a broadband coaxial drop cable.

Design, installation, and maintenance of broadband cable networks are available as part of Digital Network Services. (For more information on broadband network services, refer to Section 6 or contact the local Digital sales or field service representative.)

Broadband 802.3/Ethernet Cabling Layout



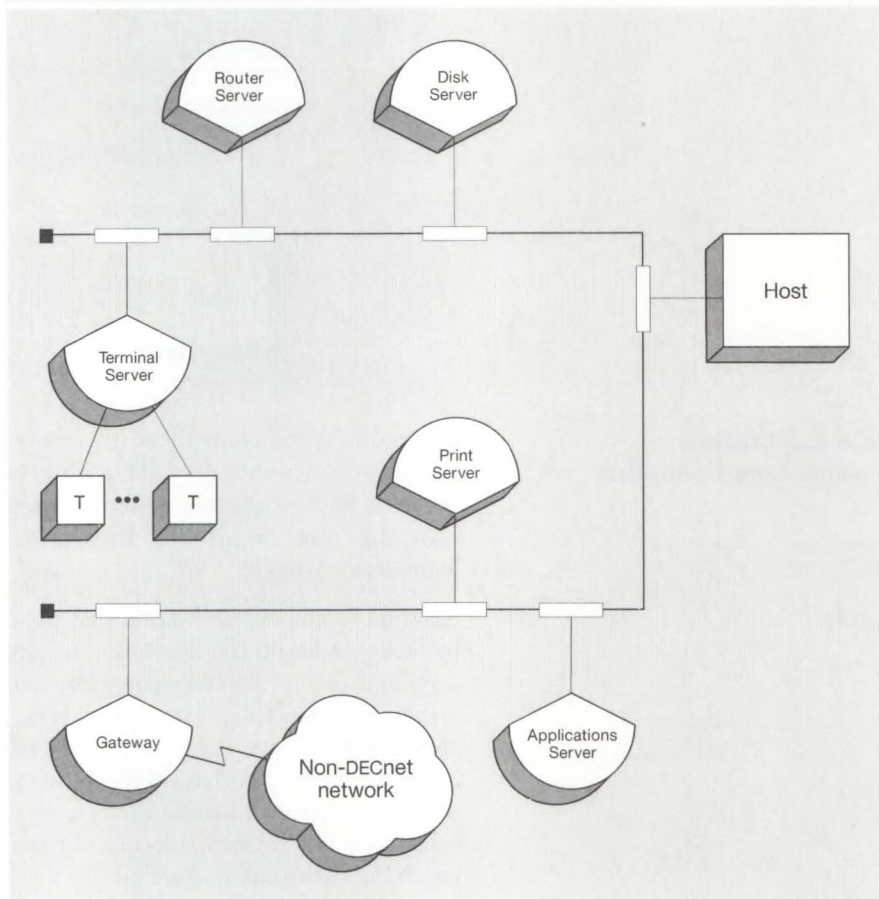
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IEEE 802.3/Ethernet Communications Controllers

Communications controllers implement the Ethernet or IEEE 802.3 data link layer functions and CSMA/CD protocol to make electrical connections between 802.3/Ethernet systems. An 802.3/Ethernet communications controller must be installed in systems that connect to an 802.3/Ethernet local area network.

Servers

A server is any network node that provides a resource that can be shared by other nodes on the network. (A "node" is any intelligent device that can send and receive messages over the network.) Many different types of servers are available: terminal servers, compute servers, disk servers, application servers, router servers, gateway servers, and print servers. A computer in a LAN that offers these types of services, whether or not the node is dedicated to that function, may be viewed as providing server functions. The following figure illustrates the various types of servers for baseband or broadband networks.

Generic LAN Servers

NBG-124-00

A node providing server functions can run other applications if its nonprocessing services do not justify total dedication. By adding servers to a network, other nodes on the network can be dedicated to applications processing.

Digital has a substantial amount of software available that can be used to provide server functions in the network. Print server, file server, terminal server, and database server capabilities are available by using existing Digital software on general-purpose computers.

Users can build servers by providing their own application software. For example, a computer node providing typesetting services might be viewed as an application server. A VAX 8700 that is connected to a local area network and is running the VMS operating system might be viewed as a computer server, while a VAX 8250 with a laser printer might be viewed as a print server. The following table illustrates server software alternatives.

Server Software Alternatives

General Purpose Servers

Print Server/File Server (for example, VMS Host)

Database Access (for example, DATATRIEVE Host)

Packaged/Special Purpose Servers

Terminal Server

Router

Gateway

Application Server

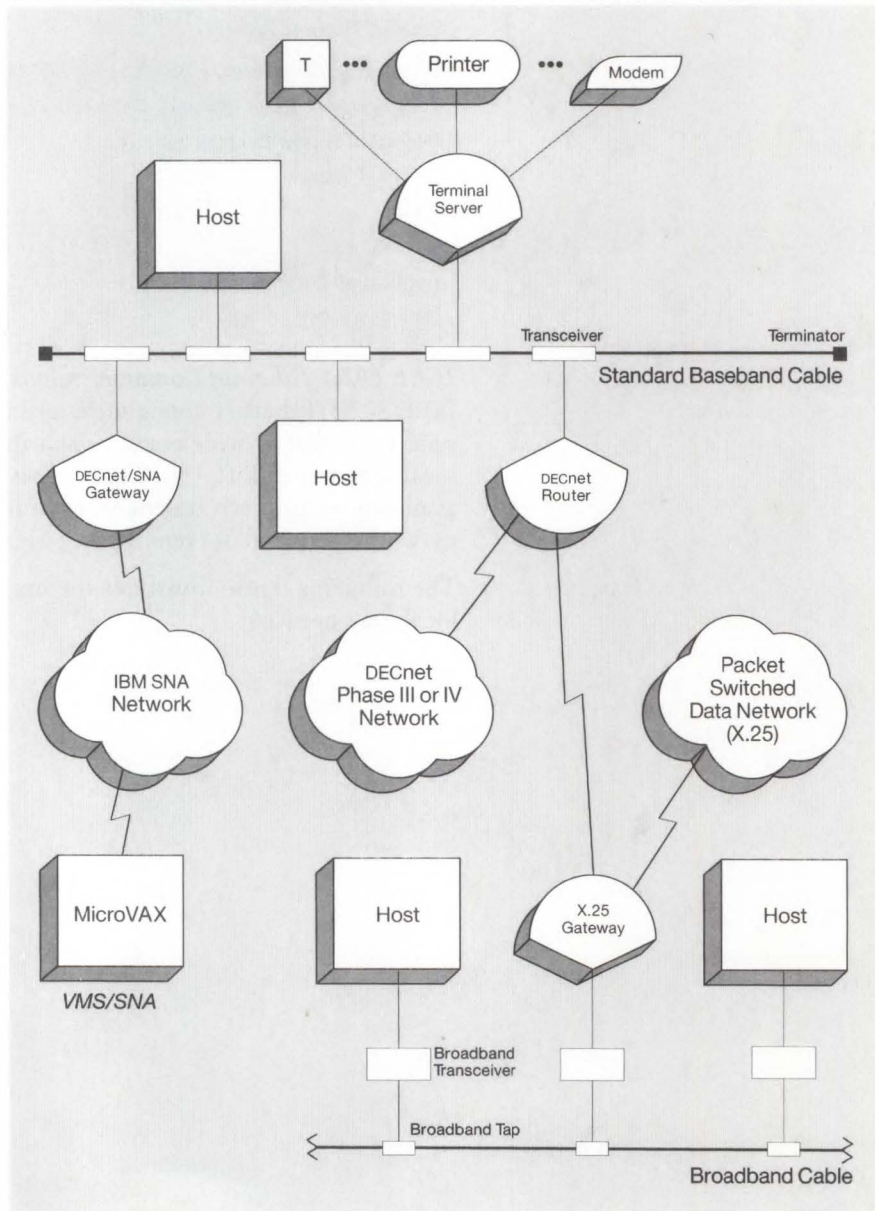
User developed

IEEE 802.3/Ethernet Communications Servers

IEEE 802.3/Ethernet communications servers are dedicated, special purpose units that provide resource sharing across many host systems within a local area network (LAN). Three types of communications servers are available for use on a baseband or broadband 802.3/Ethernet local area network: Terminal Servers, Router Servers, and Gateways.

The following figure illustrates the use of communications servers on a local area network.

Baseband/Broadband 802.3/Ethernet LAN Configuration with Communications Servers



NBG-125-01

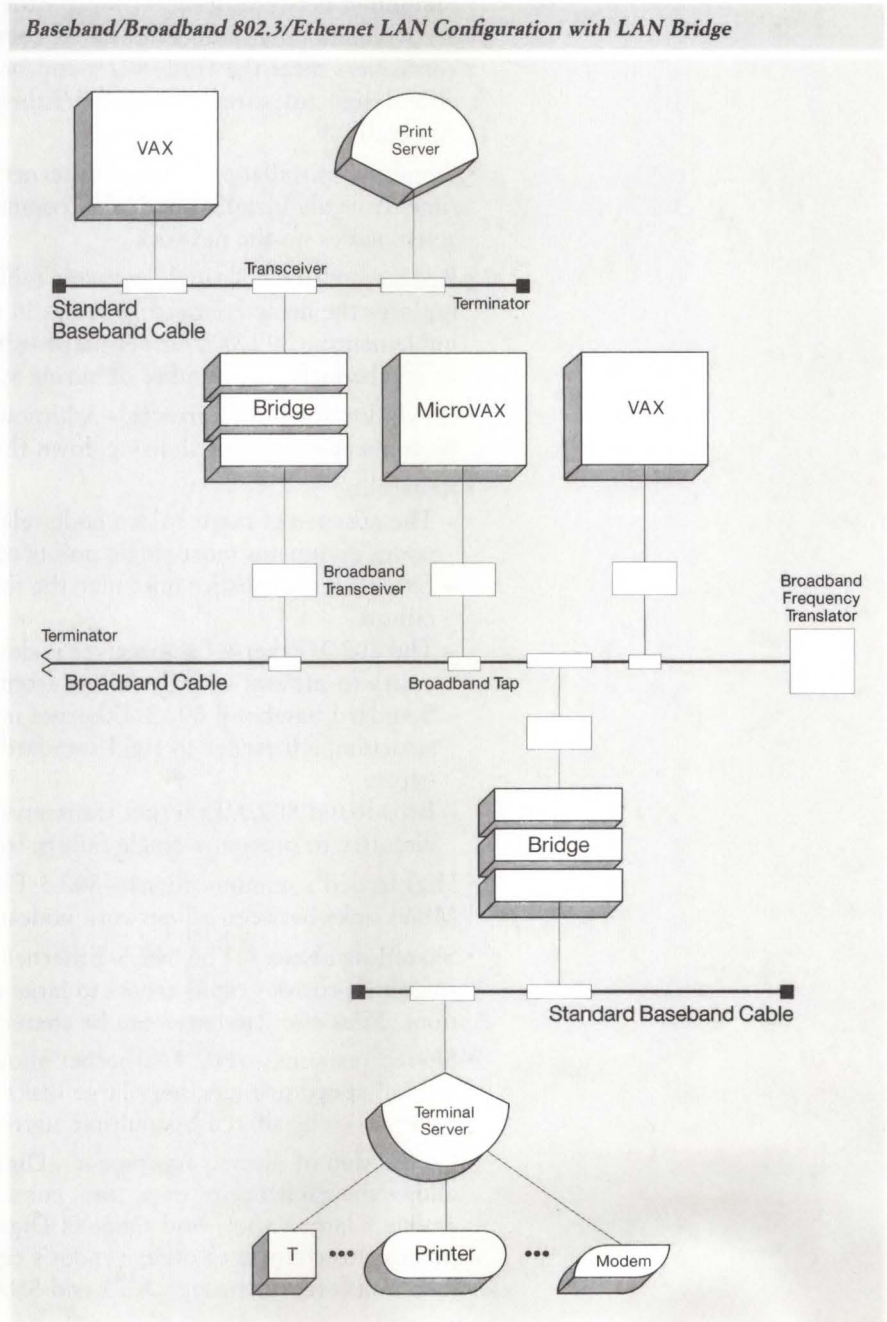
Extended Local Area Networks

The LAN Bridge 100 connects network segments, either standard baseband or broadband, to create an extended LAN. The standard 802.3/Ethernet distance limit is 2,800 meters between any two nodes: An extended LAN lengthens this distance without degrading the 802.3/Ethernet 10 Mb/s throughput. An extended LAN may consist of up to 8,000 nodes and, using fiber optic and microwave bridges, span distances of up to 35,700 meters.

The bridge dynamically manages data traffic flow between segments, selectively forwarding packets to keep local traffic local and to reduce traffic over the entire network. Baseband-to-baseband, broadband-to-broadband, and baseband-to-broadband network configurations are possible using the bridge as a link.

802.3/Ethernet Overview

The following figure illustrates an extended LAN configuration using the LAN Bridge 100.



NBG-126-01

802.3/Ethernet Overview

802.3/Ethernet Advantages

Digital's range of 802.3/Ethernet products has been developed to solve a number of problems typically encountered in business and industry.

- Simplified network design—802.3/Ethernet architecture and design rules are streamlined and uncomplicated because the cable, transceivers, and controllers meet the IEEE 802.3 and/or Ethernet specifications. (For specific design rules, refer to “802.3/Ethernet Configuration Guidelines” in Appendix A.)
- Simplified installation—802.3/Ethernet can be brought up one node at a time. A newly installed node can communicate immediately with all other active nodes on the network.
- Reduced wiring—A single network cable in baseband 802.3/Ethernet replaces the many connecting cables in traditional data networks. And by implementing 802.3/Ethernet on broadband with other video, data and voice channels, the number of wiring systems can be significantly reduced.
- Flexibility for future growth—Additional devices and cable segments can be connected without shutting down the network.
- Reliability:
 - The absence of master/slave node relationships and the need for routing nodes eliminates most single points of failure.
 - Extensive diagnostics minimize the time needed to locate and to repair a failure.
 - The 802.3/Ethernet transceiver is designed with triple redundant circuitry to prevent a single failure from disabling the network.
 - Standard baseband 802.3/Ethernet is very reliable due to its heavy construction, adherence to rigid standards on concentricity, and passive nature.
 - Broadband 802.3/Ethernet transceivers are designed with redundant circuitry to prevent a single failure from disabling the network.
- High-speed communications—802.3/Ethernet provides high-speed (10 Mb/s) links between all network nodes.
- Shared databases—The 802.3/Ethernet network coupled with DECnet software provides rapid access to large amounts of data in remote locations. Files and databases can be shared.
- Shared resources—802.3/Ethernet allows special purpose peripherals such as high-speed printers, very large disks, and high-resolution graphics packages to be shared by multiple users.
- Connection of diverse equipment—Digital Network Architecture (DNA) allows the exchange of data, files, commands, and diagnostic information among a large variety and range of Digital products. In addition, it is possible to connect to other vendor's equipment at the 802.3/Ethernet data-link level or through X.25 and SNA Gateways.

The DECconnect communications system encompasses the full family of Digital networking products from electronics to cabling and connections. DECconnect provides access to corporate computer networks, telephone communications, and a video network. The modular nature of DECconnect allows mixing and matching components to meet user requirements.

DECconnect offers a simple, cost-effective cabling system that brings both high-performance baseband 802.3/Ethernet and enhanced EIA-423-A terminal connection (compatible with EIA-232) to offices and work areas. Through separate, industry-standard cabling runs that radiate from a centralized equipment/wiring area (called the satellite equipment room) to an integrated faceplate in the work area, DECconnect cabling allows a customer to connect terminals, PCs, and workstations to an 802.3/Ethernet network. And with standard baseband cable as a backbone, users have access to data center and mainframe resources throughout a company.

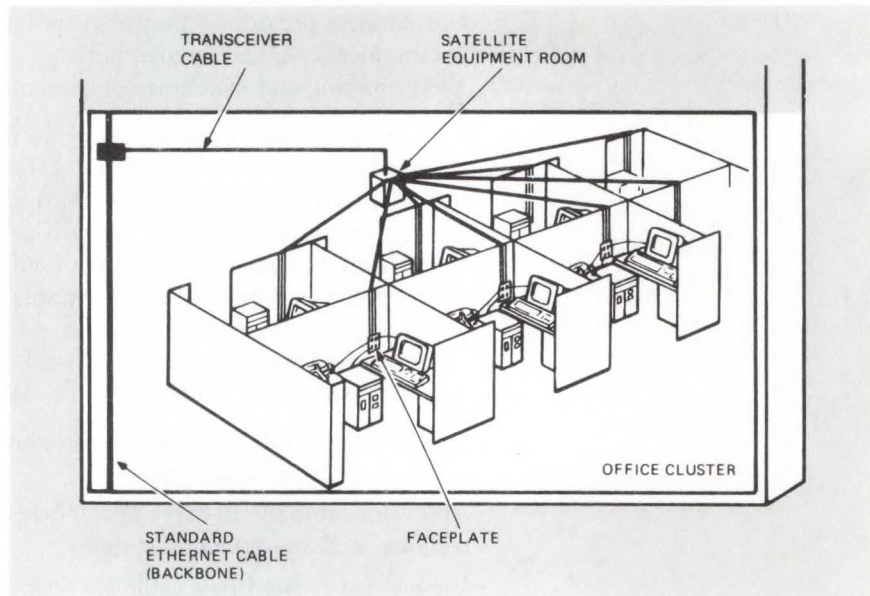
DECconnect combines separate communications technologies into one cohesive networking solution:

- ThinWire cable for 10 Mb/s 802.3/Ethernet communications to PCs, workstations, and departmental systems.
- Unshielded twisted-pair cable for terminal communications up to 19.2 Kb/s or for 10 Mb/s 802.3/Ethernet communications.
- Unshielded twisted-pair cable for telephone connections.
- Standard broadband cable for video connections.

Separate cables are used for low-speed data, high-speed data, telephone and, if desired, video communications, allowing implementation and configuration flexibility. These cables follow standard-industry wiring patterns and, except for video cabling, use radial topology from a central satellite equipment room to a faceplate in the local work area. (The voice communications feature of the DECconnect communications system does not apply in all European countries.)

Cables are pulled in a radial topology between two easily accessible points: the faceplate located in the work area/office and the wiring closet, also called the "satellite equipment room" (SER). A radial topology combines maximum office space coverage with ease of network management and maintenance. The following figure illustrates the DECconnect radial topology.

DECconnect Radial Topology



The single connection point for all network services in the office or work area is the DECconnect faceplate. Two types of faceplates are available, one for mounting flush to a standard electrical box and one for mounting on modular furniture. The user's terminal, personal computer or workstation, telephone, and video equipment plug into the four outlets on the faceplate.

The satellite equipment room (SER) rack can service as many as 128 users encompassing up to 15,000 to 20,000 square feet of floor space. The SER serves two functions:

- It serves as a central cross-connection point for all radial office wiring, such as unshielded twisted-pair cabling for terminals, ThinWire cable for 802.3/Ethernet services to personal computer and office workstations, and when appropriate, telephones.
- It provides mounting space for all the active network hardware components, such as ThinWire multiport repeaters, terminal servers, and bridges.

DECconnect Features

- Multifunction, modular DECconnect faceplate
- Satellite equipment room—cabinet racks and cable patching/cross-connect components
- ThinWire coaxial cabling (802.3/Ethernet-compliant)
- DEC423 (EIA-423-A) signaling with EOS/ESD protection and EIA-232-D compatibility
- Serial terminal/printer connections
- 802.3/Ethernet support
- DECsite planning and installation

ThinWire 802.3/Ethernet Cabling

ThinWire 802.3/Ethernet cabling, an inexpensive, industry-standard coaxial cable with BNC connectors, enables the configuration of low-cost local area networks in the work area. ThinWire cable delivers 10 Mb/s 802.3/Ethernet performance, like standard baseband cable, and is specifically designed for horizontal wiring of a work area because of its ease of installation and lower cost.

In the DECconnect communications system, ThinWire cable runs from a ThinWire 802.3/Ethernet repeater in a satellite equipment room to DECconnect faceplates in a local work area. From the faceplates, desktop systems such as personal computers, workstations, and low-end systems are connected. Non-ThinWire (A.U.I. type) devices are connected to ThinWire cable using the ThinWire Ethernet Station Adapter (DESTA). Disk and print servers can also be connected to ThinWire cable.

Unshielded Twisted-pair Cabling

Unshielded twisted-pair cabling brings full 802.3/Ethernet capability to the desktop using unshielded twisted-pair adapters. These adapters, one located in the office and the other in the satellite equipment room, convert from ThinWire communications to unshielded twisted-pair communications. The adapter products supply all required electrical and physical translation from active ThinWire devices such as DEMPRs and VAXmates, providing a complete segment between the 802.3/Ethernet network and the office device via twisted-pair cabling. Unshielded twisted-pair 802.3/Ethernet adapters complement existing media options, and can be used with many leading structured cabling systems.

In the DECconnect communications system, a segment of unshielded twisted-pair wiring runs from an unshielded twisted-pair adapter in the SER to a DECconnect faceplate in the local work area. (This faceplate connection is otherwise used to connect the user's terminal.)

DEC423 Signaling

DEC423 signaling is based on the EIA-423-A standard for low-speed terminal connection. DEC423 provides all the improved signaling benefits of EIA-423-A connection and is compatible with EIA-232.

DEC423 was chosen as the signaling standard because of its improved performance over the EIA-232 standard, and its backwards compatibility with existing EIA-232-D equipment. By following the EIA-423-A standard, DEC423 supports terminal-to-CPU or terminal server-to-terminal distances of 1,000 feet, compared to the EIA-232-D standard of 50 feet. It is fully compatible with all existing EIA-232 installations, making major equipment changes unnecessary. Digital provides necessary mechanical adapters that enable EIA-232-D (25-pin) terminals to plug into DEC423 (six-pin) communications controllers.

DECconnect Overview

DEC423 has the following features:

- Industry standard EIA-423-A signaling benefits, including CPU-to-terminal distances of up to 1,000 feet at 38.4 Kb/s
- Complete electrical compatibility with EIA-232-D
- Smaller six-pin connector, which allows for increased line density at the back of the CPU and remote connection through the use of cable concentrators
- Simplified cabling requirements with all cables having male connectors on both ends and female connectors being designed into all new DEC423 (EIA-423-A) devices
- Improved cabling capabilities through the use of unshielded cables while still meeting full FCC certification

Digital asynchronous devices with DEC423 signaling have the enhancement of integral electrical overstress/electrostatic discharge (EOS/ESD) protection. This improves equipment reliability and availability by protecting it from EOS damage caused by static discharge, lightning, or ac power surges, while still being 100 percent compliant with the EIA-423-A standard.

Terminal Connections

The DECconnect communications system allows low-speed terminal users to migrate from EIA-232-D to DEC423 (EIA-423-A) signaling, cables, connectors, and office products. Digital offers the adapters, connectors, and cables to migrate EIA-232-D devices to DEC423.

These migration products allow customers to install the DECconnect communications system without having to replace most existing cabling or communications equipment. Digital supports the connection of new cabling to old products, new cabling to new products, and old cabling to new products.

Digital has also developed a standard connection cable and modified modular plug that can be used to connect terminals to the DECconnect faceplates. The standard cable is the Digital office cable (BC16E), an unshielded six-conductor flat cable that is flexible and easy to coil and terminate. The BC16E cable is designed primarily for office applications where flexibility, simplicity, and aesthetics are important.

All Digital second-generation Ethernet products support the IEEE 802.3 LAN standard. Digital is committed to international standards so that customers can enjoy the benefits of multivendor networking and have flexibility in the choice of equipment for their companies.

DECsite Planning and Installation

Digital offers a complete line of planning and installation services for the DECconnect cabling system under the DECsite program. Refer to "Related Network Services" in Section 6 for more information.

Standard Network Packages make it easier for customers to configure and order network products because they include the major communications products required to implement specific network solutions. This modular approach to network design and ordering can be effectively used in networking applications ranging from small standalone work groups to large multiple-site installations.

Standard Network Packages work with existing Digital equipment in current system installations. All Digital computer systems having DECnet capability can be used with the Standard Network Packages.

The packages are organized into four categories based on typical user requirements. Three of the categories are based on geographic considerations; the fourth provides the capability to integrate another vendor's network into the Digital network.

The four categories of Standard Network Packages are

- Local Area Work Group Interconnection, which provides connectivity among users who are typically involved in related activities and are located on the same floor.
- Extended Local Area Interconnection, which links individuals, groups, or departments in geographically distinct work areas that are relatively close to each other.
- Wide Area Interconnection, which provides a network link between remote sites.
- Multivendor Interconnection, which allows information to be transferred between a Digital network and the network of another vendor.

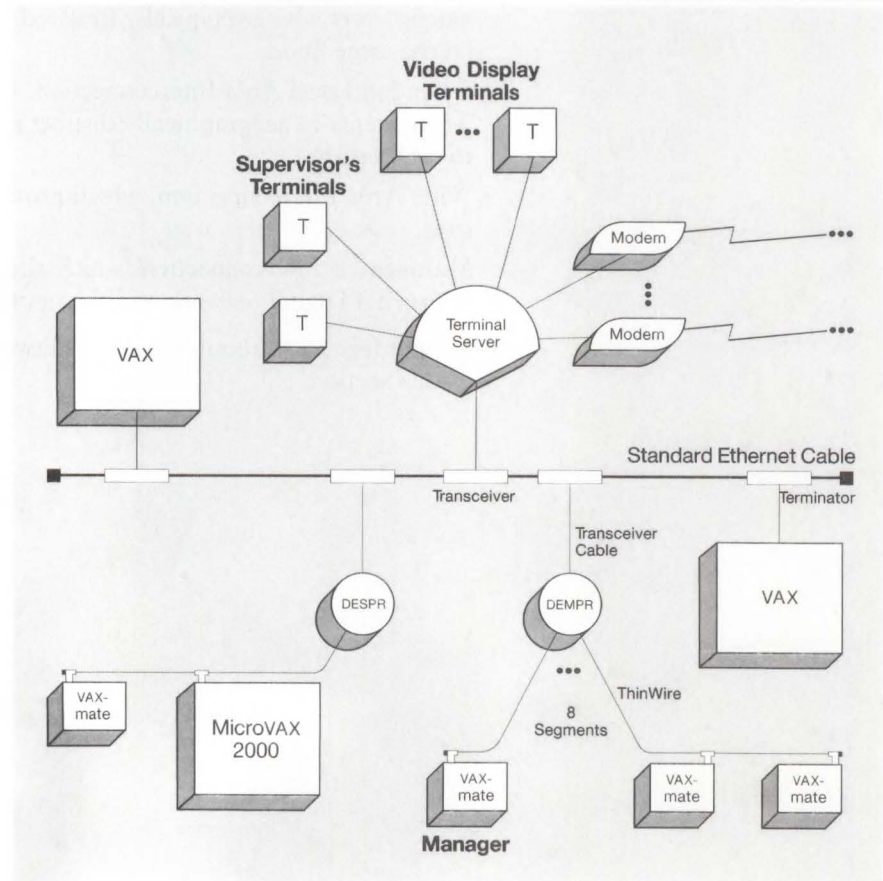
More information about Standard Network Packages is located at the end of this section.

Office Applications

The following figure depicts a business office in which terminals are available for accounting, order taking, order processing, inventory control, word processing, and so on. Two supervisory stations have access to all data. A manager with a VAXmate can monitor accounts, display graphic data (pie charts, bar graphs, and so on), and issue instructions to any department. The VAXmate is connected to a segment of ThinWire cable, which allows up to 29 additional devices to be added as the company grows.

Standard 802.3/Ethernet baseband cable extends from the office area to other major sources of information, including shipping, receiving, inventory, and the shop floor. Work can be monitored from the receipt of parts, through shipping, to receipt of payment. A bank of modems attached to a terminal server permits remote offices or sales representatives with small portable terminals to call in orders or check a particular account at any time.

Baseband 802.3/Ethernet Office Application



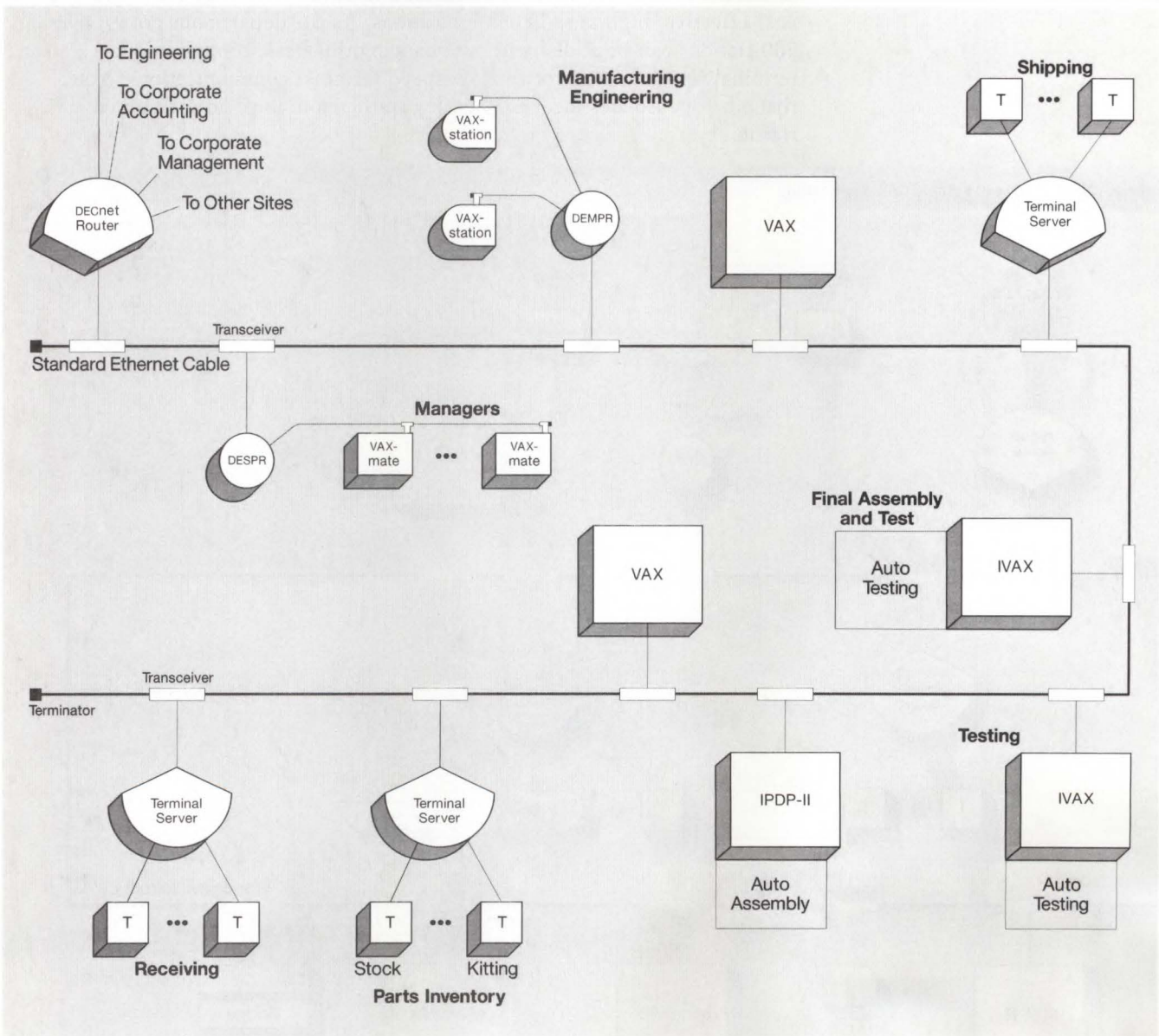
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Typical Baseband 802.3/Ethernet Applications

Factory Applications

The following figure illustrates a typical application in a factory, which controls automatic assembly/test devices. Data entry stations provide timely information on the entire manufacturing process. Exchange of data between the manufacturing site and the rest of the corporation is handled through a router server.

Baseband 802.3/Ethernet Factory Application



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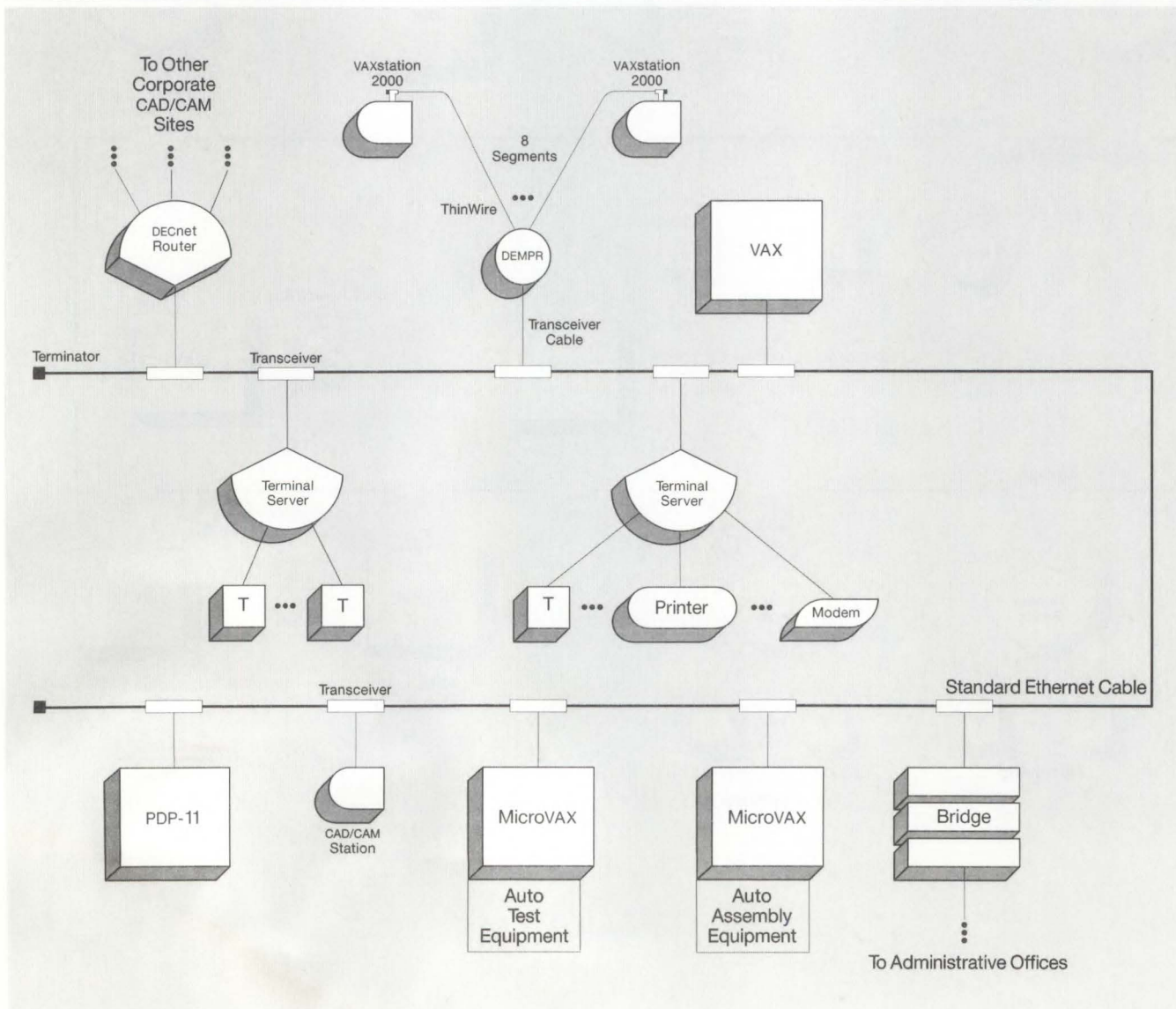
Typical Baseband 802.3/Ethernet Applications

CAD/CAM Applications

The 802.3/Ethernet 10 Mb/s throughput handles everything from word processing to bit-map graphics. A fully integrated 802.3/Ethernet design/manufacturing network permits smooth integration of design, automated manufacturing inventory, and business functions.

The following figure depicts an engineering department using 802.3/Ethernet to connect a number of workstations to CAD/CAM hosts. The workstations are connected to a segment of ThinWire cable, which provides cost-effective, high-speed communications. As the department grows, over 200 stations can be added without changing this basic configuration. A terminal server is used for the low-speed terminal communications. Note that a bridge isolates local engineering traffic from local administrative traffic.

Baseband 802.3/Ethernet CAD/CAM Application



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Hospital Applications

Connection of testing and laboratory computers to a hospital's central computer and to a number of remote monitoring stations requires a high-speed network. With the 802.3/Ethernet high data-transfer rate, even remote access to full-color bit-maps, such as CAT scans, is practical.

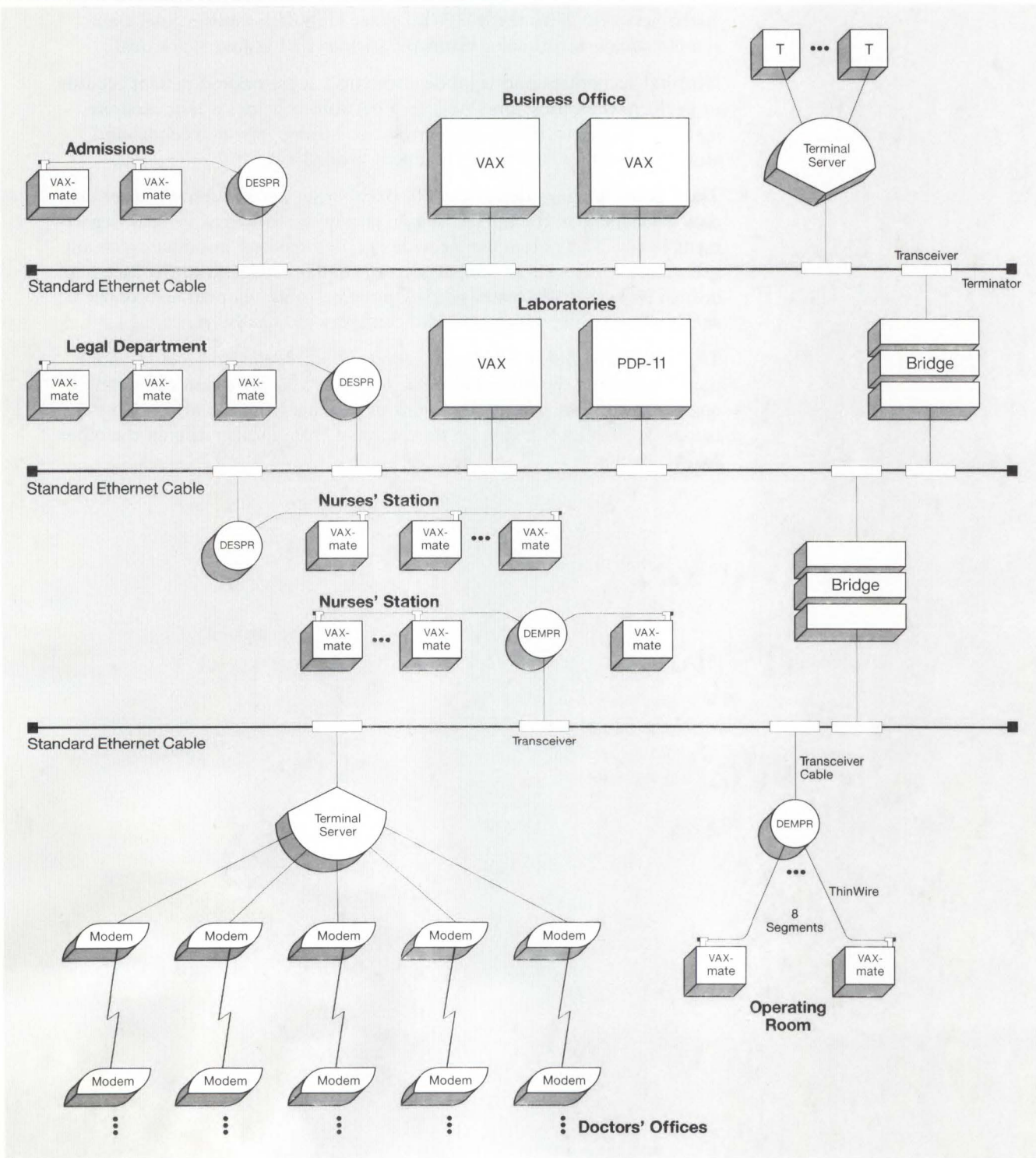
Hospital accounting and legal departments use automated patient records to perform their jobs. The local area network provides a fast, accurate means of accessing information critical to billing patient accounts and storing the details of patient treatment procedures.

The following figure depicts an 802.3/Ethernet network on which critical data is available at the nurses' station and in the offices of various department heads. The system can provide detailed medical information on any given patient, as well as comparisons to similar cases and to the accepted norms. Note that VAXmates on the operating room segment are connected to ThinWire cable, which provides configuration flexibility.

The figure also shows a terminal server with modems and leased phone lines connecting the offices of resident doctors. A physician can monitor test results or the current conditions of patients from the office. Note that a bridge isolates local traffic on this segment from local traffic on the other two segments.

Typical Baseband 802.3/Ethernet Applications

Baseband 802.3/Ethernet Hospital Application



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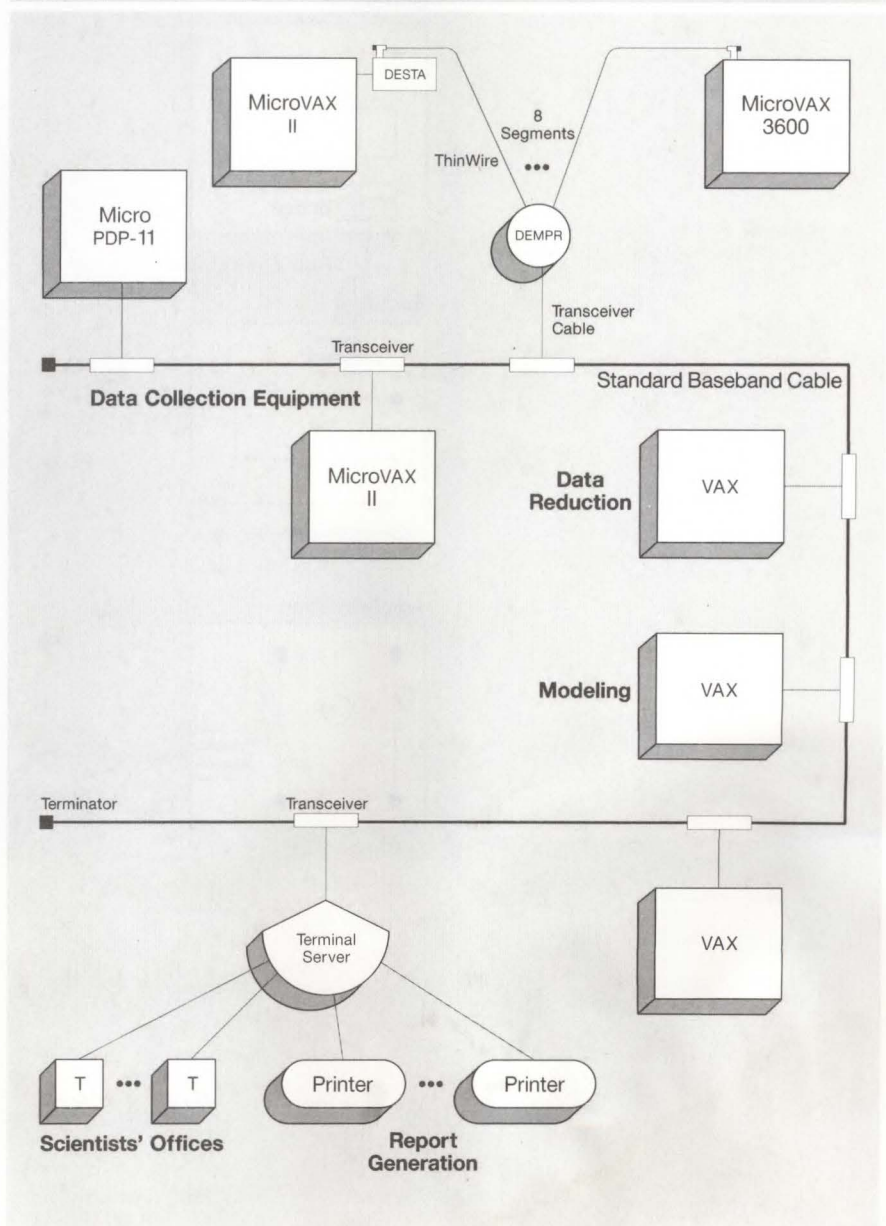
Typical Baseband 802.3/Ethernet Applications

Laboratory Applications

Within a laboratory environment, monitoring test conditions and results is extremely important. By networking a test control computer to a computer acting as a monitoring station and to a central database on another computer, current test conditions can be displayed along with previous or standard conditions. Deviations from the desired conditions become apparent and can be corrected before continuing with the test. Each MicroVAX computer is connected to a single segment of ThinWire cable, which provides a cost-effective link to the high-speed devices.

The following figure illustrates how various laboratory computers and other resources are typically connected by an 802.3/Ethernet local area network.

Baseband 802.3/Ethernet Laboratory Application



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Typical Baseband 802.3/Ethernet Applications

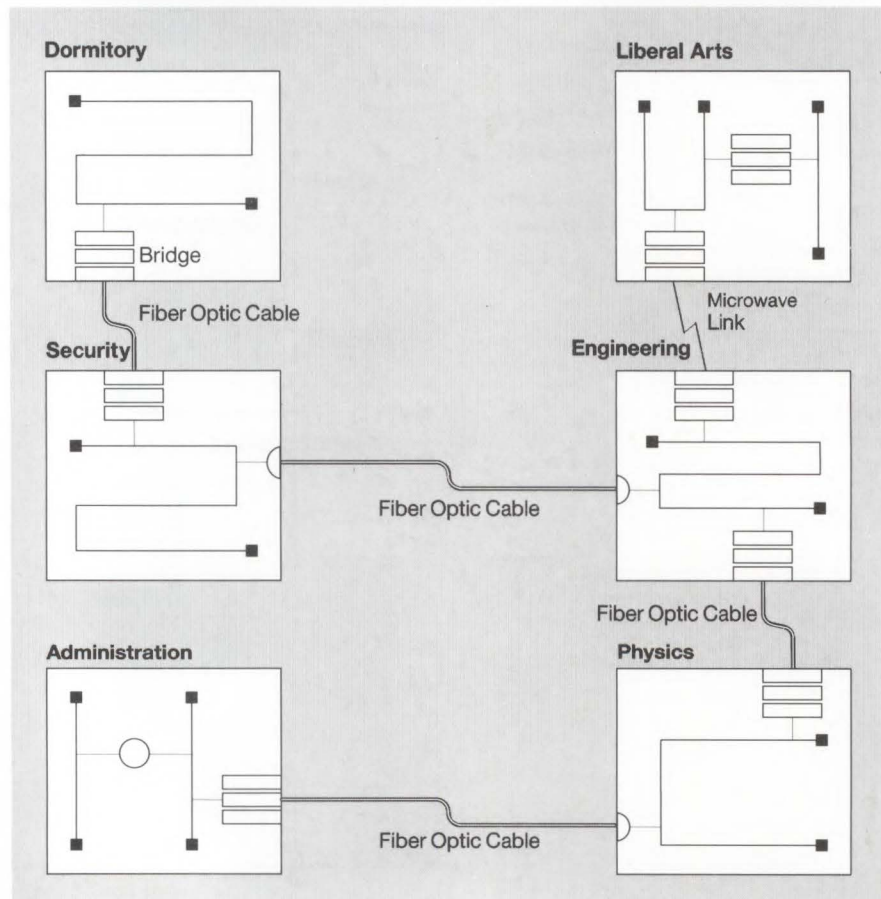
University Applications

The application of computers in a university system can cover everything from maintaining student accounts and academic records to using computers as classroom tools.

The following figure illustrates an 802.3/Ethernet application used at a university. Note that bridges isolate local traffic throughout the university.

Fiber optic cable is recommended for connecting detached buildings. The METROWAVE Bridge (microwave-based) is used as an alternative for physical or economic reasons.

Baseband 802.3/Ethernet University Application



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Typical Broadband 802.3/Ethernet Applications

Along with the 802.3/Ethernet channel, the broadband network can be used to distribute other data services, as well as voice and video communications. The shared cable capability is often a cost-effective networking solution for universities, hospitals, manufacturing complexes, research parks, and other organizations with large, dispersed user populations.

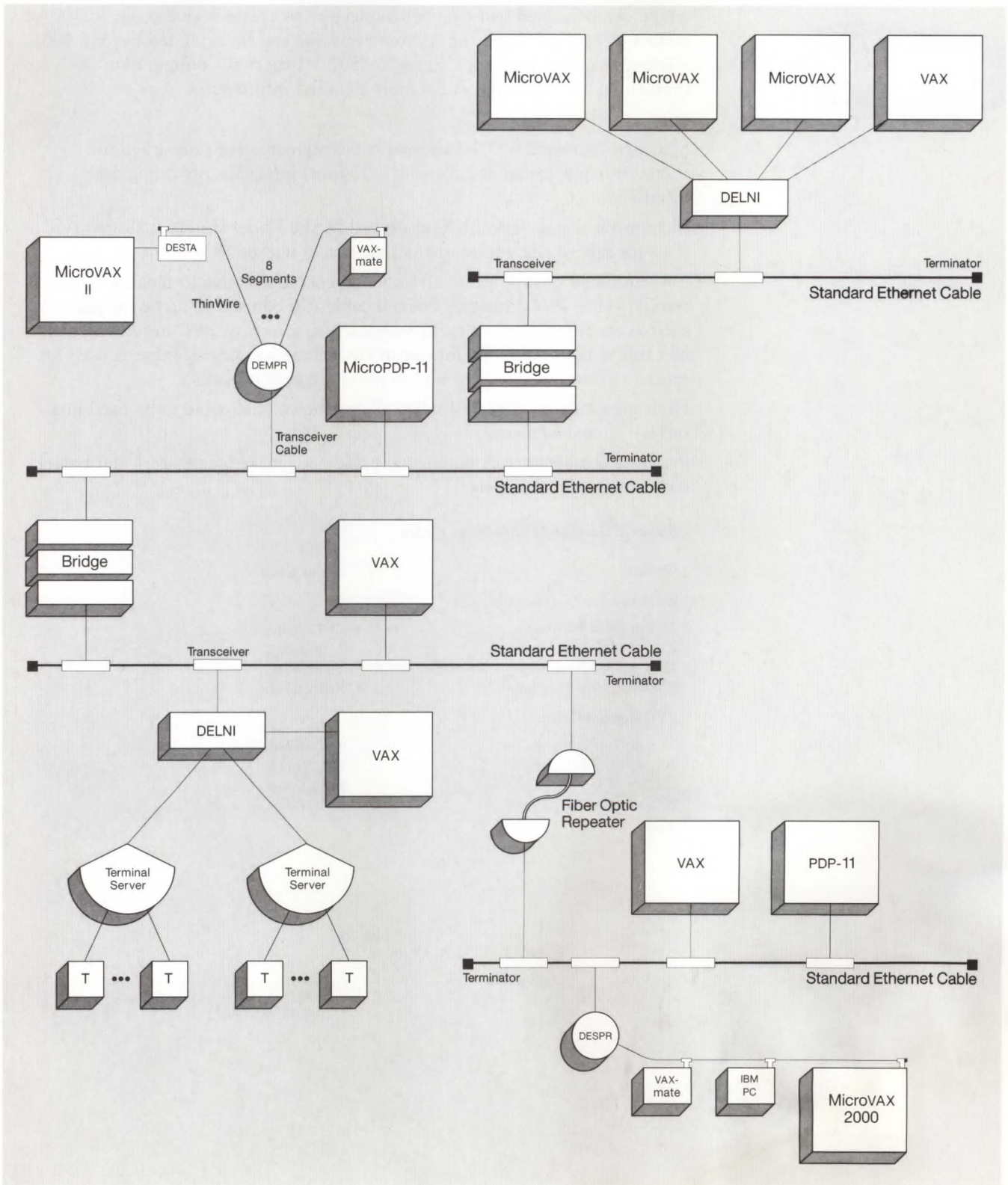
- **Corporate Offices**—Large corporations can distribute services such as corporate teleconferencing, security monitoring, and employee video training along with an 802.3/Ethernet channel onto a broadband LAN. Among a wide variety of applications, energy management and building-access control can use the 802.3/Ethernet channel. Wiring systems in a skyscraper or plant complex can be kept to a minimum, and changes to the organization can easily be accommodated.
- **Plant Environment**—Industries, such as auto or aviation manufacturing, can use the broadband network to monitor a variety of data collection stations. The 802.3/Ethernet channel can be used for transmitting reports, energy management, and inventory distribution control, among a variety of other tasks. On the factory floor, broadband 802.3/Ethernet can coexist with MAP.
- **University Campus**—Broadband can be ideal for university use because it can support extensive communications needs. A single medium that can transmit television, data communication, and security is invaluable to an educational community. The broadband 802.3/Ethernet channel can provide access to important educational tools and a variety of databases while sharing the cable with applications such as video training seminars. In addition, by wiring classrooms and dormitories with broadband cable, universities can also connect the growing number of personal computers via the 802.3/Ethernet channel.
- **Hospitals**—Broadband networks are also invaluable to hospital communities. They allow medical staffs to maintain constant watch over patients via channels from a central location, while also having access to patient records and laboratory results on the 802.3/Ethernet channel. Meanwhile, patients can be viewing their favorite programs on another channel on the broadband LAN. For a hospital to have all of these functions, all it requires is one broadband cable.

The incorporation of 802.3/Ethernet local area network technology into DECnet Phase IV demonstrates Digital's commitment to providing a complete set of products to address local area networking needs. 802.3/Ethernet networks have been developed specifically for the kinds of communications and resource sharing that take place in a local work environment.

Digital's local area network (LAN) connects Ethernet or IEEE 802.3-compatible devices in a small geographic area by way of high-speed standard, ThinWire, or unshielded twisted-pair cable. Every device attached to the cable has access to all network resources. The network becomes the system.

Hardware products combine to create a physical channel over which the DECnet and 802.3/Ethernet protocols are implemented. Baseband 802.3/Ethernet products currently available include ThinWire products, unshielded twisted-pair products, standard baseband cable, transceiver cable, connectors, terminators, Etherjack, the Local Network Interconnect (DELNI), transceivers, repeaters, communications controllers, LAN bridge products, and communications servers.

Baseband 802.3/Ethernet Products



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Baseband 802.3/Ethernet Products

Standard Baseband 802.3/Ethernet Cable



Standard baseband 802.3/Ethernet cable is the main transmission medium of a baseband network. The cable is available in four lengths (sections), which can be joined using barrel connectors to create segments up to 500 meters (1,640 feet) long. Local area networks can be extended beyond 500 meters by adding repeaters. Refer to “802.3/Ethernet Configuration Guidelines” in Appendix A for more detailed information.

Features

- Standard baseband 802.3/Ethernet cable segments are premarked for transceiver placement at 2.5-meter (8.2-foot) intervals, providing easy installation.
- Plenum-rated coaxial cable is approved by the Underwriters’ Laboratory (UL) for safe use in environmental air spaces without a conduit.
- PVC-insulated coaxial cable offers a low-cost alternative to plenum-rated coaxial cable. PVC-insulated coaxial cable can be used in an open space, such as an office, laboratory, or manufacturing facility. PVC-insulated coaxial cable is not acceptable for use in environmental airspace that is used for return airflow because it produces toxic fumes if it burns.
- High immunity to electrical noise allows the coaxial cable to be used in a variety of environments.
- Pre-installed connectors on coaxial cable ends make terminators and barrel connectors easy to install.

Standard Baseband Cable Order Codes

Option	Order Code
Plenum-rated Coaxial Cable:	
23.4 m (76.8 ft) long	BNE2A-MA
70.2 m (230.3 ft) long	BNE2A-MB
117.0 m (383.9 ft) long	BNE2A-MC
500.0 m (1640.5 ft) long	BNE2A-ME
PVC Coaxial Cable:	
23.4 m (76.8 ft) long	BNE2B-MA
70.2 m (230.3 ft) long	BNE2B-MB
117.0 m (383.9 ft) long	BNE2B-MC
500.0 m (1640.5 ft) long	BNE2B-ME

Fiber Optic Cable



Digital recommends the use of 62.5/125 micron optical fiber for connecting all its fiber optic network products. This optical-fiber type is approved by the ANSI X3T9.5 committee as the recommended fiber type for FDDI applications. In addition, the EIA TR-41.8.1 committee is seriously considering this optical-fiber type for its building wiring standard.

The optical fiber specified for use in all cable constructions must be 62.5 micron core and 125 micron cladding, dual-window, graded-index profile, multimode glass-on-glass construction (EIA Class 1a).

<i>Optical Characteristics</i>	
Attenuation	2.8 to 3.5 dB/Km at 850 nm 0.8 to 1.5 dB/Km at 1300 nm
Bandwidth	Greater than 160 Mhz-Km at 850 nm Greater than 500 Mhz-Km at 1300 nm
Numeric Aperture	0.275 +/- 0.015 at 850 nm
Recommended Connector Type	ST-style

The ST-style connector, approved for FDDI applications, is generally a higher performing connector type than the traditional SMA-style. ST-to-SMA patch cable assembly is required when connecting current fiber optic LAN Bridges (DEBET) and fiber optic repeaters (DEREP) to ST-based cableplants. Future Digital fiber optic network products will utilize an ST-type connector.

Neither the cable nor the connectors are currently sold by Digital, but are readily available from leading fiber manufacturers, such as Siecorm Corporation, American Telephone & Telegraph Corporation, or their authorized distributors.

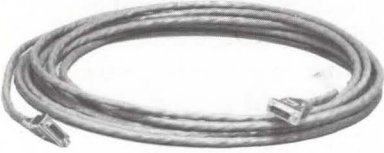
Transceiver Cable

A transceiver cable connects an 802.3/Ethernet transceiver or a Local Network Interconnect (DELNI) to an 802.3/Ethernet communications controller, broadband transceiver, or LAN Bridge 100. The cable is compatible with Ethernet and IEEE 802.3 networking products and consists of four twisted-pair wires enclosed in a shield and jacket of either plenum-rated or PVC (polyvinyl chloride). Plenum-rated cable is more expensive than PVC-insulated cable, but it can be used in environmental airspaces without an expensive conduit. PVC-insulated cable can be used in an open space, such as an office, laboratory, or manufacturing facility. PVC-insulated cable is not acceptable for use in environmental airspace because it produces toxic fumes if it burns.

Transceiver cable is available in several lengths (sections). Sections can be connected with built-in slide latches to form a single continuous link up to 50 meters (164 feet) long. The connection point for a transceiver cable section can be secured to a wall and hidden with the use of an Etherjack. Each transceiver cable has either a straight or right-angled 15-pin connector on both ends.

For standard 802.3/Ethernet baseband networks, use BNE3H, K, L, or M series cable.

Office Transceiver Cable



The office transceiver cable performs the same function as the transceiver cable but is smaller in diameter and more flexible. The office transceiver cable can be used in an open area (office, laboratory, or manufacturing area) instead of the heavier transceiver cable.

The office transceiver cable is available only with PVC insulation. It should not be connected to a standard baseband transceiver if the transceiver is located in environmental airspace. PVC-insulated cable is not acceptable in environmental airspace because it produces toxic fumes if it burns.

Office transceiver cable is available in two lengths (sections). Each office transceiver cable has either a straight or right-angled 15-pin connector on both ends. The connection of an office transceiver cable to a standard transceiver cable is simplified because both use the same connectors. The connection point can be secured to the wall base and hidden with the use of an Etherjack.

The office transceiver cable attenuation is greater than that of the PVC-insulated or plenum-rated transceiver cable by a factor of four (for example, two meters, or 6.6 feet, of office transceiver cable is electrically equivalent to eight meters, or 26.2 feet, of standard transceiver cable). Because office transceiver cables are not as long as standard transceiver cables, the distance between devices connected by office transceiver cables is less than the distance between connected standard transceiver cables.

For standard 802.3/Ethernet baseband networks, use BNE4C- or D-series cable.

Transceiver Cable and Office Transceiver Cable Order Codes

Option	Order Code
Transceiver Cable with PVC Insulation, Straight Connectors	Standard 802.3/Ethernet
5.0 m (16.4 ft) long	BNE3H-05
10.0 m (32.8 ft) long	BNE3H-10
20.0 m (65.6 ft) long	BNE3H-20
40.0 m (131.2 ft) long	BNE3H-40
Transceiver Cable with PVC Insulation, Right-angle Connectors:	
5.0 m (16.4 ft) long	BNE3K-05
10.0 m (32.8 ft) long	BNE3K-10
20.0 m (65.6 ft) long	BNE3K-20
40.0 m (131.2 ft) long	BNE3K-40
Transceiver Cable, plenum-rated with Straight Connectors:	
5.0 m (16.4 ft) long	BNE3L-05
10.0 m (32.8 ft) long	BNE3L-10
20.0 m (65.6 ft) long	BNE3L-20
40.0 m (131.2 ft) long	BNE3L-40
Transceiver Cable, plenum-rated with Right-angle Connectors:	
5.0 m (16.4 ft) long	BNE3M-05
10.0 m (32.8 ft) long	BNE3M-10
20.0 m (65.6 ft) long	BNE3M-20
40.0 m (131.2 ft) long	BNE3M-40
Office Transceiver Cable with PVC Insulation, Straight Connector:	
2 m (6.6 ft) long	BNE4C-02
5 m (16.4 ft) long	BNE4C-05
Office Transceiver Cable with PVC Insulation, Right-angle Connector:	
2 m (6.6 ft) long	BNE4D-02
5 m (16.4 ft) long	BNE4D-05

Standard 802.3/Ethernet Cable Connectors and Terminators



Digital sells standard 802.3/Ethernet baseband cable with connectors at each end of the cable. Standard Ethernet cables can be ordered in bulk, with end connectors purchased later.

End connectors cannot remain open. At each end connector, a barrel connector with another baseband cable or a terminator must be connected.

Barrel Connectors

Barrel connectors are used to directly join two sections of standard baseband cable. The barrel connector threads into the end connectors on the two cable sections.

Terminators

Terminators are used to electrically complete the ends of the standard baseband cable. A terminator must be installed at each end of a standard cable segment that is not connected to another standard cable segment.

Baseband 802.3/Ethernet Products

802.3/Ethernet Turnaround Connector

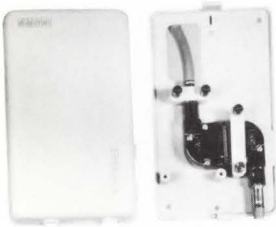
The 802.3/Ethernet turnaround connector is a testing device used to verify that a host controller at the user's station or a server controller and its transceiver cable are electrically operational.

The turnaround connector consists of a transceiver installed on a short length of coaxial cable. Both ends of the turnaround-connector coaxial cable are terminated. The turnaround connector is attached to the transceiver cable, which is connected to a host controller or to a server controller. The turnaround connector is used to verify host operation prior to the transceiver cable's actual installation on the baseband cable. The turnaround connector tests the controller and transceiver cable that connect it to the local area network.

The Etherjack (DEXJK) is a device for mounting cable connectors. Cables can be run either along a wallbase or within a wall.

The Etherjack can be used to secure the cable along the base of a wall, keeping the cable from the office floor area. The Etherjack also can be used to secure transceiver cables extending from transceivers so that they can be run down the inside of an office wall to the desired point of entry into the office area. A third use for the Etherjack is to cover unsightly connectors at the cable connection points within the office area.

Etherjack (DEXJK)



Baseband Cable Connector and Terminator Product Order Codes

Option	Order Code
Baseband cable barrel connector	12-19817-01
Baseband coaxial terminator	12-19816-01
Baseband ground clamp (available only from Digital Field Service)	12-21766-01
Baseband turnaround connector	H4080
Baseband transceiver cable straight connector kit	H4054-00
Baseband transceiver cable right-angle connector kit	H4055-00
Etherjack	DEXJK

Baseband IEEE 802.3/Ethernet Transceiver (H4005)



The H4005 is a non-intrusive tapping transceiver that provides a physical and electrical connection to a standard 802.3/Ethernet cable. The H4005 connects to the standard baseband cable via a removable tap assembly. This product complies with the IEEE 802.3 specification and can interface to both 802.3 and Ethernet station controllers. The H4005 contains the necessary electronics to send and receive signals at 10 Mb/s, detect the occurrence of collisions, and provide electrical isolation between the cable and the station.

Compatibility

The H4005 is compatible with all products except the DEREK, which requires the H4000 transceiver to connect to the standard 802.3/Ethernet cable.

Features

- IEEE 802.3 and Ethernet compatibility allows for flexible network configuring.
- The transceiver clamps onto the standard baseband cable without cutting it, allowing the unit to be installed, repaired, or removed without interrupting network operation.
- Simple installation and replacement procedures allow quick and easy network reconfiguration. Network devices can be added to or removed from the network easily.
- Redundant protective circuitry, high noise immunity and internal self-test make the H4005 a highly reliable physical channel, reducing maintenance cost.
- Heartbeat is enabled or disabled by a switch accessible from outside the unit.
- The continuous message loopback feature simplifies and speeds fault isolation, reducing maintenance time and cost.
- The U.L.-approved, rugged, insulated housing allows the H4005 to be installed in environmental airspace without conduits.

Installation in Environmental Airspace

Commercial buildings commonly have drop ceilings. The space between the drop ceiling and the floor above is called environmental airspace. Environmental airspace is often used for return air for heating and air conditioning systems (called return airspace) and to run wiring, such as coaxial cable. Equipment in return airspace can be a potential fire hazard because there is often no barrier to contain fire or smoke. Therefore, equipment that is not approved by U.L. must be placed in a conduit when installing it in return airspace.

Digital's plenum-rated cable and the H4005 are approved by the U.L. and National Electric Code (NEC) for use in environmental airspace without a conduit. (Canada, Europe, and GIA requirements may differ from those of NEC). However, local and state regulations always take precedence over U.L. approval.

Specifications

Physical Characteristics:

- Length: 3 in (8.7 cm)
- Width: 4 in (9.8 cm)
- Height: 1.5 in (3.7 cm)
- Weight: 10 oz.

Power Requirements:

- Voltage required at transceiver: 15.75 V at maximum distribution impedance of less than 4 ohms
- Maximum current: 0.5 amps
- Environment class: C

Ordering Information

Installation of the H4005 transceiver by the customer requires the Transceiver Installation Tool Kit, which includes all the components necessary to install the H4005.

Local Network Interconnect (DELNI)



H4005 Order Codes

Option	Order Code
802.3/Ethernet Transceiver	H4005
Transceiver Installation Tool Kit	12-24664-02

The Local Network Interconnect (DELNI) is a low-cost, tabletop device with its own power supply. It is a concentrator that allows up to eight Ethernet-compatible devices (not terminals) to be grouped together. Device performance remains constant whether a device is connected to the local area network through a transceiver or a DELNI.

The DELNI can be configured three ways: standalone, hierarchical standalone, and connected. A switch on the DELNI allows selection of either standalone or connected mode of operation.

The figure "DELNI Standalone Configuration" illustrates the standalone configuration that supports up to eight systems using standard transceiver cables.

The figure "DELNI Hierarchical Standalone Configuration" illustrates the hierarchical standalone configuration that supports a combination of DELNIs and devices using standard transceiver cables. Hierarchical standalone configurations are not connected to standard baseband cable.

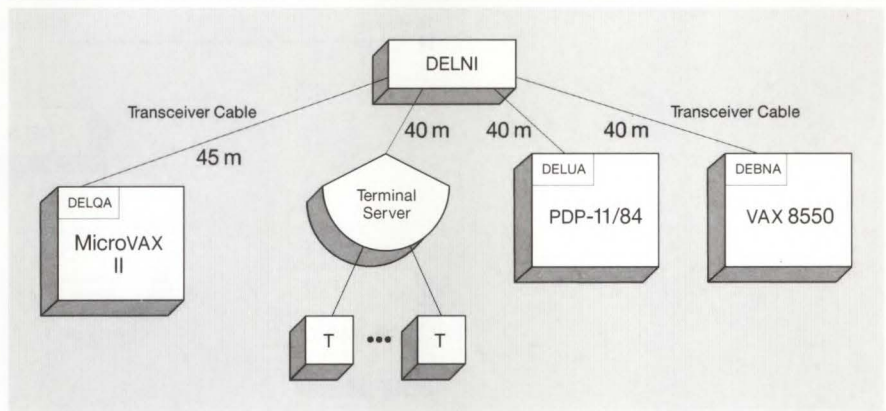
The figures "DELNI Connected Configuration" and "DELNI Hierarchical Connected Configuration" illustrate connected configurations that support up to eight devices using transceiver cable. These configurations are connected to standard baseband cable via transceivers and transceiver cable. For specific distance requirements, refer to "802.3/Ethernet Configuration Guidelines" in Appendix A.

The DELNI can also be used in ThinWire configurations to concentrate up to eight ThinWire repeaters. Refer to "ThinWire 802.3/Ethernet Products" in this section for more information.

Features

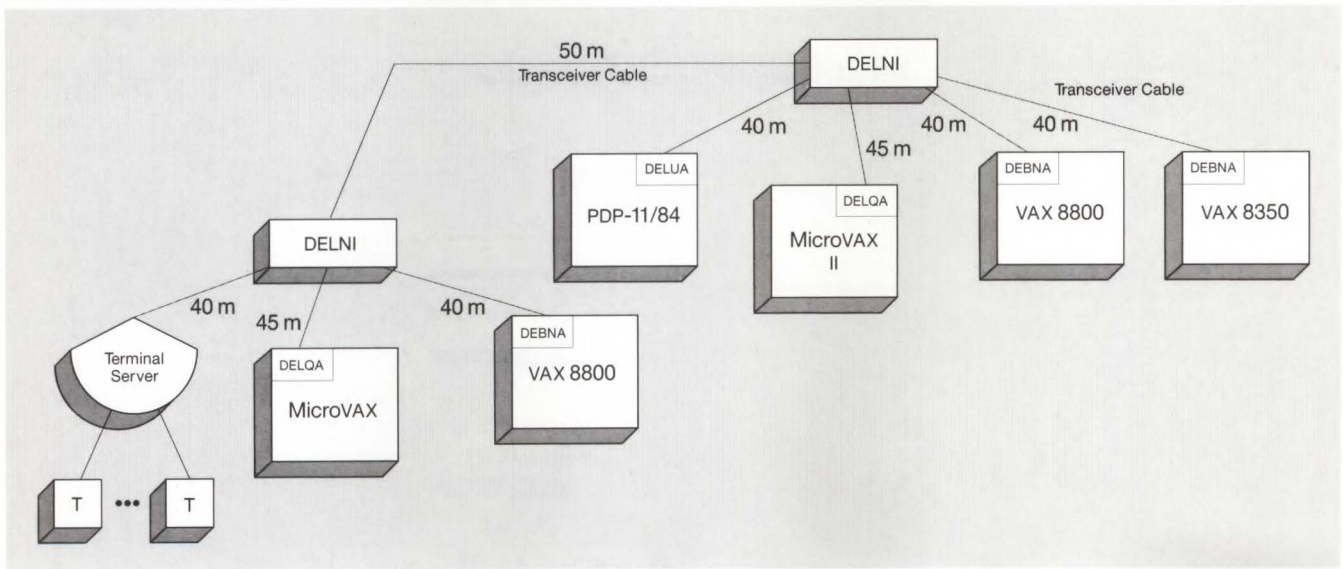
- A connected DELNI LAN reduces the cost of multiple connections to standard baseband cable. It also allows more than 100 devices to be connected to a single 500-meter coaxial cable segment.
- The standalone and hierarchical standalone DELNI LAN configurations eliminate the need for standard baseband cable and transceivers in very small networks.
- Transceiver cable wiring to a centrally located DELNI offers wiring configuration flexibility.
- The DELNI can be installed by customers, reducing installation cost.
- A standalone/connected mode switch allows a user to change from the connected configuration to the standalone configuration. This allows for the temporary isolation of traffic in the DELNI subnet for security or for performance testing.

DELNI Standalone Configuration



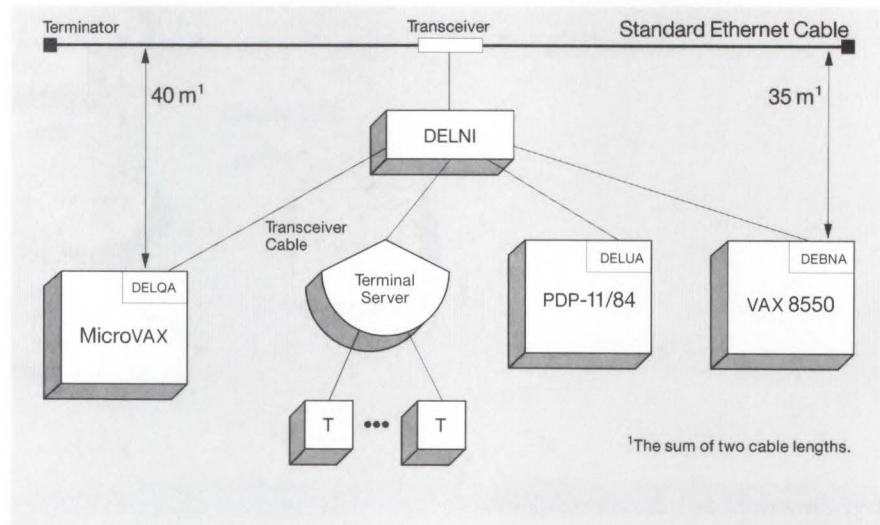
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DELNI Hierarchical Standalone Configuration



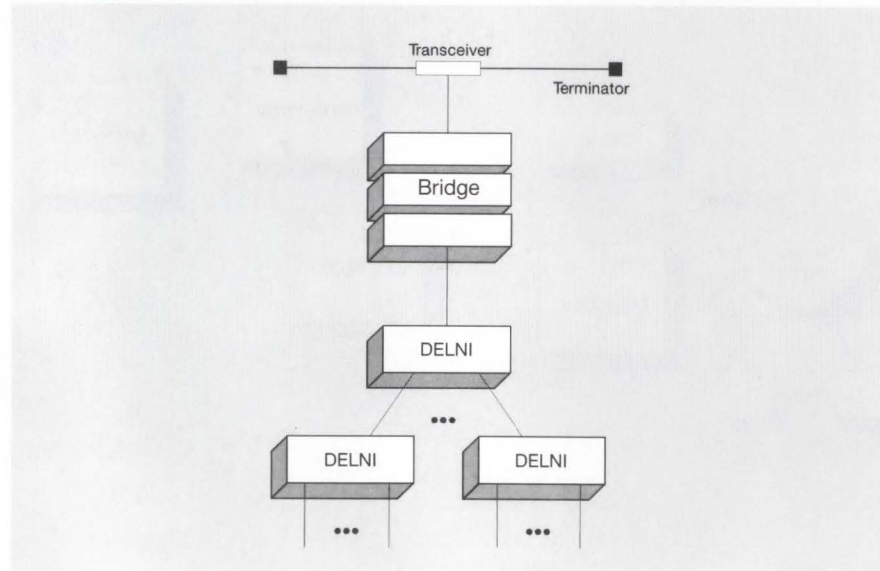
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DELNI Connected Configuration



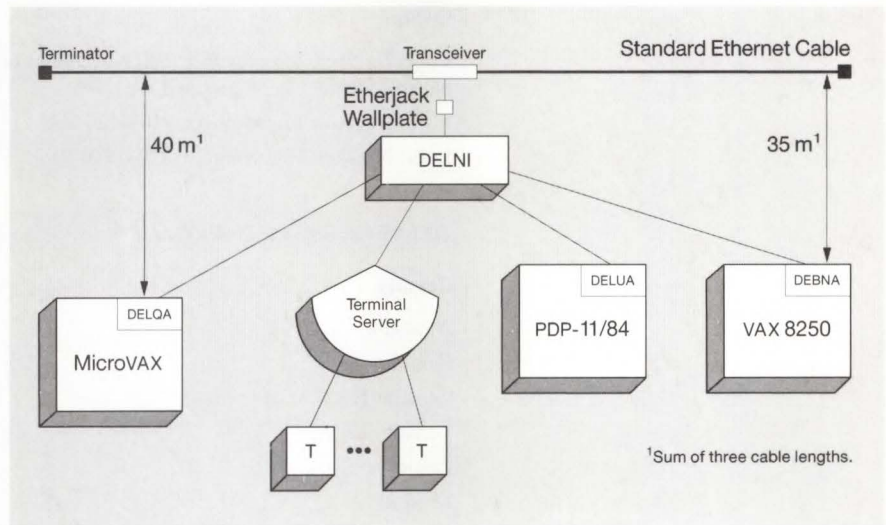
NBG-137-01

DELNI Hierarchical Connected Configuration



NBG-138-00

DELNI Connected Configuration Using an Etherjack



NBG-139-01

Specifications

Physical Characteristics:

- Length (rackmount): 44.5 cm (17.5 in)
- Length (with cover): 48.9 cm (19.25 in)
- Width (rackmount): 17.8 cm (7.0 in)
- Width (with cover): 19.7 cm (7.75 in)
- Height (rackmount): 6.4 cm (2.5 in)
- Height (with cover): 8.9 cm (3.5 in)
- Weight: 6.4 kg (14.0 lb)

Power Requirements:

- Switch-selectable: 120 V or 240 V, 47 to 63 Hz
- ac watts drawn: 26
- Inrush Currents: 1.0 amps at 120 V; 0.5 amps at 240 V
- Surge Currents: 2 amps for 5 cycles at 120 V; 1 amp for 5 cycles at 240 V

Environmental Class: C (Refer to Appendix B for details.)

Ordering Information

Order the DELNI and, if required, a country kit.

Each node connected to a DELNI requires an 802.3/Ethernet communications controller and transceiver cable. DELNI-connected configurations require a transceiver and transceiver cable.

Non-U.S. versions of the DELNI require a country kit. (The U.S. version does not require a country kit.) Each kit contains installation instructions and a power cord. For countries not listed, select a country kit that uses the same plug configuration.

Baseband 802.3/Ethernet Products

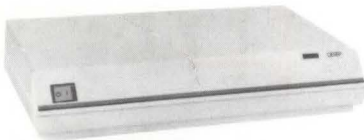
DELNI Order Codes

Option	Order Code
Local Network Interconnect (DELNI), allows up to eight network devices to be grouped together.	
Local Network Interconnect, 110—120 Vac	DELNI-BA
Local Network Interconnect, 220—240 Vac	DELNI-BB

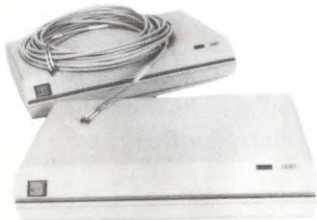
DELNI Country Kit Order Codes

Country	Order Code
Australia	DELNK-AZ
Belgium	DELNK-AB
Canada (English)	DELNK-AQ
Canada (French)	DELNK-AC
Denmark	DELNK-AD
Finland	DELNK-AF
France	DELNK-AP
Holland	DELNK-AH
Italy	DELNK-AI
Norway	DELNK-AN
Spain	DELNK-AS
Sweden	DELNK-AM
Switzerland (German)	DELNK-AL
Switzerland (French)	DELNK-AK
United Kingdom	DELNK-AE
United States	Not required
West Germany	DELNK-AG

Ethernet Repeaters (DEREP)



*Local Ethernet Repeater
(DEREP-AA)*



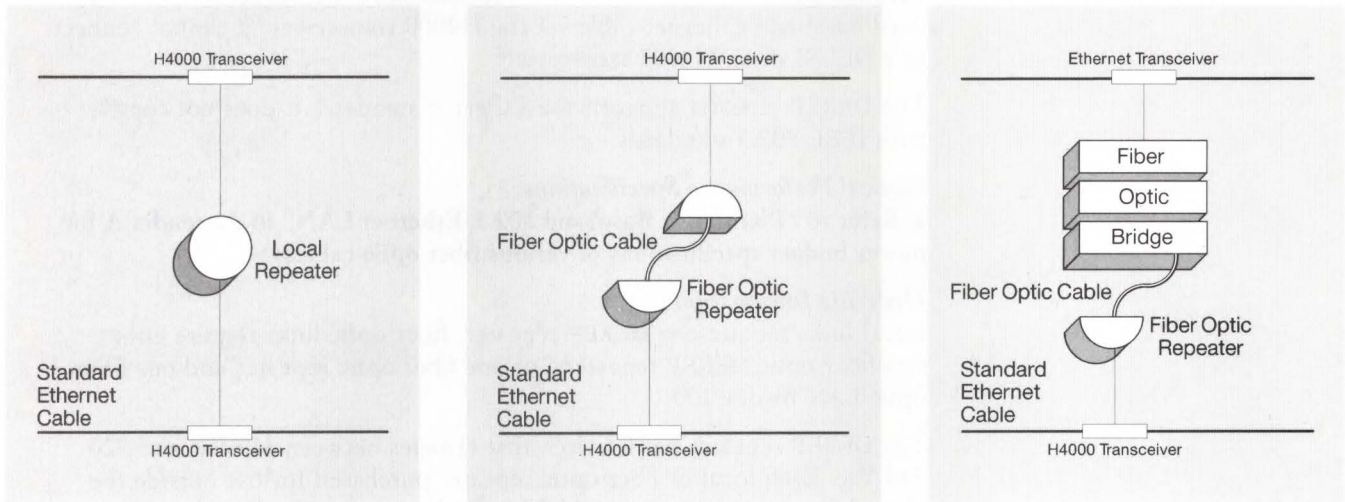
*Fiber Optic Ethernet Repeater
(DEREP-RH)*

The standard baseband Ethernet repeater (DEREP) is a tabletop, standalone device that connects two segments of standard baseband Ethernet cable, extending an Ethernet LAN beyond the 500-meter (1,640 feet) single-cable limit. Each repeater can connect two segments of standard Ethernet cable, each up to 500 meters (1,640 feet) long with as many as 99 additional Ethernet transceivers installed. (The DEREP uses one transceiver space.) The repeater retimes, amplifies, and repeats all signals it receives from one cable segment and passes the signal to the next segment.

The DEREP repeater is offered in two versions, local and fiber optic. The local DEREP repeater connects two standard baseband Ethernet segments via transceiver cables and H4000 transceivers. The fiber optic version interfaces one transceiver cable and a fiber optic link, which must connect to either another fiber optic DEREP repeater or a fiber optic LAN Bridge 100. (For more information on the LAN Bridge 100, refer to "Extended 802.3/Ethernet Local Area Networks" in this section.)

The local repeater connects two standard cable segments that are up to 100 meters (328 feet) apart. Two fiber optic repeaters connect two standard cable segments that are up to 1,100 meters (3,600 feet) apart via a fiber optic link. The fiber optic repeater/bridge combination connects cable segments up to 1,500 meters (4,920 feet) apart via fiber optic link.

Local and Fiber Optic DEREPE Configurations



NBG-140-01

Features

- Connects segments of standard Ethernet cable, increasing the length of an Ethernet LAN and the number of devices supported.
- Can be installed and maintained by the customer, thus reducing cost.
- Contains an internal self-test feature that simplifies fault isolation, increases reliability, and reduces maintenance costs.
- The fiber optic repeater is not affected by electrical or electromagnetic interference and is protected from moisture, providing high performance and low error rates. The fiber optic repeater can be used between buildings, underground, and in harsh environments.
- When the repeater detects faulty signals, it automatically stops repeating them until good signals are detected again, at which point it resumes normal signal transmission. This greatly increases network reliability.
- Diagnostic light-emitting diodes (LEDs) on the back panel of both the local and fiber optic repeater assist in network troubleshooting.
- A second local repeater can be configured into the network providing automatic backup for any local repeater, increasing network availability.

Specifications

Physical Characteristics

Length	43.2 cm (17 in)
Width	30.5 cm (12 in)
Height	8.9 cm (3.5 in)

Environmental Class

C (Refer to Appendix B for details.)

Qualifications

A message transmitted on a local area network must pass through no more than two repeaters (DEREP, DEMPR, or DESPR) before either reaching its destination or passing through a LAN Bridge.

Baseband 802.3/Ethernet Products

The DEREPEP repeater cannot be used in broadband Ethernet networks or between baseband and broadband Ethernet networks. It connects to standard baseband Ethernet cable via the H4000 transceiver; it cannot connect to a DELNI or an H4005 transceiver.

The DEREPEP repeater supports the Ethernet standard; it does not comply with IEEE 802.3 standards.

Optical Performance Specifications

▲ Refer to "Planning a Baseband 802.3/Ethernet LAN" in Appendix A for power budget specifications of various fiber optic cables.

Ordering Information

Local links require one DEREPEP repeater; fiber optic links require either two fiber optic DEREPEP repeaters, or one fiber optic repeater and one fiber optic LAN Bridge 100.

The DEREPEP repeater has a switch that changes between 110 Vac and 220-240 Vac. Each local or fiber optic repeater purchased for use outside the United States requires a country kit, which contains installation instructions and a power cord. (Versions for use within the United States do not require a country kit.) For countries not listed, select a kit that uses the same plug configuration.

Transceivers, transceiver cables, and fiber optic cable must be ordered separately. ▲ Refer to this section and to "Communications Cables" in Section 3 for more information.

DEREP Order Codes

Option	Order Codes
Local repeater for United States. Includes installation instructions in English and 110-Vac power cord. Does not require a country kit.	DEREP-AA
Local repeater for non-U.S. countries. Requires a country kit.	DEREP-AB
Fiber optic repeater for United States. Includes installation instructions in English and a power cord. Does not require a country kit.	DEREP-RH
Fiber optic repeater for non-U.S. countries. Requires a country kit.	DEREP-RJ
Ethernet transceiver for use with DEREPEP Ethernet repeater.	H4000
Upgrade kit to convert older-model DEREPEP-RC/RD to DEREPEP-RH/RJ. Includes field service installation. One version for 110 and 220-240 Vac. (Does not convert DEREPEP-AA or DEREPEP-AB.)	FOAED-AA

Baseband 802.3/Ethernet Products

DEREP Country Kit Order Codes

Country	Local Repeater	Fiber Optic Repeater
Australia	DEREK-AZ	DEREK-RZ
Belgium	DEREK-AB	DEREK-RB
Canada (English)	DEREK-AQ	DEREK-RQ
Canada (French)	DEREK-AC	DEREK-RC
Denmark	DEREK-AD	DEREK-RD
Finland	DEREK-AF	DEREK-RF
France	DEREK-AP	DEREK-RP
Holland	DEREK-AH	DEREK-RH
Italy	DEREK-AI	DEREK-RI
Norway	DEREK-AN	DEREK-RN
Spain	DEREK-AS	DEREK-RS
Sweden	DEREK-AM	DEREK-RM
Switzerland (German)	DEREK-AL	DEREK-RL
Switzerland (French)	DEREK-AK	DEREK-RK
United Kingdom	DEREK-AE	DEREK-RE
United States	None required	None required
West Germany	DEREK-AG	DEREK-RG

ThinWire 802.3/Ethernet cable delivers 10 Mb/s 802.3/Ethernet speed to the desk, work area, and local area systems for connecting PCs, workstations, and computing systems.

ThinWire cabling and connection products are designed to the IEEE 802.3 specification for Ethernet, which provides a simple, inexpensive and flexible means of attaching devices to the local area network by using industry-standard cable and BNC-type connectors.

ThinWire 802.3/Ethernet Cable



ThinWire cable is a thin, flexible, and easy to install coaxial cable compatible with standard baseband cable. These qualities make it very suitable for horizontal connections of devices on a work area floor, and for connecting local work areas to satellite equipment rooms.

In comparison, standard baseband cabling is recommended for vertical or horizontal connection between satellite equipment rooms or work group areas because it can cover long distances (500 meters compared to 185 meters for ThinWire) and has superior EMI/RFI resistance. These qualities make standard baseband cabling very suitable for connecting satellite equipment rooms on facility floors and between floors.

Features

- ThinWire products are compatible with the IEEE 802.3 specification that allows users greater capability to participate in multivendor Ethernet networks.
- The maximum length of a ThinWire segment is 185 meters. Thirty devices can be connected to a single segment by daisy-chained connections. When a ThinWire Ethernet repeater is used, 29 stations may be connected to each segment of ThinWire cable.
- Non-ThinWire 802.3/Ethernet (A.U.I. type) devices are connected to ThinWire using a ThinWire Ethernet station adapter (DESTA), a compact inexpensive IEEE 802.3 transceiver.
- A ThinWire segment consists of sections linked together by BNC T-connectors. The bottom of the "T" is inserted either into a DESTA, which is then connected to the station, or into an 802.3/Ethernet communications controller that supports a BNC connector. T-connectors must be a minimum of 0.5 meter apart.
- A maximum of eight ThinWire segments can be connected to a ThinWire Multiport Repeater (DEMPR) to form a network of up to 232 stations. A Local Network Interconnect (DELNI) can be used to concentrate up to eight DEMPRs. These configurations can either stand alone or connect to standard baseband cable using an H4005 (or H4000-BA) transceiver.
- The Ethernet limit of 1,023 devices can be configured in a single ThinWire 802.3/Ethernet network.

ThinWire 802.3/Ethernet Cable Order Codes

Option	Order Code
PVC cable with connectors and boots:	
6 feet	BC16M-06
15 feet	BC16M-15
30 feet	BC16M-30
ThinWire PVC cable (1,000 ft)	H8243-A
ThinWire plenum-rated cable (1,000 ft)	H8244-A
Male coaxial connectors and boots	H8222
T-connectors and boots	H8223
Barrel connectors and boots	H8224
Terminators and boots	H8225
Installation kit	H8242

ThinWire Ethernet Multiport Repeater (DEMPR)

The ThinWire Ethernet multiport repeater (DEMPR) provides eight ports for connection of eight ThinWire 802.3/Ethernet segments, and one port for connection to standard baseband cable. It can be used as a standalone device, called a local DEMPR configuration, or connected to standard baseband cable, called a global DEMPR configuration. The DEMPR retimes, amplifies, and repeats signals between each of its nine ports. A DEMPR must be counted as a repeater when configuring a standard baseband 802.3/Ethernet network.

Each ThinWire segment can be up to 185 meters long (606 feet), and can accommodate connection of up to 29 stations, for a total of 232 stations per DEMPR.

Up to eight DEMPRs can be connected to a Local Network Interconnect (DELNI). This configuration provides up to 64 cable segments for connecting as many as 1,023 stations (Ethernet limit). This configuration, in turn, can be used in a standalone network or connected to standard baseband 802.3/Ethernet cable.

The ThinWire Ethernet singleport repeater (DESPR) connects a single ThinWire segment to a standard 802.3/Ethernet network. The ThinWire segment can be up to 185 meters long (606 feet), and can accommodate up to 29 stations.

The DESPR singleport repeater connects to standard baseband 802.3/Ethernet cable using a standard baseband transceiver, or via a DELNI. The DESPR must be counted as a repeater when configuring a standard baseband 802.3/Ethernet network.

Qualification

A message transmitted on a local area network must pass through no more than two repeaters (DEREP, DEMPR, or DESPR) before either reaching its destination or passing through a LAN Bridge.

ThinWire Ethernet Singleport Repeater (DESPR)

ThinWire 802.3/Ethernet Products

DEMPR/DESPR Specifications

Physical Characteristics	-AA Models	-BA Models
Length	31.11 cm (12.25 in)	
Width	48.9 cm (19.25 in)	
Height	11.43 cm (4.5 in)	
Power Requirements		
Nominal Voltage	100 to 120 Vac 3-wire single phase	189 to 240 Vac 1 N-PE single phase
Frequency	47 to 63 Hz	47 to 63 Hz
Maximum current	0.83 Amp	0.42 Amp
Maximum power	40 watts	40 watts
Operating Environment	5 °C to 50 °C (41 °F to 122 °F)	
Relative Humidity	10% to 90% (noncondensing)	

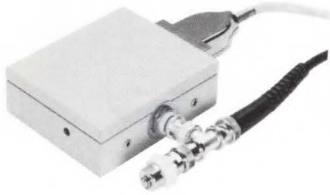
DEMPR/DESPR Order Codes

Option	Order Code
ThinWire Ethernet Multiport Repeater, 120 V. Includes power cord.	DEMPR-AA
ThinWire Ethernet Multiport Repeater, 240 V. Requires power cord.	DEMPR-AB
ThinWire Ethernet Singleport Repeater, 120 V. Includes power cord.	DESPR-AA
ThinWire Ethernet Singleport Repeater, 240 V. Requires power cord.	DESPR-AB

DEMPR/DESPR Power Cord Order Codes

Country	Order Code
United Kingdom, Ireland	BN02A-2E
Austria, Belgium, Finland, France, Germany, Netherlands, Norway, Portugal, Spain, Sweden	BN03A-2E
Switzerland	BN04A-2E
Australia, New Zealand	BN05A-2E
Denmark	BN06A-2E
Italy	BN07A-2E

ThinWire Ethernet Station Adapter (DESTA)



The ThinWire Ethernet Station Adapter (DESTA) converts a standard 15-pin A.U.I. station to ThinWire cabling. The station adapter can be attached to standard-cable Ethernet controllers, allowing UNIBUS, Q-bus, VAXBI, DECsystem-20, and other devices to connect to ThinWire. It also allows Digital's 802.3/Ethernet communications controllers and terminal servers to connect to ThinWire.

The DESTA has one 15-pin connector port that allows it to be mounted in or near the 802.3/Ethernet station, and a second port for connection to the ThinWire cable. It contains 802.3/Ethernet transceiver circuitry and provides transceiver functions. The DESTA is very compact, and is powered from the controller.

Specifications

Physical Characteristics:

- Length: 7.62 cm (3.0 in)
- Width: 8.38 cm (3.3 in)
- Height: 3.55 cm (1.4 in)

Power Requirements:

- Input voltage (from controller): +12 V
- Voltage required at transceiver: -9 V
- Maximum Current: 250 mA
- Typical Current: 200 to 250 mA

Environmental Class: C (Refer to Appendix B for details.)

DESTA Order Code

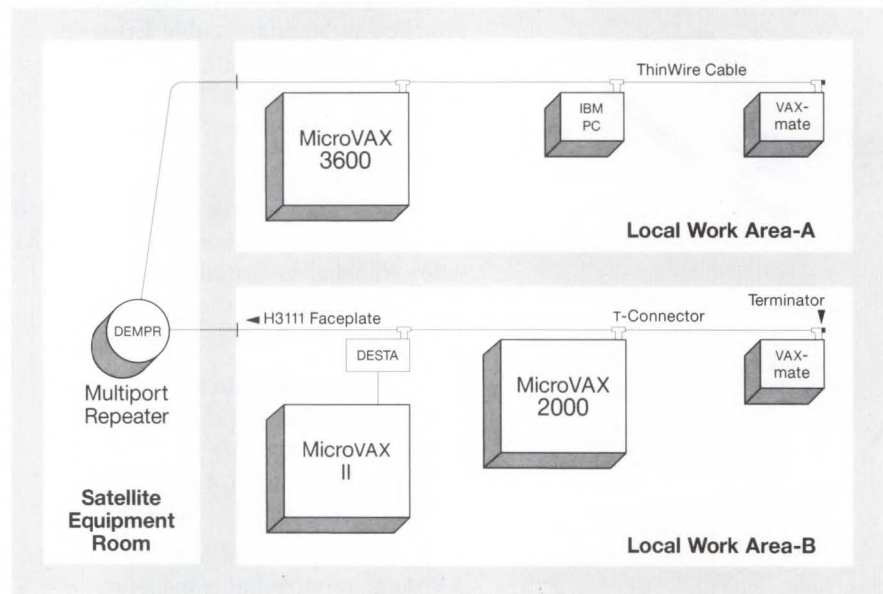
Option	Order Code
ThinWire Ethernet Station Adapter	DESTA-AA

DECconnect ThinWire Configurations

The DECconnect communications system recommends an installation that includes ThinWire coaxial cable and two twisted-pair cables (one for DEC423 and one for the telephone) distributed in a radial topology from a local work area to a satellite equipment room. The ThinWire cable extends, without interruption, from a DEMPR in the satellite equipment room to an H3111 faceplate in the local work area, and then to PCs, workstations, or systems. Devices in the local work area can be daisy-chained on the ThinWire segment using T-connectors and DESTAs. The ThinWire cable attaches to the faceplate with a BNC connector. The total length of a ThinWire cable segment from DEMPR to farthest work area device is 185 meters.

Standalone (Local) Configuration

In standalone or local configurations, a multiport repeater (DEMPR) acts as a hub. Up to eight ThinWire segments run from the DEMPR to the local work areas without interruption. In the local work area, ThinWire cables connect to PCs, workstations, and low-end systems. The DEMPR connects devices from up to eight local work areas in this configuration. The DEMPR also isolates faults in a segment, keeping the rest of the segments in operation. The following figure illustrates a standalone configuration in local work areas.

DECconnect ThinWire Standalone Configuration (Local DEMPR Configuration)

NBG-141-01

A larger standalone network can be formed by connecting up to eight DEMPR hubs to a Local Network Interconnect (DELNI). This configuration can service up to 64 local work areas.

Connected (Global) Configurations

In connected or global configurations, multiple standalone configurations are connected to standard baseband 802.3/Ethernet cable. A DEMPR with up to eight ThinWire segments can be connected to the standard baseband cable using a standard baseband transceiver. This configuration provides standard baseband 802.3/Ethernet service for up to eight local work areas. (A single ThinWire segment with up to 29 stations may be connected to standard baseband cable using a DESPR.)

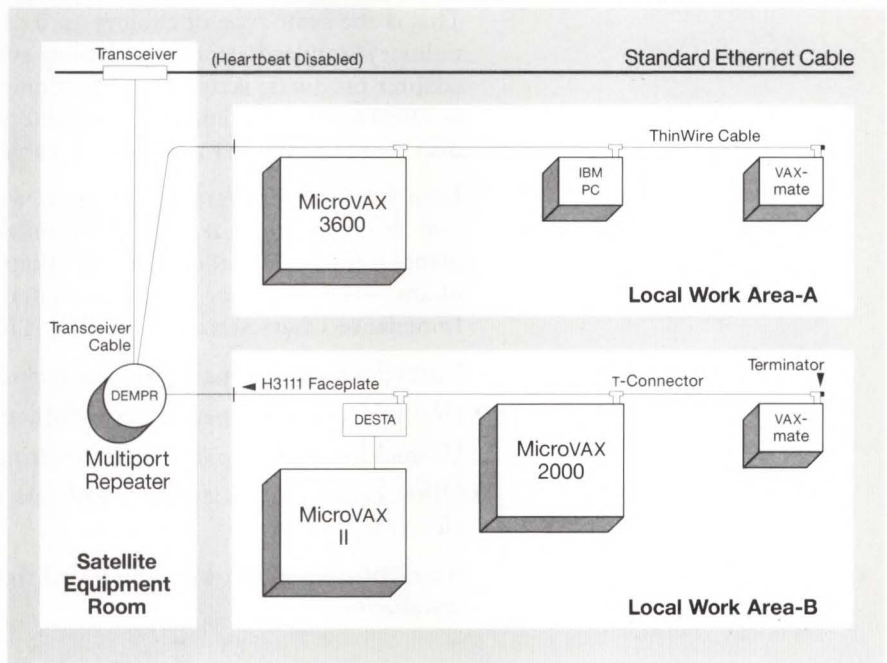
A DELNI with up to eight attached DEMPRs/DESPRs must be connected to standard baseband cable using an H4005 (or H4000-BA) transceiver. This configuration provides standard 802.3/Ethernet service for up to 64 local work areas.

When a DELNI/DEMPR combination is connected to a standard baseband cable segment, the following restrictions apply:

- The standard segment must be less than 300 meters.
- Connection to other standard segments must use a LAN Bridge (DEBET) only.

When connected to standard baseband cable, the DEMPR or DESPR counts as a repeater in the configuration. A message transmitted on a local area network must pass through no more than two repeaters (DEREP, DEMPR, or DESPR) before either reaching its destination or passing through a LAN Bridge.

DECconnect ThinWire Connected Configuration (Global DEMPR Configuration)



NBG-142-01

Unshielded twisted-pair 802.3/Ethernet products provide full 10 Mb/s Ethernet capability over telephone-type unshielded twisted-pair cabling. This is the same type of cabling used in DECconnect and many other industry-standard structured cabling systems. Through the use of passive adapter products, active ThinWire components, such as the DEMPR, DESPR or DESTA, can be connected to desktop computers and low-end systems over most unshielded twisted-pair cable.

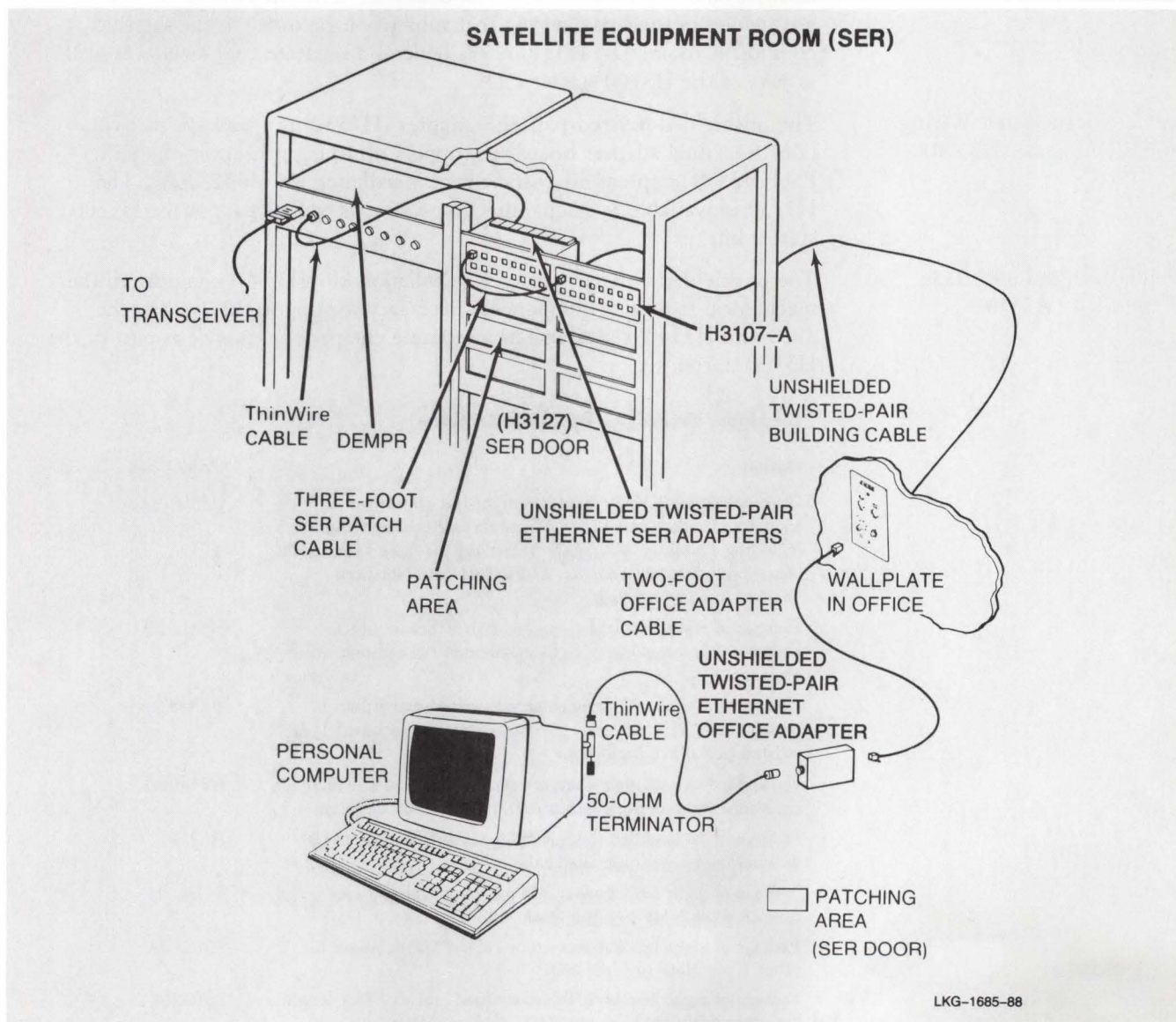
Each twisted-pair segment can be up to 70 meters long from SER to station. It is recommended that all installed unshielded twisted-pair cabling planned for 802.3/Ethernet applications should be tested before installation of any 802.3/Ethernet products. Digital Field Service can provide Line Impedance Characterization Testing (LICT) on a custom quotation basis.

Unshielded twisted-pair products include

- Unshielded twisted-pair Ethernet office adapter.
- Unshielded twisted-pair Ethernet wiring closet/SER adapter.
- Office cables from adapter to wallplate and cables from DEMPR to wiring closet/SER adapter.

An eight-user starter kit includes all the components above plus a rack installation kit.

Table 2.21 Unshielded Twisted-pair Configuration



Unshielded Twisted-pair Starter Kit (H3300)

The unshielded twisted-pair starter kit (H3300) provides all the required components to connect eight offices to a DEMPR via unshielded twisted-pair cabling. These components include one H3310, one H3330, one H3340, and all necessary cabling.

Unshielded Twisted-pair 802.3/Ethernet Products

Unshielded Twisted-pair Ethernet Office Adapter (H3310)

The unshielded twisted-pair Ethernet office adapter (H3310) is a package of eight passive adapters that allow 802.3/Ethernet stations to connect to unshielded twisted-pair wiring that runs from the office to the satellite equipment room. The H3310 is available as a separate component, as well as part of the H3300 starter kit.

Unshielded Twisted-pair Wiring Closet/SER Adapter (H3330)

The unshielded twisted-pair SER adapter (H3330) is a package that contains four dual adapter boards to support up to eight users in the SER. Four H3330 adapters fill a single rack installation kit for 32 users. The H3330 is available as a separate component, as well as part of the H3300 starter kit.

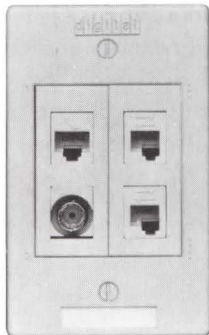
Unshielded Twisted-pair Rack Installation Kit (H3340)

The unshielded twisted-pair rack installation kit (H3340) contains all the mechanical mounting components necessary to support 32 users in the SER. The H3340 is available as a separate component, as well as part of the H3300 starter kit.

Unshielded Twisted-pair Product Order Codes

Option	Order Code
Unshielded twisted-pair Ethernet eight-line starter kit. Includes all office and SER components and cabling options, including ThinWire SER patch cables, and all three varieties of office cables for DECconnect, AT&T, IBM, and Northern Telecom cabling systems.	H3300-AA
Package of eight unshielded twisted-pair Ethernet office adapters. (Accommodates eight unshielded twisted-pair office segments.)	H3310-AA
Package of four dual-line unshielded twisted-pair Ethernet wiring closet/SER adapters. (Accommodates eight unshielded twisted-pair office segments.)	H3330-AA
Unshielded twisted-pair Ethernet rack installation kit. Includes enclosure and mounting hardware for H3330 SER adapters.	H3340-AA
Package of 50 modified modular plug (MMP) connectors for terminating twisted-pair segments.	H8226
Package of eight DECconnect SER patching cables, 3-foot length for SER 6-pin MMP to 6-pin MMP.	BS16Q-03
Package of eight DECconnect office cables, 1-foot length for office 6-pin MMP to 6-pin MMP.	BS16R-02
Package of eight Northern Telecom office cables, 2-foot length for office 6-pin modular plug (MP) to 6-pin MMP	BS16S-02
Package of eight AT&T, IBM office cable, 2-foot length for office 8-pin MP to 6-pin MMP	BS16U-02
Package of eight ThinWire SER/OCC patch cables, 8-foot length.	BS16K-08

DECconnect Modular Faceplate (H3111-C)



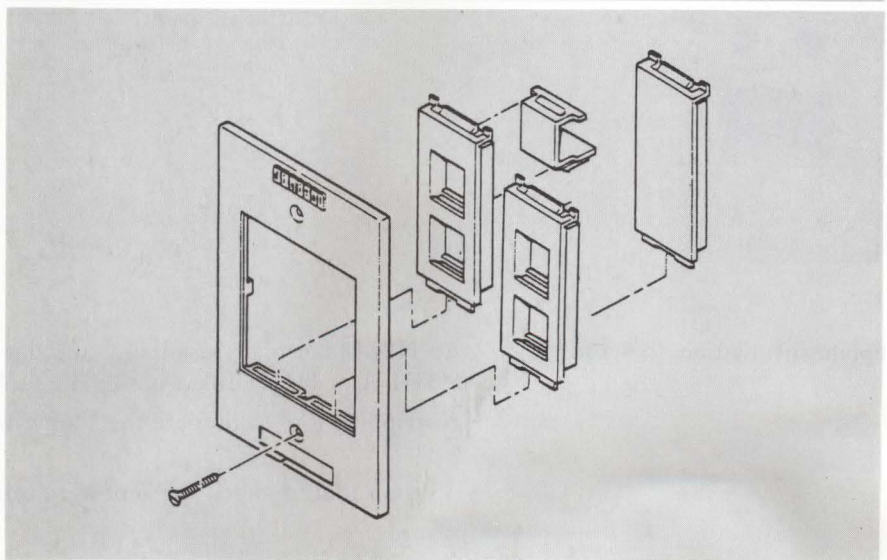
Fully Configured Modular Faceplate

DECconnect faceplate products can be used in new installations or as replacement products. The faceplates come with plugs to cover any unused openings; the desired connectors are chosen separately. The modular phone jack and modified modular data jack are the same size: A customer can use two telephones or two data connectors, rather than one of each.

The DECconnect modular faceplate (H3111-C) supports a choice of faceplate connectors by accommodating virtually any combination of low-speed data (terminals), 802.3/Ethernet (PCs/Workstations) and/or multiple voice connections, up to a total of four “snap-in” connectors per faceplate. This flexibility allows customers to support many combinations of data and voice applications to meet at a single faceplate.

The Modular Faceplate is a frame that accepts any combination of two types of inserts, blank or double opening. These inserts are then “snap-mounted” into the faceplate frame. The inserts in turn accept any of the traditional “snap-in” connectors including the modular jack (MJ) for telephones and modified modular jack (MMJ) for low-speed data transmissions. A snap-in BNC (ThinWire) connector is available for the faceplate. The faceplate provides total flexibility in that multiple voice and data connections can be supported from the same faceplate, and a single, flexible configuration of telephone, unshielded twisted-pair and ThinWire can be wired from every faceplate to accommodate the needs of a single office user.

H3111-C Modular Faceplate



Features

- Modular, snap-in design allows faceplate to meet individual requirements.
- Easy, installation simplifies moves, adds, and changes.
- The faceplate, designed to an industry-standard form factor, does not require custom wall boxes, and allows for the use of standard in-the-wall electrical boxes, single- or dual-gang and side-by-side mounting of multiple faceplates.

DECconnect Faceplate Products

Ordering Information

The modular faceplate is sold in kits of eight individually packaged faceplates. Each package contains the faceplate plus three inserts (one blank and two doubles) to allow any combination of one-to-four snap-in connectors. Connectors are purchased separately.

Surface-mount Faceplate



The H3111-A is a combination surface-mount box and faceplate, self-enclosed for mounting to the walls of modular furniture, concrete walls, or walls where internal cabling is prohibited. It is cabled in a similar fashion to the H3111-B except that cables run to the box from a raceway or along the floor, depending on the type of furniture and panels installed. The cables enter the box from the top or bottom, rather than from behind, and the box is mounted to the wall or furniture with double-sided tape or magnets (included).

Flush-mount Faceplate



The H3111-B is a flat, flush-mount faceplate that provides connection to standard receptacle boxes that are a minimum of three inches deep and installed in the wall. It mounts with two screws (included) to the pre-installed wall box after installation of the appropriate cables.

Faceplate Installation Tool Kit

An H8242 faceplate installation tool kit is required to install either the H3111-A or H3111-B faceplate. The tool kit includes the following:

- A stripping tool to prepare the ThinWire before attaching the BNC connector
- A crimp tool to attach the ThinWire cable to the back of the BNC connector
- A punch-down tool to attach the twisted-pair cable to the back of the modified modular jacks (MMJ) and modified jacks (MJ)
- A socket wrench to attach the BNC connector and the F connector to the faceplate
- Loopback connectors for testing

At least one tool kit is required per facility, but it is recommended to have at least one tool kit for every 100-120 faceplates. (This figure is based on the size of the facility and the need for multiple installation resources: It is not based on the life expectancy of the tool.)

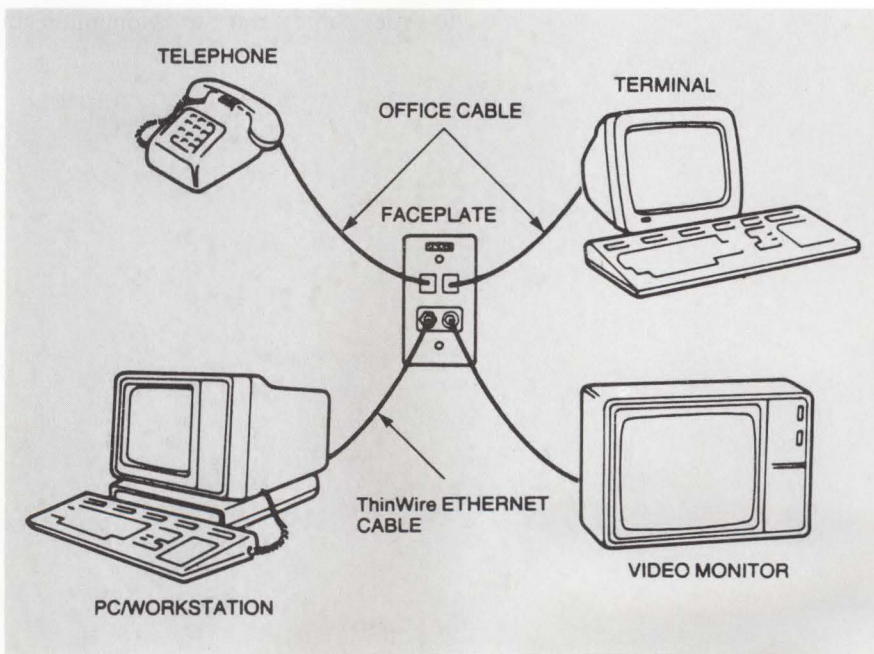
DECconnect Faceplate Products

Faceplate Jacks and Connectors

DECconnect jacks and connectors are used to customize the faceplate to provide essential network connections in office or other work areas. Jacks and connectors are available for four connections:

- High-speed data over ThinWire Ethernet using a BNC connector (H3114), for use with the H3111-A or H3111-B faceplates
- Low-speed data with DEC423 (EIA-423-A) signaling using a modified modular jack (H3111-A) for use with H3111-A or H3111-B faceplates
- Voice connection combined with the PBX vendor of choice using one of three modular jacks (H3112-A, H3112-B, or H3112-D) for use with the H3111-A or H3111-B faceplates. The H3112-A jack supports AT&T wiring, the H3112-B jack supports a Northern Telecom PBX or Rolm PBX, and the H3112-D is a universal 8-pin modular jack that accommodates other PBXs. They can be snapped into the faceplate along with the H3113 for the DEC423 wiring.
- Video connection using a standard F video connector (H3115) for use with the H3111-A or H3111-B faceplates

Office Faceplate Configuration



DECconnect Faceplate Products

Faceplate Product Order Codes

Option	Order Code
DECconnect surface-mount faceplates, package of eight	H3111-A
DECconnect flush-mount faceplates, package of eight	H3111-B
DECconnect modular faceplates, package of eight	H3111-C
Modular jacks for AT&T connection, package of eight	H3112-A
Modular jacks for Northern Telecom, Rolm PBX connections, package of eight	H3112-B
Modular jacks for universal telephone connections, package of eight	H3112-D
Modified modular jacks for EIA-423-A signaling, package of eight	H3113-A
Modified modular jacks for H3107-A only, package of eight	H3113-B
ThinWire Ethernet BNC bulkhead faceplate connectors, package of eight	H3114-AB
F-style video connector, package of eight	H3115
Faceplate installation tool kit	H8242

To order cables, refer to "Communications Cables" in Section 3.



H8571-A



H8571-B



H8572

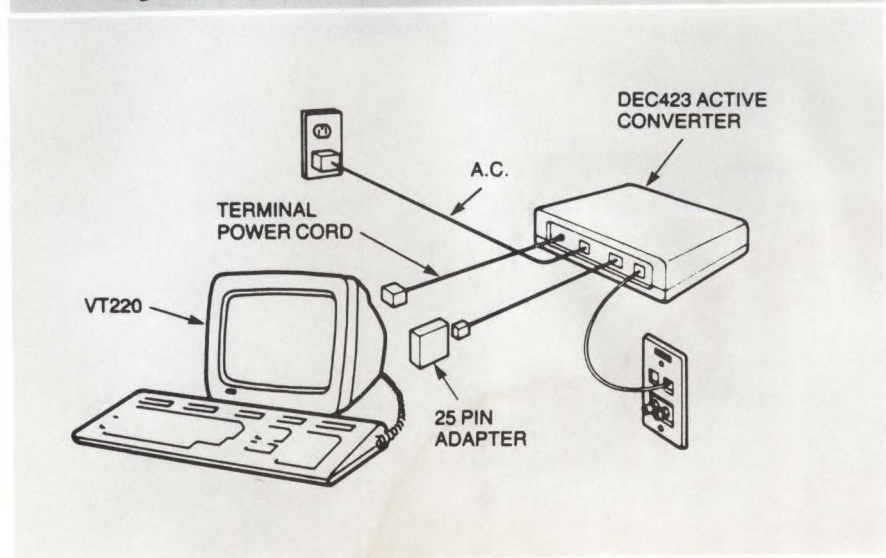
DECconnect terminal-connection components are the cables, connectors, and adapters used to link terminals, terminal servers, and computer hosts within the DECconnect communications system. Low-speed terminal communication in the DECconnect system uses the DEC423 standard, a superset of the EIA-423-A signaling standard. The Digital DEC423-based products enhance the industry standard EIA-232-D performance by

- Improving transmission speed.
- Increasing the distance that terminals can be located from host computers.
- Incorporating EOS/ESD protection.

Digital offers the following DEC423 products to connect devices using the EIA-423-A signaling standard and to adapt devices from EIA-232-D signaling to EIA-423-A signaling.

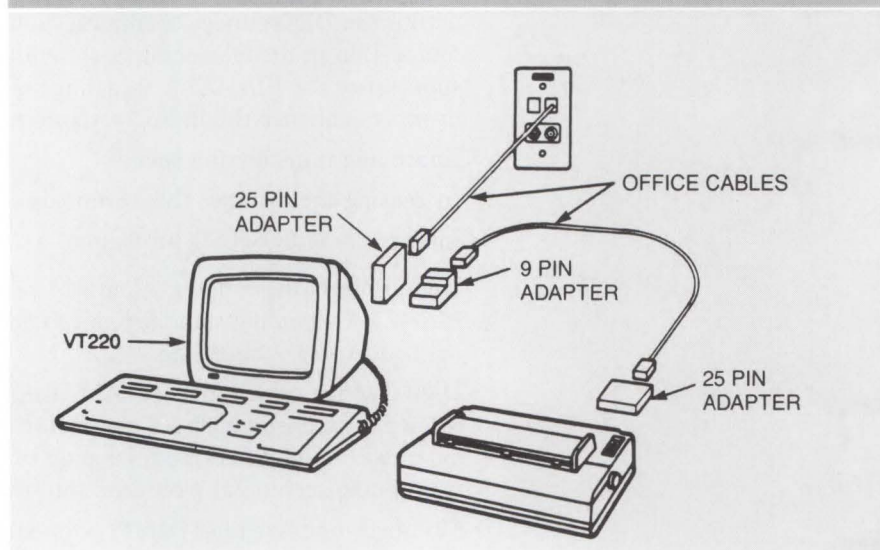
- Digital office cable—the DEC423 (EIA-423-A) standard office cable (BC16E), an unshielded six-conductor flat cable. The BC16E cable is terminated with a modified modular plug that has an offset key to prevent it from being accidentally plugged into the telephone jack.
- Modified modular plug (MMP)—the DEC423 standard connector. To connect MMPs into existing terminals and printers, passive physical adapters are required. Passive adapters allow both EIA-232 and EIA-423-A signaling to pass through. However, EIA-423-A devices, when connected to EIA-232-D wiring, are limited to EIA-232-D signaling parameters. Each passive adapter has a modified modular jack (MMJ) to receive the MMP.
- H8571-A adapter (25-pin D subminiature)—required for terminal connection.
- H8571-B adapter (9-pin D subminiature)—required for printer connection.
- H3105 active converter—allows customers to upgrade an EIA-232-D device to DEC423 and realize all the benefits of increased distance and EOS/ESD protection. As opposed to the passive adapters, which provide only a mechanical adaptation, the H3105 active converter transforms the electrical signal from an EIA-232-D interface to the signal for a DEC423 interface, thus allowing longer distances and better noise immunity.
- H8572 cable extender (6-conductor)—used to extend the length of two MMP preterminated cables.

Office Configuration with Passive Adapters



DECconnect Terminal-connection Components

Office Configuration with Active Converter



H3105

Terminal-connection Product Order Codes

Option	Order Code
6-conductor DEC423 (EIA-423-A) office cable terminated with MMPs (Refer to "Communications Cables" in Section 3 for cable lengths.)	BC16E-xx
25-pin active converter (110 V)	H3105-A
25-pin active converter (220/240 V)	H3105-B
Package of 50 MMPs for 6-conductor office cable	H8220
1,000-foot spool of unterminated, 6-conductor, flat office cable	H8240
Crimp tool for 6-conductor cable	H8241
25-pin passive adapter (EIA-232-D female)	H8571-A
25-pin passive adapter (EIA-232-D male)	H8571-D
9-pin passive adapter	H8571-B
6-conductor cable extender	H8572

The DECconnect communications system offers the following network equipment mounting options.

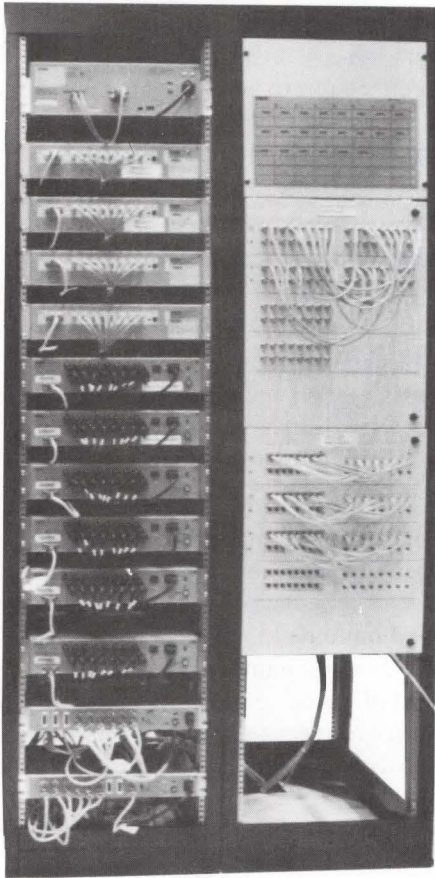
- Satellite equipment room (SER) rack, H3120—designed to be used as a central hub servicing a large number of users (48-64) or up to 80 active connections by either direct connection or connection to smaller, remotely located equipment cabinets or patching panels. Because it is not enclosed with panels, doors, or other enclosures, it must be located within a secure room or wiring closet.
- Office communications cabinet (OCC), H9646-E—designed for customers who might not have or want a dedicated room to house an SER rack, or who prefer to use a standalone cabinet within an office area or computer room.
- Remote Wall Enclosure (RWE), H3131-A—designed to provide small, local workgroups with a simple, easy-to-implement network connectivity solution for low-speed terminals via terminal servers (DECserver 200 or 500) and high-speed PC/Workstations via Ethernet multiport repeaters (DEMPRs) to an enterprisewide 802.3/Ethernet backbone.

The SER and OCC cabinets utilize a common set of products known as building block kits. These kits comprise cable patching, termination panels, cables for low- and high-speed data applications, mounting hardware, and cable strain relief/management hardware. The building block kits offer the flexibility to easily configure SER racks and office communications cabinets for low- and high-speed data applications and office cable patching. They allow the network/telecommunications manager to meet the needs of current users, while keeping the flexibility to easily upgrade the cabinets to meet future needs.

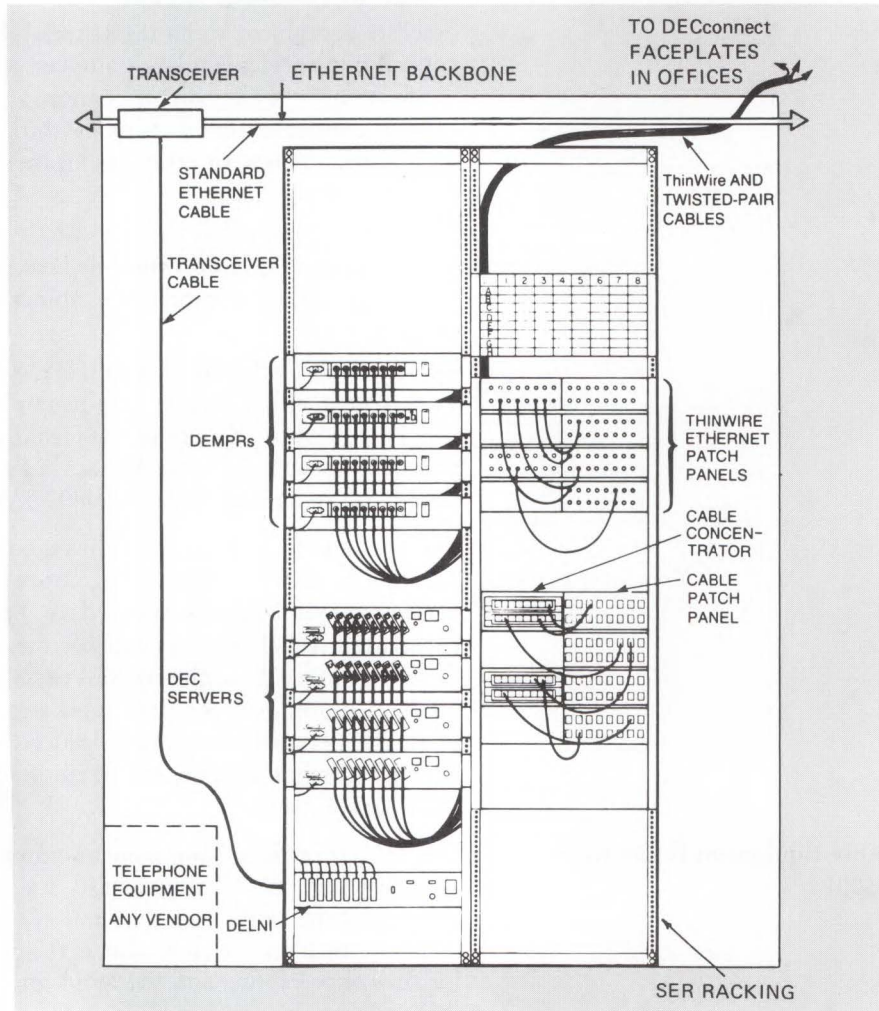
Satellite Equipment Room Rack (H3120)

The H3120 satellite equipment room rack comprises two industry-standard 19-inch-wide NEMA cabinet racks attached side by side. The rack on the left side is the active rack and houses the active network hardware component; the rack on the right side is the passive rack, the termination point for the office cabling and the mounting area for cable patching components that connect the office cabling to the active devices. This cabinet is designed to support up to 80 active connections.

DECconnect Network Equipment Cabinet Products



Satellite Equipment Room Configuration



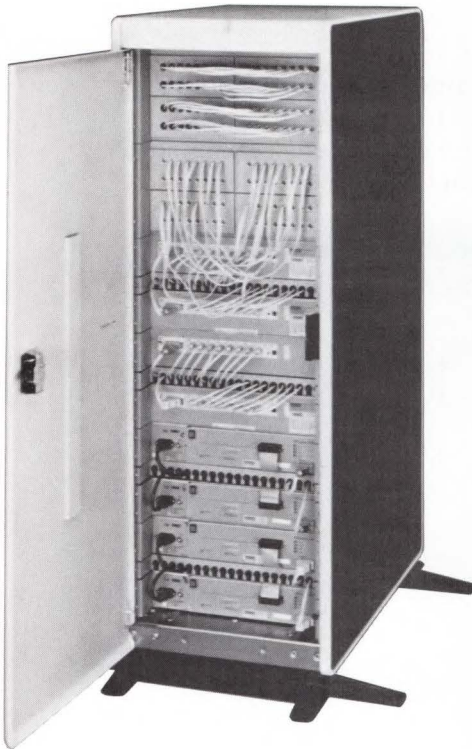
The H3120 includes two steel racks, power strip, cable managers, eight sets of rackmount brackets for DECservers or DEMPrs, one set of rackmount brackets for the DELNI, and two patch frame panels for mounting cable patch panels. Customers select patch panels, patch cords, and other accessories from the menu of building block kits to meet their application needs. (Refer to "Cabinet Building Block Kits" in this section for more information.)

The H3120 must be housed within a secure room or wiring closet. Each dual rack is 88 inches high, 46 inches wide, and 23 inches deep. The general room minimum requirements are 65 inches deep/wide and 96 inches long with a ceiling at least 96 inches high. These dimensions allow sufficient space for accommodating a telephone and/or video patching area.

The H3120 can accommodate a wide variety of Digital network hardware such as the DECserver 200 and 500, DEMPrs, DELNIs, and the LAN Bridge 100. Additionally, many 19-inch industry standard rackmountable products can be accommodated if they meet environmental and power considerations.

DECconnect Network Equipment Cabinet Products

Office Communications Cabinet (H9646-E)



SER Rack Order Code

Option	Order Code
SER starter racks, power strip, cable managers, cable trays, patching frames, and miscellaneous hardware, 110-120 Vac	H3120

The H9646-E DECconnect office communications cabinet (OCC) is a standalone cabinet, as opposed to the H3120 SER rack, which requires a secure room. The cabinet is attractive and takes little floor space, making it suitable for an office. This product is ideal for small departments that plan to expand and that need a secure environment for their networking products.

The H9646-E office communications cabinet, which complements the 64-user satellite equipment room rack (H3120), can accommodate a variety of devices that mount in a 19-inch rack.

Features

- Enclosed cabinet with standard 19-inch frames
- Locks on both front and rear doors
- Power strip for up to nine devices
- Patch panels for cable management

The H9646-E cabinets have sufficient space to accommodate the cabinet building block kits, which allow customers to configure a cabinet to meet specific requirements for number of users and types of network applications (such as low- or high-speed connections.) Refer to "Cabinet Building Kits" in this section for more information.

Preconfigured Office Communications Cabinet (H3130-A)

The H3130-A office communications cabinet is a preconfigured version of the H9646-E cabinet. It includes enough passive components, cables (excluding transceiver cable), and hardware to accommodate one DELNI, four DECserver 200s, and four ThinWire multiport repeaters (DEMPRs), allowing a total of 32 high- and low-speed connections with full patching capability.

Office Communications Cabinet Order Codes

Option	Order Code
60-inch network equipment cabinet, includes side panels, top cover, front and rear locking doors and 120 Vac power strip. Does not include any other active or passive hardware components.	H9646-EA
Network equipment cabinet, same as H9646-EA except that it contains a 220-240 Vac power strip	H9646-EB
Office communications cabinet, includes enough patching components and cables to support 32 low- and high-speed users, 110-120 Vac	H3130-A2
Office communications cabinet, same as H3130-A2, except that it contains a 220-240 Vac power strip	H3130-A3

DECconnect Network Equipment Cabinet Products

Cabinet Building Block Kits

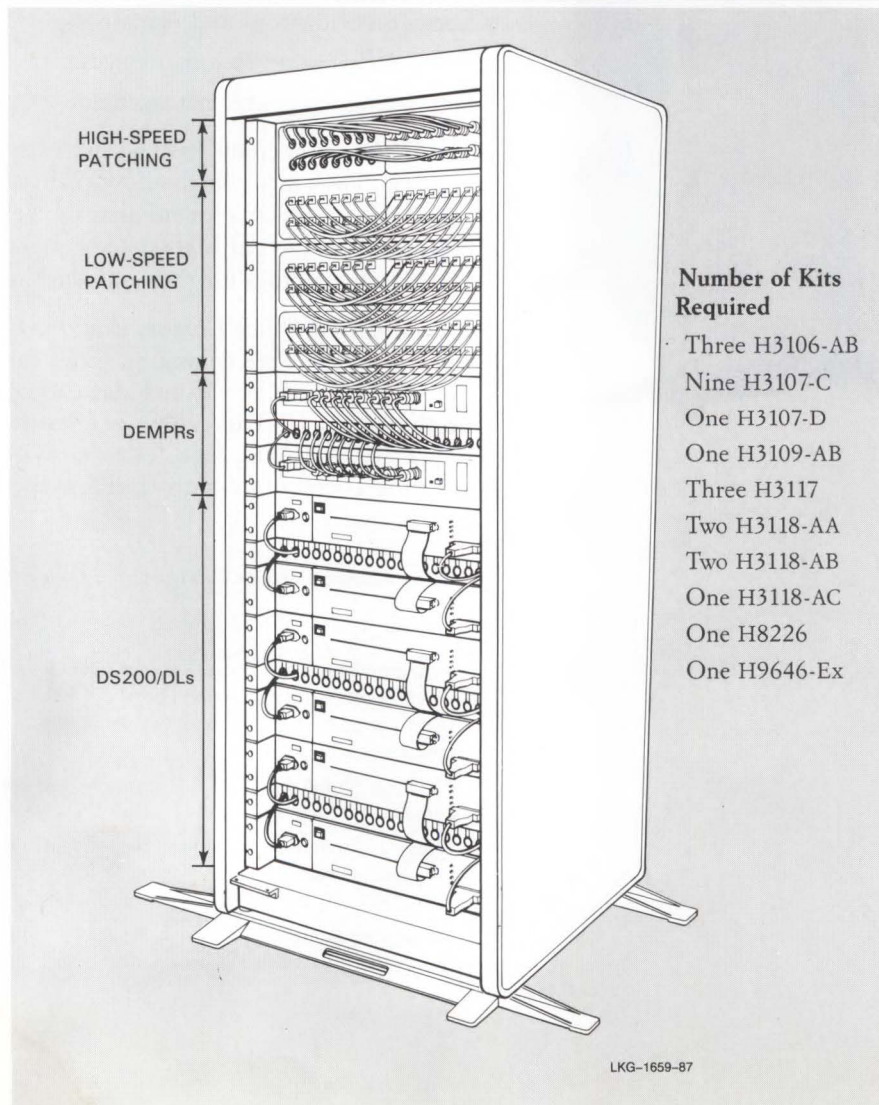
The cabinet building block kits consist of DECconnect patching and termination products, mounting brackets for rackmounting termination panels, recessed mounting brackets for DEMPRs, DECservers and DELNIs, and cables. These kits are used with either the H9646-E office communications cabinet or H3120 satellite equipment room rack. They allow customers to patch in current users, while offering the flexibility to configure future user support in 16-user increments.

All the components meet industry standards, allowing them to mount in any 19-inch wide rack.

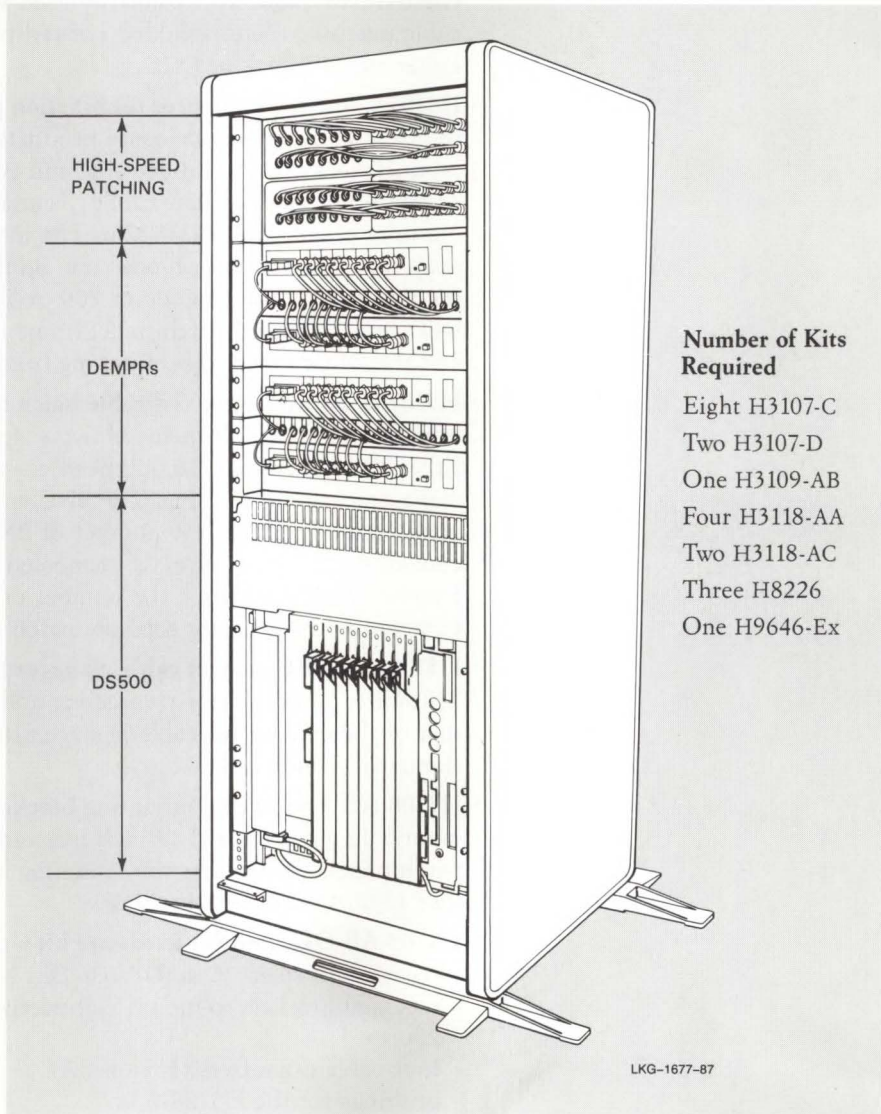
Building Block Ordering Examples

The following two figures show examples of using the building block kits. The examples list all the components required for two Digital-supported configurations for the H9646-E series cabinet racks. The components are ordered separately from the Building Block Kit Order Code table.

H9646-E Cabinet Configuration for 48 Low-speed, 16 High-speed Connections with 100 Patching



H9646-E Cabinet Configuration for 128 Low-speed, 32 High-speed Connections with No Patching



- Number of Kits Required**
- Eight H3107-C
 - Two H3107-D
 - One H3109-AB
 - Four H3118-AA
 - Two H3118-AC
 - Three H8226
 - One H9646-Ex

Cabinet Kit Descriptions

The following list describes several cabinet kits. ▲ For information regarding other building block components, such as ThinWire patch cable kits and DECconnect patch-panel mounting brackets, refer to the Building Block Kit Order Code table.

- **H3106-AB flip adapters**—two flip adapters, attached to the 36-conductor ribbon cables, connect the H3107-C patch panels on the front of the H9646-E cabinet to the H3107-Cs mounted in the rear of the cabinet. The rear-mounted H3107-Cs are used as termination panels for building/office twisted-pair wiring. The H3106-AB provides a “flip” in the signal paths required when these two identical panels are used in this configuration.

DECconnect Network Equipment Cabinet Products

- **H3107-A low-speed 16-user termination patch panel**—has 16 individual snap-in MMJ connectors, which allow for “punching down” unshielded twisted-pair cable. It is primarily used with the H3120 SER cabinet and for cable patching the unshielded twisted-pair 802.3/Ethernet product within either the SER rack or OCC.
- **H3107-C low-speed 16-user termination patch panel**—primarily used with the OCC and remote-enclosure products. Includes 16 PC-mount modified modular jacks (MMJ) on one side and two 36-pin connectors on the other. The building twisted-pair cabling is attached to the panels using modified modular plugs (MMP) (H8226). The MMPs, attached to building wiring, snap into these panels on one side; on the other side is a 36-pin connector for attaching to the DECserver 200 or 500. This panel fits into both the DECconnect hinged patch-panel frame (H3127) that comes with the H3120 and the DECconnect rackmounting bracket (H3108-AB).
- **H3107-D ThinWire coaxial cable patch block**—supports 16 high-speed office terminations. It includes two snap-in panels for ThinWire 802.3/Ethernet connections, 16 bulkhead coaxial connectors, bushings for cable management, and labeling. The BNC mounts into the plastic panels without bushings and reduces the number of BNC connections (because the office connections are now directly connected on the right side of the patch panels). With this panel, the number of ThinWire cables is reduced by eliminating the need for separate patch cables.
- **H3108-AA DECconnect cable manager bracket**—provides strain relief for ThinWire, 36-conductor transceiver and cables, and guides the cable to the rear of the cabinet for cable management. This bracket mounts into any standard 19-inch rack.
- **H3108-AB Patch-panel mounting bracket**—has four cutout openings, mounts in any standard 19-inch rack, and is used with any the H3107-series patch panels. It includes the mounting bracket, two cable stress-relief rods, four U-nuts and mounting screws.
- **H3109-AB DECconnect hardware kit**—contains
 - recessed brackets to mount one DELNI.
 - recessed brackets to mount eight active devices, DEMPR or DECserver 200.
 - four cable organizers (H3108-AA).
 - bushings for the H3108-AAs.
 - various screws, tie wraps, and cable clips.
 - three patch-panel brackets (H3108-AB).
 - six strain-relief rods for providing cable strain relief (used with the H3108-AB panels).
- **H9646-E 60-inch network equipment cabinet**—fully enclosed, including side panels, top cover, front and rear locking doors, and rear-mounted cable manager bracket. The cabinet includes a 12 amp power strip with 10 receptacle outlets and 15 amp circuit breaker. The power strip provides power to all the active hardware components, such as DECservers or DEMPRs.

DECconnect Network Equipment Cabinet Products

Building Block Kit Order Codes

Flip adapter kit, containing two male 36-conductor flip adapters used with ribbon cables and H3107-C for patching DECserver 200/DL or DECserver 500/550 active connections	H3106-AB
16-user patch panel with 16 individual snap-in modified modular jacks for "punching down" unshielded twisted-pair cable in the H3120 SER rack	H3107-A
16-user patch panel with 16 PC-mounted modified modular jacks to patch building/office wiring for low-speed data to two DECserver 200 terminal servers in the H9646-E series OCC	H3107-C
16-user patch panel used to patch ThinWire cable to two ThinWire Ethernet multiport repeaters. It contains 16 female BNC bulkhead connectors for terminating the building/office ThinWire cable within the patch panel.	H3107-D
Cable manager bracket kit	H3108-AA
Patch-panel mounting bracket kit	H3108-AB
DECconnect hardware kit	H3109-AB
Blank panel kit, containing eight blank panels for mounting in the patch panel brackets	H3116-AA
Package of 16 two-foot low-speed DEC423 (EIA-423-A) patch cords	H3117
Package of 16 two-foot high-speed ThinWire patch cords	H3118
Package of four 36-conductor ribbon cables, each eight feet long (connects servers to patch field)	H3118-AA
Package of four 36-conductor ribbon cables, each three feet long (connects H3107-C patch panels)	H3118-AB
ThinWire patch cable kit, containing 16 8-foot male-to-male patch cables for the H3107-D	H3118-AC
DEMPR/DECserver 200 recessed bracket rackmounting kit, containing all the necessary hardware to mount one DECserver 200 and/or one DEMPR in a 19-inch-wide cabinet	H3119-AA
DELNI mounting kit, containing two recessed brackets to mount one DELNI	H3126-AA
Package of 50 modified modular plugs/connectors for field termination of unshielded twisted-pair cable, solid wire only	H8226

DECconnect Remote Wall Enclosure (H3131-A)

The DECconnect Remote Wall Enclosure (RWE), H3131-A, is a wall-mounted metal enclosure that houses passive patching equipment to support a radial wiring topology for either 16 high- or 16 low-speed data lines running over unshielded twisted pair cabling. The RWE provides small, local work groups with a simple, easy-to-implement network connectivity solution for low-speed terminals via terminal servers (DECserver 200 or 500) and high-speed PC/Workstations via Ethernet multiport repeaters (DEMPR) to an enterprisewide Ethernet backbone. The DECconnect Remote Wall Enclosure provides a cost-effective alternative to a Satellite Equipment Room (SER) or Office Communications Cabinet (OCC).

DECconnect Network Equipment Cabinet Products

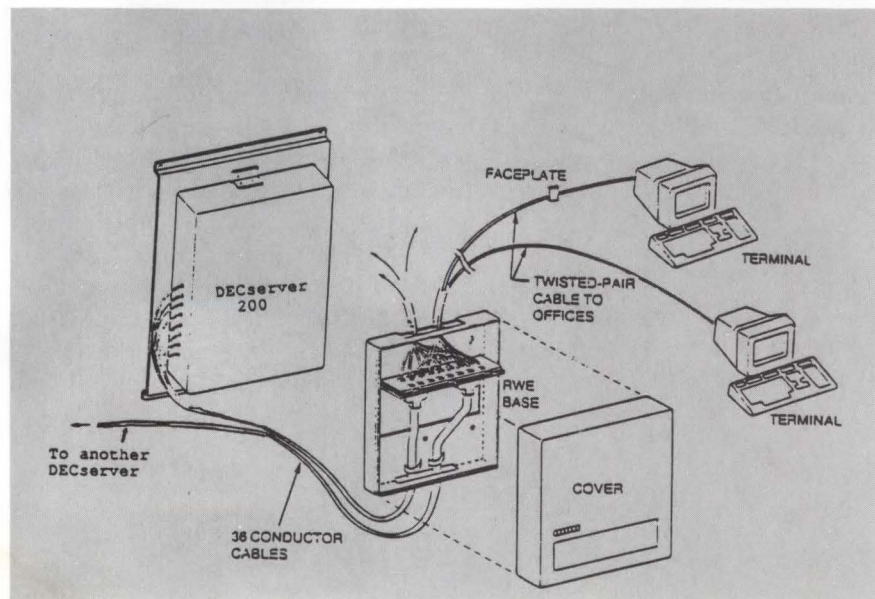
Support of low-speed, data-only (no modem control) terminal network connectivity is accomplished by mounting a 16-user termination patch panel kit (H3107-C) into the RWE. Unshielded twisted-pair office cabling terminates at MMJ connectors in the H3107-C and radiates out to DECconnect faceplates or directly to office equipment. A pair of 36-conductor cables leads from the RWE-mounted H3107-C to local or remotely located (up to 300 feet) DECserver 200/DL terminal servers or to DECserver 500/550 CXA16 line cards.

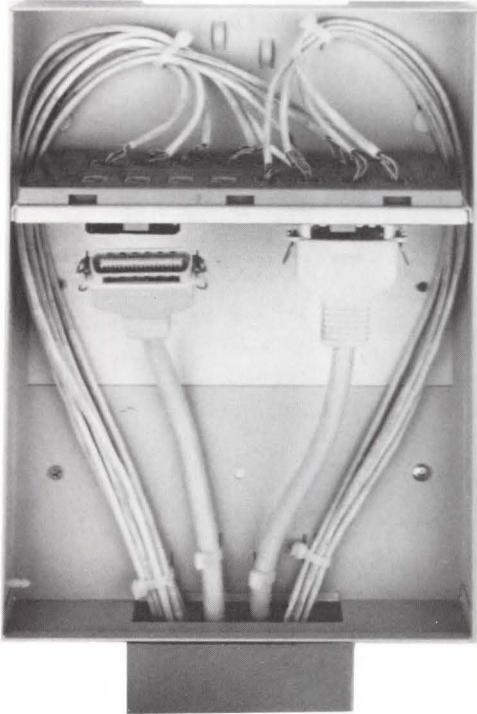
Terminal servers (DECserver 200/DL) can be wall-mounted in proximity to the RWE by using a H039 wall-mount kit (1 per DECserver 200). Then the BC16C-10 cables that come with the DECserver 200/DL can be used to connect the RWE mounted termination patch panel to the terminal server.

If the terminal servers are remotely located, the customer can use additional BC16D 36-conductor extension cables or can terminate bulk 36-conductor cable using the H8101 field termination tool kit and H8227 field termination connector kit. The 36-conductor cable can be run up to 300 feet to a DECserver 200/DL or to a CXA16 line card in a DECserver 500/550.

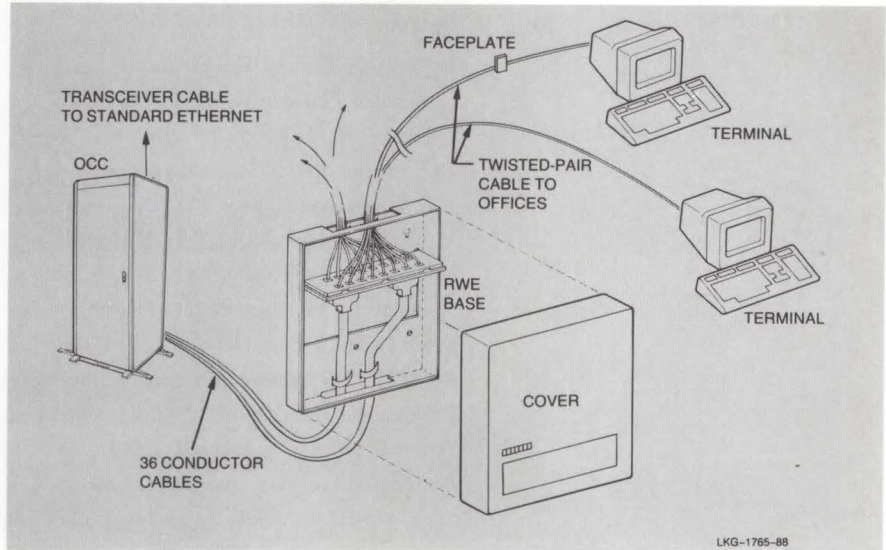
High-speed 10 Mb/s 802.3/Ethernet communications is accomplished by mounting an unshielded twisted-pair card cage kit (H3131-B) into the RWE (H3131-A). Up to two unshielded twisted-pair adapter kits (H3330-AA) can then be mounted into the H3131-B. Each H3330-AA kit contains four adapter boards (eight lines), each of which supports two unshielded twisted-pair 802.3/Ethernet connections that run to DECconnect faceplates or office equipment. Two H3330-AA support a total of up to 16 radially distributed unshielded twisted-pair communications lines. ThinWire cables run from the back of the H3330-AA to DEMPRs, which is wall-mounted next to the RWE using the H039 wall-mount kit. As an alternative, a super 8 Pack (H3300-AA) provides all twisted-pair components.

RWE Configuration for Local Terminal Server





RWE Configuration for Remote Terminal Server



Features

- Compact wall-mounted enclosure uses no floor space.
- Aesthetically acceptable for office applications.
- Local patching/cable termination simplifies moves, additions, and changes.

Ordering Information

For low-speed communications, the maximum length for a 36-conductor cable run between an RWE and a terminal server is 300 feet.

For high-speed communications,

- The maximum length for a twisted-pair cable running 802.3/Ethernet communications is 230 feet.
- Twisted-pair cables terminate at twisted-pair Ethernet adapters, which in turn use a short section of ThinWire to connect to the respective devices. The total length of ThinWire cable—the cable leading from the RWE to the DEMPR plus the cable leading from the office adapter to the end user equipment—must not exceed 10 meters.

DECconnect Network Equipment Cabinet Products

Remote Wall Enclosure Order Codes

Option	Order Code
DECconnect Remote Wall Enclosure	H3131-A
Unshielded Twisted-pair Card Cage Kit	H3131-B
Connector kit, 36-conductor cable	H8227-A
Tool kit, termination 36-conductor cable	H8101
36-conductor cable spool, PVC, 250 feet	H8247-A
36-conductor cable spool, PVC, 1000 feet	H8247-B
36-conductor cable spool, FEP, 250 feet	H8248-A
36-conductor cable spool, FEP, 1000 feet	H8248-B
Kit of 16 ThinWire cables	H3118-AC
Kit of eight unshielded twisted-pair office adapters	H3310-AA
Unshielded twisted-pair 802.3/Ethernet SER card	H3330-AA
Terminal patching "low-speed" panel	H3107-C
Wall-mount kit, DECserver, DEMPR	H039
Super 8-pack unshielded twisted-pair office adapters	H3300-AA

Broadband 802.3/Ethernet is most often selected by customers who have multiple services to distribute over large local areas. Broadband networks use frequency division multiplexing to carry many channels on one wiring system, enabling customers to transmit data, video, and voice over the same cable, simultaneously. The broadband cable and components are the same as those used for cable TV.

Digital Network Services can provide design, installation, and network maintenance, and can serve as the customer's single point of contact for the broadband network, Digital hardware and software products, and qualified vendor products.

Broadband 802.3/Ethernet is an extension of Digital's baseband 802.3/Ethernet. Baseband and broadband provide the same capabilities: a high-speed 10-Mb/s, peer-to-peer communications link between computers and other intelligent devices for transferring files and high-resolution graphics displays, and for transmitting text, electronic mail, and facsimile data. The broadband 802.3/Ethernet transceivers use the same controllers and DECnet Phase IV software as baseband. In addition, the broadband transceiver is used in conjunction the same bridges, routers, gateways, terminal servers, and communications servers as baseband networks. Also, the broadband transceiver cable is the same as for the baseband. The major difference between the two is the transceivers: the standard Ethernet transceiver for baseband, and Ethermodem for broadband.

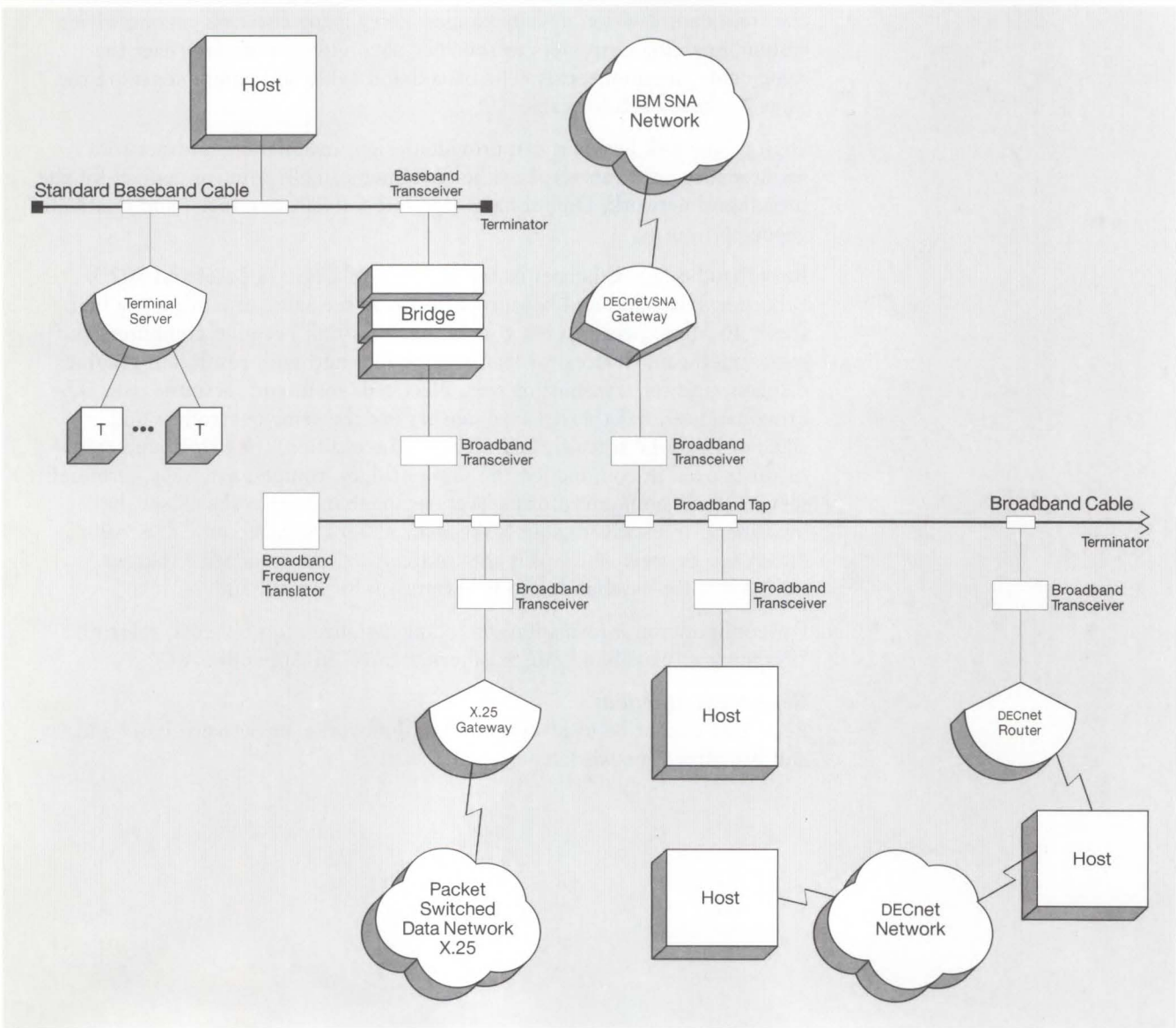
For configuration information, including distance requirements, refer to "Planning a Broadband 802.3/Ethernet LAN" in Appendix A.

Repeater Restrictions

Repeaters cannot be used in broadband networks, or between baseband and broadband networks.

Broadband 802.3/Ethernet Products

Broadband 802.3/Ethernet Configuration



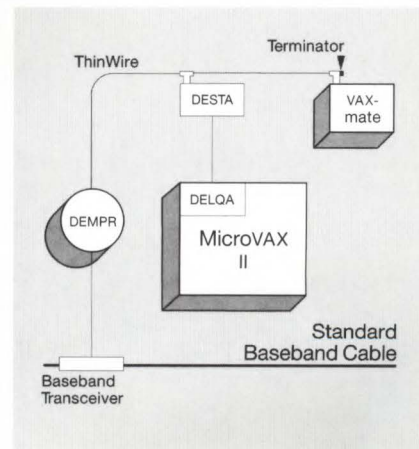
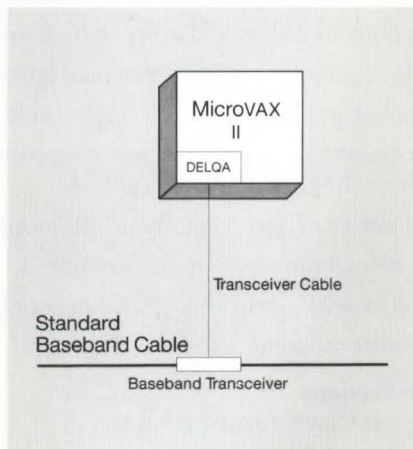
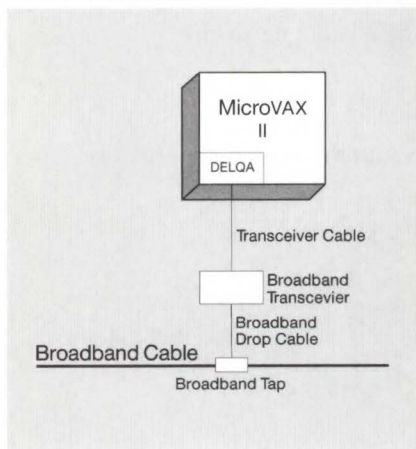
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Broadband 802.3/Ethernet Products

Broadband	Baseband	ThinWire
Packets are transmitted by a broadband transceiver.	Packets are transmitted by a baseband transceiver.	Packets are transmitted by a built-in DESTA transceiver.
Broadband can share the cable with other independent channels, such as video, data, and voice.	Baseband is the only channel on the cable.	Baseband is the only channel on the cable.
Network cable is the same as for cable TV.	Network cable is designed to Ethernet or IEEE 802.3 specifications.	Network cable is designed to Ethernet or IEEE 802.3 specifications.
Tap and drop cable are the same as for cable TV.	Transceiver serves as the tap, and transceiver cable serves as the drop cable.	Transceiver serves as the tap, and transceiver cable serves as the drop cable to a ThinWire Ethernet Repeater. ThinWire cable connects devices to the ThinWire Ethernet Repeater.*

*ThinWire is also available in standalone configurations. Refer to "802.3/Ethernet Configuration Guidelines" in Appendix A for more information.

Broadband, Baseband, and ThinWire Cable Connection Comparison



NBG-155-01

Digital's broadband 802.3/Ethernet products implement an 802.3/Ethernet channel for both single- and dual-cable broadband LANs. Almost all Digital networking products used with baseband technology are compatible with broadband. These include

- DECnet Phase IV for VMS, RSX, RSTS/E, and P/OS operating systems.
- The 802.3/Ethernet communications controllers that connect to standard baseband cable.
- Communications servers (routers, terminal servers, and gateways).
- LAN Bridge 100.

Broadband 802.3/Ethernet Products

Digital's Third-party Program has qualified two products that incorporate multivendor services on broadband 802.3/Ethernet LANs. The products, the Ethermodem and the Frequency Translator, are available through Chipcom Corporation in the United States and in most European countries. Ethermodem is 802.3-compliant and coexists with Ethernet, MAP, IBM PC NET, or Sytek LocalNet 20.

Chipcom Ethermodem Broadband Ethernet Transceiver



The Chipcom two-port Ethermodem is a broadband transceiver that links baseband 802.3/Ethernet nodes to broadband networks. Ethermodems are fully IEEE 802.3 compliant and are available in either single or dual-cable configurations. Ethermodems are available in five frequencies providing 10 Mb/s performance and are transparent to higher level network software such as DECnet, TCP/IP, and XNS.

The DELNI, DEREPEP repeater, and ThinWire Ethernet repeaters should not be used with the Ethermodem as these are unsupported configurations. Chipcom and installed Digital broadband products (DECOM) can neither communicate nor coexist on the same broadband cable due to frequency conflicts. Single-cable Ethermodem installations require a Chipcom frequency translator.

Features

- IEEE 802.3 and Ethernet V2.0 compatible.
- 10 Mb/s CSMA/CD performance with full collision enforcement.
- Multiple frequency ranges to allow flexibility when configuring with MAP, IBM PC network, and SYTEK services.
- Functions in either mid-split or high-split single cable networks.
- 3,800 m station-to-station distance coverage.
- Available in either dual- or single-cable versions.
- Transparent to upper-level network software supporting systems that use DECnet, XNS, TCP/IP, or TOP.
- On-board self-test, digital and RF loopback.
- Can be rackmounted or shelfmounted.
- Coexists with up to three MAP channels.
- Two-port modem.

Specifications

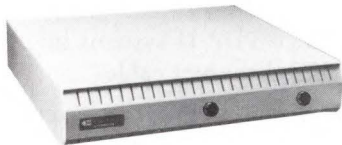
Physical Characteristics:

- Height: 8.89 cm (3.5 in)
- Width: 44.45 cm (17.5 in)
- Depth: 37.46 cm (14.75 in)
- Weight: 6.80 kg (15 lb)

Power Requirements:

- Power source: 115/220 Vac
- Frequency tolerance: 50/65 Hz \pm 10%
- Maximum AC watts drawn: 40 W
- Power connector: IEC male
- Transmitted power: 50 dBmV \pm 2 dBmV optional for dual cable versions
- Receiver range: 20 dB minimum (-4 to +16 dBmV), 25 dB typical (-6 to +19 dBmV)

Chipcom Ethermodem Frequency Translator



Ordering Information

Ethermodem is available in the U.S. and in some other countries via distributors. Contact a local marketing representative for country-specific information.

The Chipcom Ethermodem frequency translator, located at the network headend, is used with single-cable Ethermodems. The Ethermodem frequency translator receives low frequency signals from the reverse direction and translates them up in frequency by 192.25 MHz (IEEE recommended standard) to the transmit band. It amplifies, filters, and sends the signal to the user on the forward direction. The Ethermodem frequency translator minimizes interference with services in nearby frequencies by providing sharp, out-of-band filtering. It is available off-the-shelf in a range of standard frequencies. The Ethermodem frequency translator coexists with other broadband products (such as IBM PC Network, Sytek LocalNet 20, and MAP), video, and other common services. Contact your local Digital sales representative for ordering and service information.

Specifications

Physical Characteristics:

- Height: 8.89 cm (3.5 in)
- Width: 44.45 cm (17.5 in)
- Depth: 40.64 cm (16.0 in)
- Weight: 6.80 kg (15 lb)
- Mounting: 48.26 cm (19.0 in) standard rack

Power Requirements:

- Power source: 115/220 Vac
- Frequency tolerance: 50/60 Hz \pm 10%
- Maximum ac watts drawn: 40 W
- Power connector: IEC male
- Power indicator: red LED

Translation frequency: 192.25 MHz \pm 25 kHz

Nominal bandwidth: 18 MHz

Gain: 55 \pm 2 dB

802.3/Ethernet communications controllers are interfaces that connect systems to an 802.3/Ethernet local area network. Digital currently offers the following communications controllers:

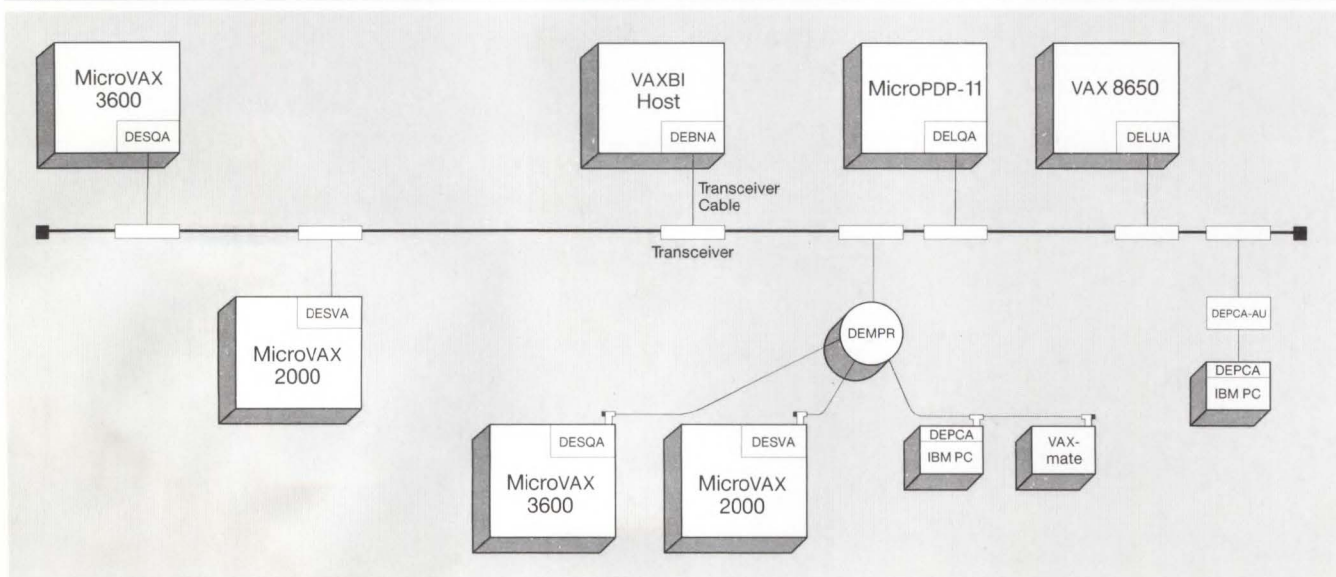
- The DEBNA, which connects VAXBI systems to standard baseband or broadband cable
- The DELQA, which connects Q-bus MicroVAX and MicroPDP-11 systems to standard baseband or broadband cable
- The DESQA, which connects Q-bus MicroVAX and MicroPDP-11 systems in BA200-series enclosures to standard or ThinWire 802.3/Ethernet cable
- The DELUA, which connects UNIBUS VAX and PDP-11 systems to standard baseband or broadband cable
- The DESVA, which connects MicroVAX 2000 and VAXstation 2000 systems to ThinWire, standard baseband, or broadband cable
- The DEPCA, which connects the IBM PC, PC/XT, and Personal Computer AT to ThinWire Ethernet cable

In addition, the VAXmate has an integral Ethernet communications controller which connects to ThinWire Ethernet cable.

Controllers designed for standard baseband cable connect to the cable with a standard baseband 802.3/Ethernet transceiver or via a Local Network Interconnect (DELNI). They connect to broadband cable with a broadband transceiver. They can connect to ThinWire cable via a ThinWire Ethernet station adapter (DESTA).

Controllers designed for ThinWire 802.3/Ethernet cable connect to the cable via a BNC connector. They can connect to standard baseband cable via a ThinWire Ethernet Repeater, which then connects to standard baseband cable via an 802.3/Ethernet transceiver or DELNI.

802.3/Ethernet Communications Controllers



NBG-156-01

802.3/Ethernet Communications Controllers

802.3/Ethernet Communications Controllers						
	DEBNA	DELUA	DEPCA	DELQA	DESQA	DESPA
Bus	VAXBI	UNIBUS	IBM PC-bus	Q-bus	Q-bus systems in BA200-series enclosures	MicroVAX 2000 and VAXstation 2000 bus
Number of lines	1	1	1	1	1	1
DMA	Yes	Yes	Yes	Yes	Yes	Yes
Maximum speed¹	5 Mb/s	10 Mb/s	10 Mb/s	10 Mb/s	10 Mb/s	10 Mb/s
Ethernet cable	Standard	Standard	Standard ⁴ or ThinWire	Standard	Standard or ThinWire	Standard or ThinWire
DECnet support	DECnet-VAX, ² DECnet-ULTRIX	DECnet-VAX, DECnet-ULTRIX, DECnet-RSX, DECnet/E	DECnet-DOS, PCSA/PC Client ³	DECnet-VAX, ² DECnet-ULTRIX, DECnet-RSX, DECnet-Micro/ RSX, DECnet/E	DECnet-VAX, ² DECnet-ULTRIX, DECnet-RSX, DECnet-Micro/ RSX, DECnet/E	DECnet-VAX, ² DECnet-ULTRIX
Operating system support	VMS,	VMS, ULTRIX-32 ULTRIX-11, RSX-11, RSX-11M-PLUS, RSX-11S, RSTS/E	IBM PC DOS, ULTRIX-32, MS-DOS	VMS, COMPAQ, ULTRIX-11, RSX-11M, RSX-11M-PLUS, RSX-11S, Micro/RXS, RSTS/E, VAXELN	VMS, ULTRIX-32, ULTRIX-11, RSX-11M, RSX-11M-PLUS, RSX-11S, MICRO/RXS, RSTS/E, VAXELN	VMS, ULTRIX-32,

¹Consult the appropriate DECnet Software Product Description for more information.

²DECnet-VAX allows multiple 802.3/Ethernet controllers per host within the limitations listed in the Load Unit Table in Software Product Description 25.03. When two or more 802.3/Ethernet controllers are used on a single CPU, they must be connected to different cables attached to separate local area networks. These cables must not be joined by a bridge or repeater, though they may be joined by a DECnet router.

³PCSA/PC Client software includes DECnet-DOS support.

⁴Converts to standard baseband cable with the optional DEPCA-AU.

DEBNA

The DEBNA is an 802.3/Ethernet-to-VAXBI communications controller that connects VAXBI systems to an 802.3/Ethernet local area network. The DEBNA also allows a VAXBI system to be used as a boot member in a Local Area VAXcluster. (The number of satellite nodes that can be supported varies by system.) One DEBNA is a standard component of each VAXBI system.

The DEBNA is a single VAXBI module that supports the physical and data-link communications layers. It operates at speeds up to 5-Mb/s peak hardware throughput. (Actual throughput depends on system configuration, packet sizes, and application.)

802.3/Ethernet Communications Controllers

Multiple DEBNA controllers can be added for control of multiple local area networks. Each DEBNA must be connected to a separate LAN, except when two controllers are connected to the same LAN with one on standby. The maximum number of DEBNA controllers allowed per system depends on available system DC power, available backplane space, and the following system limits:

- VAX 87xx/88xx systems may have a maximum of three DEBNA controllers per VAXBI channel and a maximum of four DEBNA controllers per system. Four DEBNA controllers on internal VAXBI channels may connect to the standard baseband cable with transceivers or a DELNI. DEBNA controllers on external VAXBI channels must connect through a DELNI.
- VAX 85xx systems may have a maximum of three DEBNA controllers per VAXBI channel and a maximum of four DEBNA controllers per system. No more than two DEBNA controllers on internal VAXBI channels may connect to the standard baseband cable through a transceiver. External VAXBI channels allow only one standard 802.3/Ethernet transceiver connection per channel. Additional connections must be through a DELNI.
- VAX 82xx/83xx Configuration 2 systems may have a maximum of two DEBNA controllers per system. Both DEBNA controllers may be connected to the standard baseband cable using the transceiver or DELNI.
- VAX 82xx/83xx Configuration 1 systems may have a maximum of two DEBNA controllers per system. The standard 802.3/Ethernet transceiver may be used to connect one controller to the standard baseband cable; the other connection must be made through a DELNI.

For VAXBI systems which include a UNIBUS, the maximum number of combined UNIBUS and VAXBI 802.3/Ethernet controllers per system cannot exceed the maximum numbers listed above.

Specifications

Mounting Code: One VAXBI Slot

Power Requirements:

– dc amps drawn at +5 V: 6.72

– dc amps drawn at +12 V: 0.5 (CK-DEBNA-LJ)

I/O Panel Units: 1 for CK-DEBNA-LJ; 2 for -LM, -LN

DEBNA Order Codes

Option	Order Code
VAXBI 802.3/Ethernet controller. Includes base module only.	DEBNA-M
For system installation, select one of the following cabinet kits, which includes an internal 802.3/Ethernet cable, an I/O connector panel, and a boot-enable jumper for 802.3/Ethernet:	
Cabinet kit for use with VAX 88xx, 87xx, 8550 internal VAXBI channels.	CK-DEBNA-LJ
Cabinet kit for use with VAX 88xx, 87xx, 8550 and 8350 external VAXBI channels.	CK-DEBNA-LN
Cabinet kit for use with VAX 8350 and 8250.	CK-DEBNA-LM

DELUA

The 802.3/Ethernet-to-UNIBUS high-performance synchronous communications controller (DELUA) connects UNIBUS systems (VAX and PDP) to both Ethernet V2.0 and IEEE 802.3 local area networks. It is M68000 microprocessor based, operates at 10 Mb/s, and has 4-Mb/s throughput capability. (Actual device speed and throughput depend on operating system, system configuration, and application.) The 80-KB RAM is used primarily for buffering of data at the high bus rate. A separate DMA controller is used to access host memory locations.

The DELUA microcode implements data encapsulation and decapsulation, data link management, and all channel access functions to ensure maximum throughput with minimum processor intervention. It provides such network maintainability features as remote loopback of data from other stations, resident microdiagnostics, system identification, and the loading and remote booting of UNIBUS PDP-11 systems from other stations on the network.

The DELUA physically and electrically connects to the standard baseband cable via transceiver cable (BNE3X or BNE4X series) and either a baseband transceiver or Local Network Interconnect (DELNI). The DELUA also connects to a DESTA and ThinWire cable in ThinWire networks. Transceiver cable can be a maximum of 40 meters (131 feet) and must be ordered separately. Refer to "Communications Cables" in Section 3 for all order codes.

The DELUA-M option comprises one hex module. A cabinet kit option, which must be ordered separately with the DELUA-M, contains a distribution panel and associated internal cabling.

Specifications

Mounting Code: 1 hex slot

Power Requirements:

- dc amps drawn at +5 V: 8.0 A
- dc amps drawn at -15 V: 1.0 (to power the transceiver)

Bus Loads: ac 4, dc 1

I/O Connection Panel Inserts: 2 panel units

Environmental Class: B (Refer to Appendix B for details.)

DELUA Order Codes

Option	Order Code
802.3/Ethernet UNIBUS single-line interface communications controller. Includes base module only.	DELUA-M
For system installation, select the appropriate external cables and one of the following cabinet kits:	
For use with VAX-11/725 shielded cabinets.	CK-DELUA-KL
For general purpose use with shielded cabinets.	CK-DELUA-KM
For use with unshielded cabinets.	CK-DELUA-K1

802.3/Ethernet Communications Controllers

DELQA

The DELQA is an 802.3/Ethernet-to-Q-bus communications controller that connects Q-bus MicroPDP-11 and MicroVAX systems to an Ethernet V2.0 or IEEE 802.3 local area network.

The DELQA provides the firmware capability to support Maintenance Operation Protocol (MOP), which offers enhanced network management features, including remote circuit loopback, system identification messages, remote booting of diskless systems, maintenance of data link counters, and IEEE 802.2 XID and Test.

The DELQA physically and electrically connects to the standard baseband cable by means of a cabinet kit, transceiver cable (BNE3L or BNE3H series), and baseband transceiver or Local Network Interconnect (DELNI). The DELQA also connects to ThinWire via a DESTA station adapter.

Features

- Dual size module saves on backplane space.
- Low power draw provides more available power for additional peripheral and communications options.
- On-board self-test executes extensive testing of the DELQA circuitry at each power-up or reset.
- On-board MOP provides the ability to decrease the demand on system software, thus reducing processor time required to support network management activities.

Specifications

Mounting Code: 1 dual slot

Power Requirements:

- dc amps drawn at +5 V: 2.5
- dc amps drawn at +12 V: 0.5

Bus Loads: ac 2.2, dc 0.5

I/O Connection Panel Insert: Size A

Operating Environment:

- Storage Temperature: 0°C–66°C (32°F–151°F)
- Operating Temperature: 5°C–60°C (41°F–140°F)
- Relative Humidity: 10%–95% non-condensing (Complies with DEC 102 standard, Class C)

DELQA Order Codes

Option	Order Code
802.3/Ethernet-to-Q-bus communications controller. Requires one of the following cabinet kits.	DELQA-M
Cabinet kit for BA123 and BA11-M enclosure	CK-DELQA-YA
Cabinet kit for MicroPDP-11 BA23 enclosure	CK-DELQA-YB
Cabinet kit for H9642 cabinet	CK-DELQA-YF

DESQA

The DESQA is an 802.3/Ethernet-to-Q-bus communications controller that connects MicroPDP-11 and MicroVAX systems in BA200-series enclosures to an 802.3/Ethernet local area network. Based on the DELQA, the DESQA combines, on a quad-height module, the functions of the DELQA-M with a cabinet kit and ThinWire Ethernet station adapter (DESTA). A separate cabinet kit is not required because the bulkhead is integral to the module handle.

The DESQA can interface to either standard 802.3/Ethernet cable (15-pin D-connector) or to ThinWire (BNC connector). This allows the user to connect a system to the local area network using a standard 802.3/Ethernet transceiver cable or ThinWire cable.

Specifications

Mounting Code: 1 quad BA200 slot

Power Requirements:

- dc amps drawn at +5 V: 2.4
- dc amps drawn at +12 V: 0.22
- Maximum watts drawn: 14.64

Bus Loads: ac 3.3, dc 0.5

Operating Environment:

- Storage Temperature: 0°C–66°C (32°F–151°F)
- Operating Temperature: 5°C–60°C (41°F–140°F)
- Relative Humidity: 10%–95% non-condensing (Complies with DEC 102 standard, Class C)

Ordering Information

Order the DESQA-SA for factory installation, and the DESQA-SF for field installation.

The DESQA physically and electrically connects to standard 802.3/Ethernet cable via BNE3x or BNE4x transceiver cable, directly to BC16M ThinWire, or to broadband cable via transceiver cable, broadband transceiver, and broadband drop cable. These components are not included with the DESQA.

The following accessories are supplied with the DESQA:

- One ThinWire BNC T-connector
- Two 50-ohm terminators

DESQA Order Codes

Factory-installed 802.3/Ethernet-to-Q-bus communications controller for BA200-series enclosures.	DESQA-SA
Field-installed 802.3/Ethernet-to-Q-bus communications controller for BA200-series enclosures.	DESQA-SF
DESQA Technical Manual	EK-DESQA-TM

802.3/Ethernet Communications Controllers

DESVA

The DESVA is a synchronous 802.3/Ethernet communications controller that connects MicroVAX 2000 and VAXstation 2000 computers to ThinWire local area networks. It includes a 15-pin standard Ethernet connector and a short transceiver cable for direct connection to a baseband 802.3/Ethernet transceiver. The DESVA has FCC certification, is fully compatible with the IEEE 802.3 standard, and operates at 10 Mb/s.

The DESVA provides 802.3/Ethernet data-link layer functions and a portion of the physical channel functions. It is supported under DECnet Phase IV software. The DESVA is a standard component of the VAXstation 2000, and optional for the MicroVAX 2000.

DESVA Order Codes

Option	Order Code
ThinWire 802.3/Ethernet communications controller option for MicroVAX 2000. Includes Networking Guide, T-connector, two terminators, and connector plus transceiver cable for connection to standard baseband cable.	DESVA-AA

DEPCA

The DEPCA is an 802.3/Ethernet communications controller that connects the IBM PC, PC/XT, and Personal Computer AT to Ethernet and IEEE 802.3 local area networks. The DEPCA operates at 10 Mb/s.

The DEPCA implements data encapsulation and decapsulation, data link management, and all channel access functions to ensure maximum throughput. It provides network maintenance features including remote loopback, resident self-test diagnostics, and system identification. The DEPCA implements an asynchronous serial channel for connection to the VSXXX-AA mouse. This interface may be operated in an interrupt driven environment.

The DEPCA contains 48-KB RAM memory, used primarily for buffering network data at the high bus data rate. The Personal Computer's CPU is used to access the buffer memory, and to execute data link and self-test firmware (contained in a 16 KB ROM memory on the DEPCA module).

The DEPCA connects directly to the ThinWire cable, using integral transceiver (MAU) circuitry. With the addition of the DEPCA-AU connector option, the DEPCA can connect to standard baseband cable via a transceiver or Local Network Interconnect (DELNI).

The DEPCA is offered as a module-only option or as a component of the Network Integration Packages. ▲ **For more information, refer to "Integrated Personal Computing" in Section 5.**

802.3/Ethernet Communications Controllers

Specifications

Mounting Code: One 8-bit PC-bus slot (2 when used with DEPCA-AU)

Power Requirements:

- dc amps drawn at +5 V: 2.0 (max)
- dc amps drawn at +12V: 1.350 (max) (1.0 to power the transceiver)
- dc amps drawn at -12 V: 0.050 (max)

Bus Loads: 2 LSTTL

I/O Connection Panel Inserts: 1 slot (2 when used with DEPCA-AU)

Environmental Class: A (Refer to Appendix B for details.)

DEPCA Order Codes

Option	Order Code
ThinWire 802.3/Ethernet communications controller for IBM PC, PC/XT, and Personal Computer AT. Includes a ThinWire assembly kit (T-connector, terminator, and 12-foot PVC BNC cable).	DEPCA-AA
15-pin 802.3/Ethernet transceiver adapter connects the DEPCA to standard baseband cable via a transceiver or DELNI.	DEPCA-AU

Introduction

A standard 802.3/Ethernet local area network (LAN) has a limit of 2,800 meters between the farthest two nodes on the network. This limitation is the sum of

- Two 50-meter transceiver cables extending from the nodes, plus
- Three 500-meter coaxial cable segments that are connected by two pairs of DEREPE fiber optic repeaters, plus
- Four 50-meter transceiver cables connected to the fiber optic repeaters, plus
- A fiber optic link that is 1,000 meters long.

A Digital *extended* LAN uses the LAN Bridge 100, METROWAVE Bridge, and Vitalink Communications Corporation's TransLAN Bridge to increase the distance between local area networks and to increase the number of nodes directly connected over 10 Mb/s 802.3/Ethernet links.

Variations of the LAN Bridge 100 are

- The **standard LAN Bridge 100** (DEBET-Ax), which interfaces two transceiver drop cables.
- The **fiber optic LAN Bridge 100** (DEBET-Rx), which interfaces one transceiver cable and a fiber optic link. The fiber optic link must connect to either another fiber optic LAN Bridge 100 or to a fiber optic DEREPE repeater.

Bridges and/or repeaters are required for sites that have more than 90 meters between two LANs, where a pair of 45-meter transceiver cables would be insufficient to span the distance. ▲ **For more information on the fiber optic repeater, refer to "Baseband 802.3/Ethernet Products" in this section.**

- The **METROWAVE Bridge** (DEMWB-*A), which interfaces one transceiver drop cable at each end with a microwave link. The METROWAVE Bridge connects geographically separated LANs where cable is neither feasible nor economical, up to 4.5 miles (7,240 meters) bridge to bridge.

LAN Bridge 100, METROWAVE Bridge, and TransLAN Extended LANs

Digital's 802.3/Ethernet bridges, the LAN Bridge 100 and the METROWAVE Bridge, are designed to transparently connect a series of up to eight 802.3/Ethernet segments, creating an extended LAN that could be 35 kilometers (22 miles) long. The LAN Bridge 100 and METROWAVE Bridge provide high-performance throughput across the network. Additionally, the low error rate of the connection is maintained from one end of the network to the other.

Many of the functions and capabilities of the Digital and Vitalink bridges are similar. One exception, however, is Digital's implementation of Remote Bridge Management Software (RBMS) that allows a privileged user anywhere in the network to monitor and analyze the network.

Extended 802.3/Ethernet Local Area Network Products

Vitalink's TransLAN Bridge is primarily intended to connect LANs across distances greater than a few miles where coaxial, fiber optic, or microwave links are not available or feasible. TransLAN provides industry-standard V.35 or EIA-232 connections and is capable of transmitting at a maximum rate of 2.048 Mb/s. This can be a constraint when the average traffic load is higher than the 2.048 Mb/s capability. Additionally, depending on the communications links (for example, terrestrial lines) delay may be apparent. Unlike the Remote Bridge Management Software, the TransLAN Bridge is managed from a bridge-management console attached to the TransLAN Bridge.

Comparison of Repeaters, Bridges, and Routers

The following table compares the LAN extension features of the LAN Bridge 100 with the Ethernet Repeater and DECrouter 2000.

Comparison of Extended LAN Devices

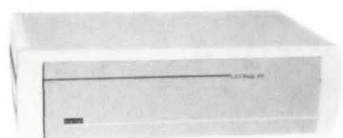
Features	Repeater	Bridge	Router
ISO layer	Physical	Data Link	Network
Forwarding capability	Forwards bits	Forwards frames	Forwards messages
Addressing function	No address	MAC address ¹	Network address
Network extension	Yes	Yes	Yes
Packet filtering	No	Yes	Yes
Traffic management	No	Yes	Yes
Network management	No	Yes	Yes
Performance (throughput)	High	High	Medium
Cost	Low	Medium	Medium
Transparent to upper level protocols	Yes	Yes	No
Message segmentation	N/A	No	Yes
Load sharing	No	No	Yes
Mixed media ²	Yes	Yes	Yes
Common carrier	No	No	Yes
Multivendor network	Yes	Yes	No
Auto back-up ³	Yes	Yes	Yes
Support for DECnet area routing	N/A	N/A	Yes

¹Medium Access Control (requires Ethernet or IEEE 802.3 packet format)

²Refer to the product descriptions for media supported.

³Ability to activate upon failure of a parallel device

LAN Bridge 100



The LAN Bridge 100 (DEBET) connects two or more 802.3/Ethernet LANs, creating an *extended* local area network. The LAN Bridge 100 uses a store-and-forward technique to receive, regenerate, and transmit packets. This feature allows users to build extended LANs several times larger than Ethernet guidelines would otherwise allow.

Extended 802.3/Ethernet Local Area Network Products

The LAN Bridge 100 can connect broadband 802.3/Ethernet networks, baseband networks, or a combination of the two. It improves network performance by dynamically managing the data traffic flow. A user can increase bandwidth efficiency by isolating traffic on heavily loaded segments from the rest of the network. Traffic management is done automatically while still providing full network connectivity. Locally destined traffic remains local; remote traffic is forwarded to the appropriated destination.

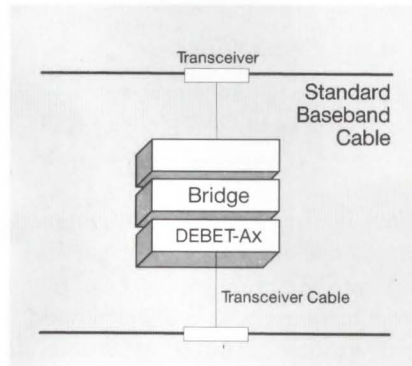
The bridge operates at the data link level and is protocol-independent. Any protocols that run on Ethernet/IEEE 802.3, such as DECnet, LAT, XNS, or TCP/IP, can simultaneously take advantage of a LAN Bridge with no loss of performance.

Changes in network configuration are automatically detected by the bridge within seconds and its memory is updated. Bridges may be used in any arbitrary topology, thereby allowing them to be used in parallel with other bridges to provide an auto-backup capability. Bridges causing loops in this situation automatically enter a backup state. A bridge that is in the backup state continues to monitor traffic on both LANs and, if the primary bridge fails, automatically takes over and forwards messages.

This auto-configuring/self-initializing feature of the bridge allows users to build a network that is immune to misconfiguration. Extended LANs can evolve without rigorous prior planning. They can be split or joined at any place or time. Customers do not need a network designer to plan changes ahead of time because the bridges automatically and completely adjust to configuration changes.

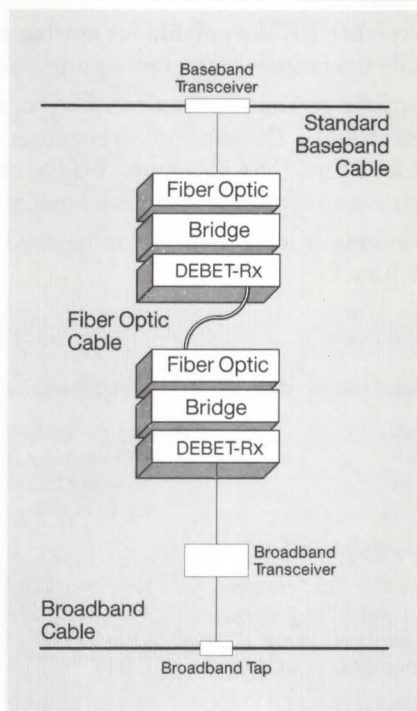
Digital recommends configuring a maximum of seven bridges in a series to ensure adequate performance of time-critical protocols. No restrictions exist on the number of bridges when time-critical protocols are not an issue. Because it has an 8,000-node address buffer, an extended LAN can contain more than 8,000 node addresses with only minor degradation to network performance. An Extended LAN spanning distances up to 35,700 meters can be constructed by using fiber optic and microwave bridges.

Baseband-to-baseband LAN Bridge 100 Configuration



NBG-158-01

Baseband-to-broadband Fiber Optic LAN Bridge 100 Configuration



NBG-159-01

Features

- **Store-and-forward capability**—receives, regenerates, and transmits packets, enabling the configuration of Extended LANs.
- **Address filtering**—reduces the total data traffic on an extended LAN by not forwarding those packets that have local destination addresses. Increases bandwidth efficiency.
- **Operates at the data link layer level**—allows multivendor implementation transparent to higher-level protocols such as DECnet, LAT, TCP/IP, or XNS.
- **Baseband and broadband 802.3/Ethernet compatible**—connects LANs: baseband to baseband, baseband to broadband, broadband to broadband.
- **No software required**—does not require downline loading. No requirement to have a Digital node on the network.
- **Remote Bridge Management Software (RBMS) available for enhanced management**—by using a VAX/VMS system running RBMS, a user can observe and control any bridge in the extended LAN.
- **IEEE 802.3/Ethernet device**—can be used in networks compliant with IEEE 802.3, standard Ethernet, or ThinWire.
- **Optional LAN Traffic Monitor (LTM) analyzes extended LAN utilization**—a LAN Bridge 100 (minimum revision level E), downline loaded with LTM software, provides multiple users with timely, accurate traffic performance statistics.
- **Dynamic learning**—automatically detects and adjusts to changes in network configuration.
- **Auto backup (using redundant bridges)**—increases availability and reliability of the network.

Extended 802.3/Ethernet Local Area Network Products

- **Write access switch**—write protection feature controls the access necessary to change operating parameters.
- **Non-volatile RAM available for storing settable parameters**—protects the settable operating parameters against loss due to power failures.
- **Fiber optic version**—provides a fiber optic link up to 3,000 meters that is not affected by electrical or electromagnetic interference and is protected from moisture. The fiber optic bridge can be used between buildings, underground, and in harsh environments.
- **Rackmount or wallmount**—Can be used in a wiring closet or mounted in a 19-inch rack.

Specifications

Physical Characteristics	With Plastic End	Without Plastic End
Height	16.2 cm (6.4 in)	13.3 cm (5.3 in)
Width	49.4 cm (19.4 in)	43.6 cm (17.2 in)
Depth	31.3 cm (12.3 in)	29.8 cm (11.7 in)
Weight	9.5 kg (21 lb)	7.3 kg (16 lb)
Power Requirements		
Low-range line voltages	120: 93 to 128 V	120: 93 to 128 V
High-range line voltages	240: 207 to 253 V	240: 207 to 253 V
Frequency tolerance	47 to 63 Hz	47 to 63 Hz
Maximum ac watts drawn	150 W	150 W
Maximum Heat Dissipation	500 Btu/h	500 Btu/h
Performance	▲ Refer to "LAN Bridge 100 Performance Guidelines" in Appendix A for packet-processing rates of the LAN Bridge and for power budget specifications of fiber optic links.	

Required Hardware

- For the standard LAN Bridge 100 (DEBET-Ax):
 - Baseband-to-baseband communications require two of the following in any combination: baseband transceiver or Local Network Interconnect (DELNI).
 - Broadband-to-broadband communications require two Ethermodems. (Note that the Ethermodem cannot connect to a DELNI.)
 - Baseband-to-broadband communications require either a baseband transceiver or DELNI on the baseband side, and a broadband transceiver on the broadband side.
- For the fiber optic LAN Bridge 100 (DEBET-Rx): either another fiber optic bridge or a fiber optic repeater (DEREP-Rx), plus the required hardware listed for the standard LAN Bridge 100.

Optional Management Software

Remote Bridge Management Software (RBMS) is an optional software package that allows users at a VAX or MicroVAX node to manage any bridge in an extended network. The network manager uses RBMS to control each bridge on the network, view error and traffic counters, operational parameters and the bridge's forwarding database. The manager also uses RBMS to change various operating parameters such as bridge state, link state and address filtering characteristics.

LAN Traffic Monitor (LTM) is network monitoring software used in multivendor environments to analyze the utilization of an extended LAN. LTM allows multiple users at any location to access traffic information that is gathered from any device connected to the LAN. LTM displays data, which is based on nodes, addresses, and/or protocol types, in graphic and tabular format. The software is downline loaded into a dedicated LAN Bridge 100 from a VAX node.

▲ For more information, refer to “Network and System Management Products” in Section 6.

Ordering Information

Local links require one DEBET bridge; fiber optic links require either two fiber optic DEBET bridges, or one fiber optic bridge and one fiber optic DEREPEP repeater.

Each local or fiber optic bridge purchased for use outside the United States requires a country kit that contains a power cord. (Versions for use within the United States do not require a country kit.) For countries not listed in the order code table, select a kit that uses the same plug configuration.

Transceivers, transceiver cables, and fiber optic cable must be ordered separately. Refer to this section and to “Communications Cables” in Section 3 for more information.

LAN Bridge 100 Order Codes

Option	Order Codes
Local LAN Bridge 100 for United States. Includes 110-Vac power cord. Does not require a country kit.	DEBET-AA
Local LAN Bridge 100 for non-U.S. countries. Requires a country kit.	DEBET-AB
Fiber optic LAN Bridge 100 for United States. Includes a 110-Vac power cord. Does not require a country kit.	DEBET-RH
Fiber optic LAN Bridge 100 for non-U.S. countries. Requires a country kit.	DEBET-RJ
Upgrade kit to convert older-model DEBET-RC/RD to DEBET-RH/RJ. Includes field service installation. One version for 110 or 220-240 Vac. (Does not convert DEBET-AA or DEBET-AB.)	FOAED-AA

LAN Bridge 100 Country Kit Order Codes

Country	Order Code
Austria, Belgium, Finland, France, Germany, Netherlands, Norway, Portugal, Spain, Sweden	BN03A-2E
Australia, New Zealand	BN05A-2E
Denmark	BN06A-2E
Ireland, United Kingdom	BN02A-2E
Italy	BN07A-2E
Switzerland	BN04A-2E

METROWAVE Bridge

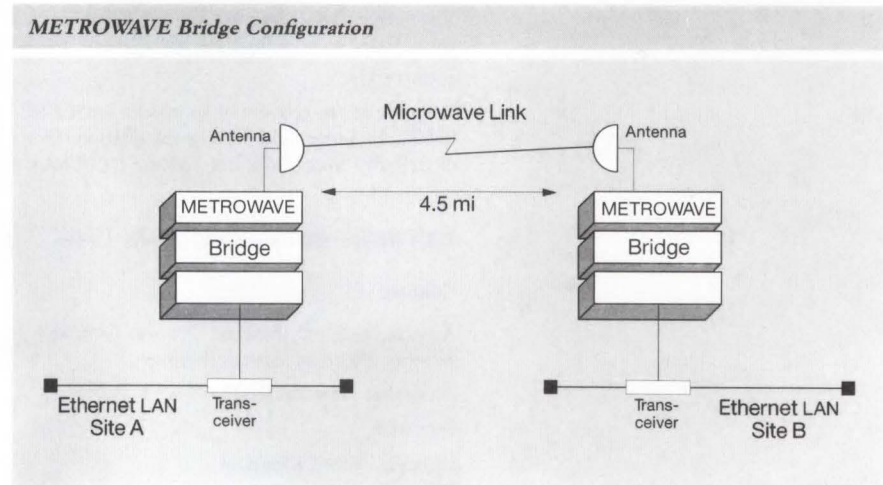
The METROWAVE Bridge connects geographically separated 802.3/Ethernet LANs within a metropolitan or campus environment in which cable is neither feasible nor economical. The METROWAVE Bridge consists of two LAN Bridge 100s connected by microwave transmission medium, thus adding microwave technology to the LAN Bridge 100's traditional coaxial and fiber optic transmission media.

The METROWAVE Bridge is a high-performance 802.3/Ethernet device that connects two or more LANs separated by such obstacles as streets, highways, and waterways. Transparent to the user, the bridge provides high-speed transmission via a 23-gigahertz (GHz) wideband, duplex, frequency-modulated microwave link. The METROWAVE Bridge spans single-link line-of-sight distances up to 4.5 miles, bridge to bridge. Multiple METROWAVE Bridges can be connected to reach greater distances, provided they adhere to 802.3/Ethernet configuration rules.

The METROWAVE Bridge provides a microwave connection that delivers the same high performance and store-and-forward filtering capability as the standard and fiber optic LAN Bridge 100s. The METROWAVE Bridge can simultaneously handle any protocols that run on 802.3/Ethernet, accommodating totally Digital, multivendor, or totally non-Digital networks.

The microwave equipment for this product is manufactured by a joint marketing partner, M/A-COM, Inc. The microwave radios, modified specifically for the METROWAVE Bridge, are based on widely proven 23-GHz technology. Digital's microwave adapter converts microwave equipment signal levels to standard 802.3/Ethernet signal levels. It also notifies the LAN Bridge 100 of a collision when both link stations attempt simultaneous transmission over the microwave link.

A complete METROWAVE Bridge system comprises two microwave link stations as shown in the following figure.



NBG-160-00

Features

- The microwave link, transparent to the user, allows connection when cable is too expensive or not feasible.
- 802.3/Ethernet 10 Mb/s bandwidth provides high-speed transmission.
- Protocol independence and Ethernet Version 2.0 compliance accommodates multivendor environments.
- Easily installed for quick availability.
- "T"-carrier and video system can be combined with the METROWAVE Bridge to increase flexibility and reduce overall costs.
- 802.3/Ethernet permits use in networks that are 802.3, standard Ethernet, or ThinWire compliant.

▲ Refer to the LAN Bridge 100 product description for additional features that the METROWAVE Bridge shares with the LAN Bridge 100.

Availability

This product is available in the United States, Canada, and Australia. Limited availability of private-use licenses for 23-GHz microwave equipment exists in some other countries where M/A-COM equipment is distributed and supported. Please call the Digital Computer Special Systems group at 1-800-832-6277 for details, or Digital Ancecy in Europe.

Implementing the Link

The customer is responsible for such activities as path survey, site analysis, and compliance with FCC licensing regulations. Assistance in performing these activities is available from Digital and authorized M/A-COM dealers. Additional information on implementing the link is listed in a separate Digital publication, *METROWAVE Bridge Links Ethernet LANs with Microwave Technology* (YM-AA114-00), or is available by calling 1-800-832-6277.

Specifications

The LAN Bridge 100 and the microwave adapter operate at 10 Mb/s using the Carrier Sense Multiple Access with Collision Detection (CSMA/CD) technique. The radio frequency (RF) unit generates a 23-GHz microwave carrier. It is co-located with the antenna and is powered by a cable from the microwave transmitter and receiver controllers.

Extended 802.3/Ethernet Local Area Network Products

The following specifications are the aggregate totals for the LAN Bridge, the microwave adapter, the transmitter controller, and the receiver controller. For individual specifications, refer to a separate Digital publication, *METROWAVE Bridge Links Ethernet LANs with Microwave Technology* (YM-AA114-00).

Physical Characteristics	
Height	31.50 in
Depth	31.25 in
Width	21.35 in
Weight	190 lb
Power Requirements	
Voltage tolerance	93 to 128 Vac
Line frequency	60 Hz
Maximum current	3.95 A (120 Vac)
Power consumption	326 W (Maximum)
Environmental Class	
	B ▲ Refer to Appendix B for details.

Prerequisite Software

No special software is required for operation of the METROWAVE Bridge because the bridge control functions are resident in the LAN Bridge 100 component.

Optional Management Software

Remote Bridge Management Software (RBMS) is recommended for enhanced control and monitoring of the microwave link for Digital LANs. ▲ Refer to "Network and System Management Products" in Section 6 for more information.

METROWAVE Bridge Order Codes for Digital Components

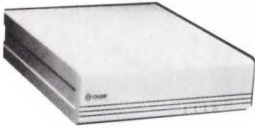
Option	Order Code
A METROWAVE Bridge includes two each: LAN Bridge 100, standard Ethernet transceiver, microwave adapter, BNE3M-20, BNE4D-02, and cable adapter. The METROWAVE Bridge is available premounted in 31.5-inch cabinets, or in non-cabinet configurations suitable for rack mounting in Satellite Equipment Room (SER) racks.	
METROWAVE Bridge in 2-cabinet configuration package	DEMWB-AA
METROWAVE Bridge in 2-SER-compatible configuration package	DEMWB-BA
METROWAVE Bridge in 1-cabinet and 1-SER-compatible configuration package	DEMWB-CA

Ordering M/A-COM Components

The M/A-COM LAN radio components, designated MA-23 LAN, include the following:

- Two transmitter controllers
- Two receiver controllers
- Two 23-GHz RF units
- Two 4-foot coaxial cables
- Two 2- or 4-foot microwave antennas

TransLAN



The MA-23 LAN and its installation are purchased separately through an authorized M/A-COM dealer. Contact the Digital Computer Special Systems group at 1-800-832-6277 for the name, address, and telephone number of the nearest authorized M/A-COM dealer.

Digital and Vitalink Communications Corporation have a third-party marketing agreement to offer a device that allows connection of multiple Ethernet or IEEE 802.3 LANs into one extended network. The Vitalink product, TransLAN, connects via terrestrial link, extending the LAN from 1.74 miles (2.8 kilometers) to thousands of miles.

TransLAN, which includes hardware and software, is a bridge that provides protocol-transparent connection of similar or dissimilar higher-level protocols on two or more LANs. It serves as a link-level relay, transferring data independently of the higher-level protocols in use. In order to translate between higher-level protocols, gateways are required.

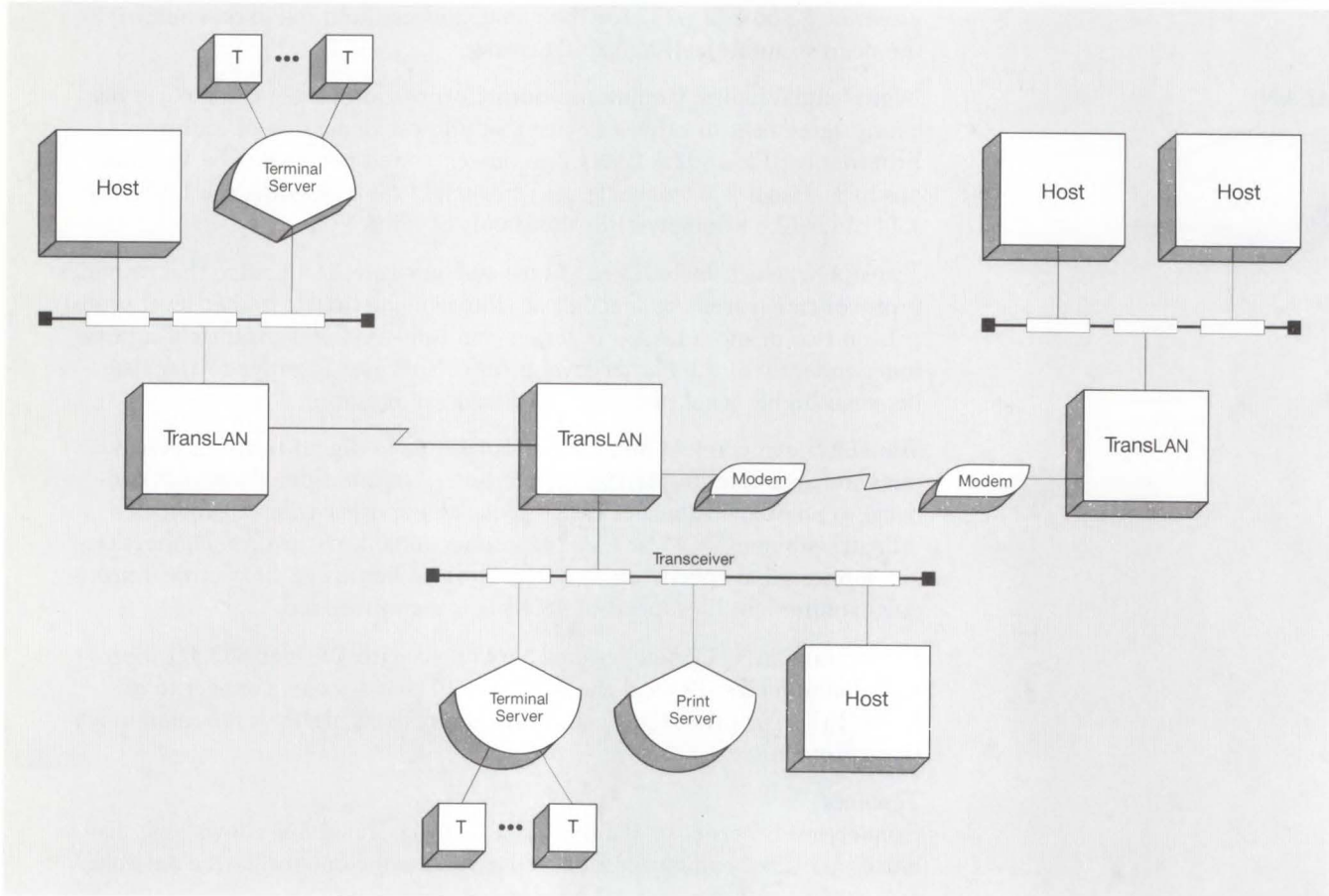
TransLAN can connect 802.3/Ethernet LANs to digital transmission systems, for example, terrestrial private lines. On one side, TransLAN connects to an 802.3/Ethernet LAN, while on the other side, it provides industry-standard V.35 or EIA-232 connections. LAN-to-LAN connections are supported at speeds up to 2.048 Mb/s. When using time-critical protocols, a minimum line speed of 56 Kb/s is recommended.

Using TransLAN, Digital systems networked with DECnet 802.3/Ethernet can communicate. Beyond the requirement that systems connect to an 802.3/Ethernet LAN, the bridge does not restrict higher-level communications protocols.

Features

- Connecting Ethernet or IEEE 802.3 LANs via TransLAN allows long distance broadcast communications, similar to using one local area network.
- Using multiple bridges connecting LANs, one node can send messages to many other local and remote nodes concurrently.
- Connects DECnet Phase III and DECnet Phase IV networks. Depending on the functions required and network configuration, you may choose a bridge or a router. A DECrouter 2000 is usually less expensive.
- TransLAN can connect Digital nodes running DECnet or other networking software on one 802.3/Ethernet LAN to Digital nodes running DECnet or other networking software on another 802.3/Ethernet LAN. The same requirement that exists on a local LAN—that stations communicating with each other must run the same protocols—also applies to nodes running on separate LANs connected by TransLAN.
- TransLAN can connect non-Digital nodes on one 802.3/Ethernet LAN to similar non-Digital nodes on a remote 802.3/Ethernet LAN. TransLAN can also connect Digital nodes on the two LANs at the same time. (Note that communication is limited to homogeneous systems.)

Network Configuration Using TransLAN



NBG-161-01

Extended 802.3/Ethernet Local Area Network Products

Specifications

Physical Characteristics

Height	14.0 cm (5.5 in)
Width	43.2 cm (17 in)
Length	54.1 cm (21.3 in)
Weight	12.2 kg (27 lb)

Power Requirements

ac watts drawn at 100 V, 47 Hz	400
ac watts drawn at 120 V, 47 Hz	400
ac watts drawn at 230 V, 47 Hz	400

Environmental Class C ▲ Refer to Appendix B for details.

Port Interfaces

User Port Interface	Ethernet Version 2.0 or IEEE 802.3
Terrestrial Port Interfaces	16 V.35/16 EIA-232
Terrestrial Port Data Capacity	2.048 Mb/s

Frame Processing Rates

15,000 frames per second filtering
600 to 1,500 frames per second
forwarding, depending on the application

Availability

TransLAN is available in some countries outside the United States via distributors. Contact a local marketing representative for more information.

Ordering Information

TransLAN is serviced and supported by Vitalink. For more information, contact your local Digital sales office.

802.3/Ethernet communications servers are divided into Terminal Servers, Print Servers, Routers and Gateways. Terminal and Print Servers are dedicated, special-purpose systems that provide resource sharing across nodes within a local area network (LAN). Router and gateway servers provide connection to nodes off the local area network via synchronous or asynchronous communication lines.

Terminal and Print Servers

Digital's Terminal and Print Server products include the following:

- **DECserver 200**—Connects up to eight terminals, serial printers, or modems to one or more hosts on an 802.3/Ethernet LAN.
- **DECserver 550**—Connects from eight to 128 terminals, serial printers, or modems to one or more hosts on the 802.3/Ethernet LAN.
- **MUXserver 100/DECmux II Remote Terminal Server**—Connects up to 16 terminals, PCs, or serial printers at remote sites to one or more hosts on the LAN.
- **PrintServer 40**—Provides high-volume laser printing via a dedicated data print controller to client nodes in a local area network.

Routers and Gateways

Digital's Router and Gateway products include the following:

- **DECrouter 200**—Transfers data packets from DECnet nodes on an 802.3/Ethernet LAN to remote DECnet nodes or other 802.3/Ethernet LANs via asynchronous lines.
- **DECrouter 2000**—Provides synchronous connections to remote a DECnet system and LANs in a wide area network or between remote LANs using DECnet.
- **X25router 2000**—Combines the functions of DECrouter 2000 with additional X.25 connections to Packet Switching Data Networks (can run both DECnet and X.25 concurrently).
- **DECnet/SNA Gateway for Synchronous Transport**—Connects 802.3/Ethernet LANs to IBM hosts using high-performance and high-bandwidth connections to front-end processors.
- **DECnet/SNA Gateway for Channel Transport**—Connects an 802.3/Ethernet LAN to an IBM host using direct attachment to the S/370 channel.

The DECrouter 2000, X25router 2000, and DECnet/SNA Gateway-ST share a common hardware base, the DEC MicroServer (DEMSA), used whenever communication is required from an Ethernet LAN into a Wide Area Network (WAN) environment. Special software determines which function the DEC MicroServer performs.

Features

- Provides resource sharing across multihost systems within an 802.3/Ethernet LAN.
- Performs a dedicated function whose cost can be spread over many users.
- Increases 802.3/Ethernet LAN configuration flexibility.
- Offloads communications processing from 802.3/Ethernet nodes, reducing CPU overhead.
- Automatic diagnosis on startup checks communications-server operation, increasing network reliability.

Summary of 802.3/Ethernet Terminal Servers

Server Product	DECserver 200	DECserver 550	MUXserver 100/ DECmux II
Hardware Type	DSRVB	DSRVS	DSRZA/DFMZA
Number of Lines/ Maximum Throughput	8 @ 19.2 Kb/s	Up to 128 (160,000 char/s output, 14,000 char/s input —application- dependent)	16 @ 19.2 Kb/s
MultiCPU Access	Yes	Yes	Yes
Modem Control	MC version—Yes; DL version—No	CXY08—Yes; CXA16—No CXB16—No	No
Protocols	Asynchronous	Asynchronous	Asynchronous
Downline-load Host Support ¹	DECnet-VAX, DECnet-11M- PLUS, DECnet-Micro/ RSX, DECnet-ULTRIX	DECnet-VAX, DECnet-11M- PLUS, DECnet-Micro/ RSX	DECnet-VAX, DECnet-11M- PLUS, DECnet-Micro/ RSX, DECnet-ULTRIX
Operational Host Support ¹	VMS, RSX-11M-PLUS, MicroRSX, ULTRIX-32 ²	VMS, RSX-11M-PLUS, MicroRSX	VMS, RSX-11M-PLUS, MicroRSX, ULTRIX-32
Primary Buying Reason	Connect to non- LAT hosts; modem control; DEC423 (EIA- 423-A) connection	Modular growth; high density with small footprint; decreased cost- per-port as users increase	Efficient remote terminal connection; low price per line

¹The terminal servers support only DECnet Phase IV implementations.²LAT support.

Summary of 802.3/Ethernet Routers and Gateways

Server Product	DECrouter 200	DECrouter 2000	X25router 2000	DECnet/SNA Gateway-ST	DECnet/SNA Gateway-CT
Hardware Type	DSRVC	DEMSA	DEMSA	DEMSA	DESNA
Number of Lines/ Maximum Throughput	8 @ 19.2 Kb/s	2 @ 256 Kb/s 4 @ 64 Kb/s	2 @ 256 Kb/s 4 @ 64 Kb/s	1 @ 256 Kb/s 2 @ 128 Kb/s 4 @ 64 Kb/s	1 @ channel speed
MultiCPU Access	Yes	Yes	Yes	Yes	Yes
Modem Control	Full	Full	Full	Full	Full
Protocols	Asynchronous DDCMP	DDCMP	DDCMP, X.25 (LAPB)	Synchronous SDLC	Channel
Downline-load Host Support ¹	DECnet-VAX, DECnet-ULTRIX	DECnet-VAX, DECnet-ULTRIX	DECnet-VAX,	DECnet-VAX	DECnet-VAX
Operational Host Support ¹	Any Phase IV DECnet node	Any Phase III or Phase IV DECnet node	VMS	VMS, ULTRIX-32, MS-DOS	VMS, ULTRIX-32, MS-DOS
Primary Buying Reason	Cost-effective PC-to-LAN connection	Connects Phase III nodes and wide area nodes to LAN; offloads nodes from communications processing	MultiCPU access to PSDNs; price and performance advantages over VAX CPUs acting as dedicated gateways	Connects an 802.3/Ethernet LAN to as many as four IBM SNA networks over synchronous communications lines	High-end DECnet/SNA transport provides channel connection for Digital/IBM communications

¹The DECnet/SNA Gateway products support only DECnet Phase IV implementations, while the DECrouter 2000 and X25router 2000 support any Phase III or Phase IV implementation.

Terminal Server Overview

Terminal servers provide a cost-effective, flexible way to connect terminals to hosts in an 802.3/Ethernet LAN. Each terminal connected to a terminal server can access services running on service nodes connected to the same LAN (refer to Prerequisite Software for supported hosts). Terminal servers connect asynchronous terminals at speeds up to 19.2 Kb/s to local nodes that implement the Local Area Transport (LAT) protocol.

Digital offers the following terminal server products:

- **DECserver 200**—an eight-line server that includes software that is downline loaded into DSRVB hardware. The DECserver 200 has a version with modem control (MC), and a DEC423 (EIA-423-A) version for data-only leads with no modem control.
- **DECserver 550**—an eight-to-128-line server that includes software that is downline loaded into DSRVS hardware. The DECserver 550 can accommodate three types of line controllers: one for full modem control, one for DEC423 (EIA-423-A) connections with no modem control, and one for EIA-422 connections with no modem control.
- **MUXserver 100/DECmux II**—a 16-line remote server that includes MUXserver 100 V2.0 software downline loaded into DSRZA hardware, and a remote multiplexer, the DFMZA.

Server software, including diagnostics, is downline-loaded into the server from a load host. In the event of hardware or software malfunction, the unit attempts to upline-dump the memory image (for later analysis), and automatically reloads the software.

The function performed by these terminal servers is similar to that offered by traditional terminal data switches (for example, Gandalf or Micom). The difference is that the terminal servers handle terminal communications over a communications line, while a traditional switch requires multiple terminal line connections. This results in a significant reduction in cost per line when using terminal servers, especially when cabling, host power, and packaging expenses are factored into the overall cost of network terminal connection.

In a VAXcluster environment, terminal servers add significantly in maintaining high availability to the cluster. Features such as log-in load balancing, automatic login failover, and multisession terminal connections provide greater user productivity.

Terminal servers support VT, LN, LA and LQ series terminal devices as well as Digital devices that run in VT100 compatibility mode (for example, the DECmate II and III, the Rainbow personal computer, and the Professional 300 Series computers).

Terminals connected to terminal servers can access remote DECnet nodes through DECnet Phase IV routing nodes on the same LAN. They can also connect to VMS nodes running Access software to access a X25router 2000 or DECnet/SNA Gateway. Note that a system on the LAN does not have to be running DECnet to communicate with the terminal servers. However, DECnet must be running on at least one node on the LAN in order to downline load the terminal server.

Printer Support

A terminal server used for printer applications provides a cost-effective way to distribute a printer or a collection of printers in an 802.3/Ethernet LAN. Each printer connected to a server can be shared between multiple VMS nodes connected to the same LAN. A terminal server can connect asynchronous printers at speeds up to 19.2 Kb/s to local nodes that implement the LAT protocol. Refer to the appropriate terminal-server Software Product Description for a list of printers supported.

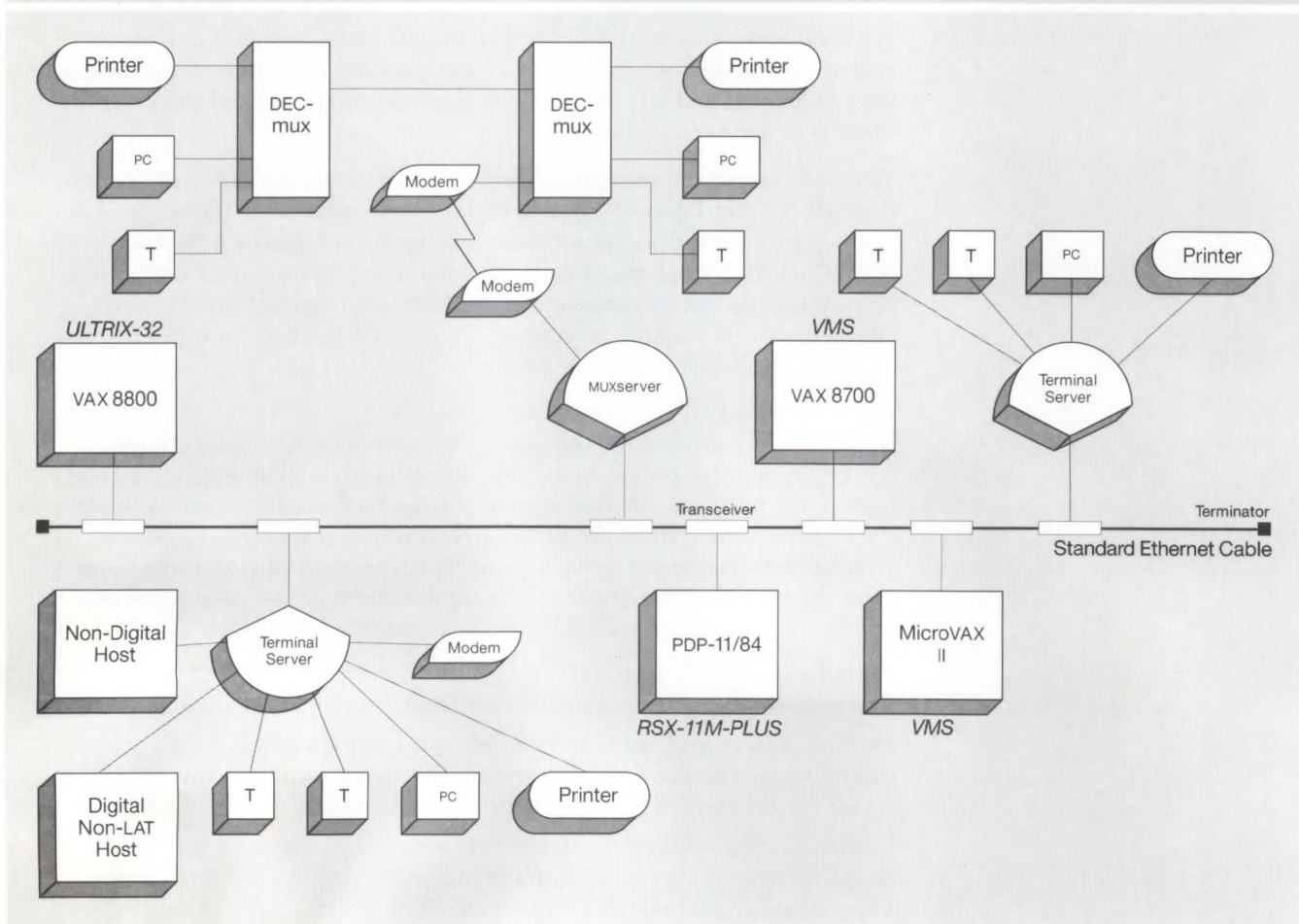
Features

The following features are common to Digital terminal servers:

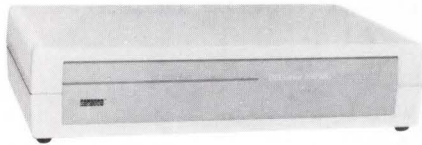
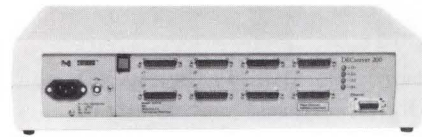
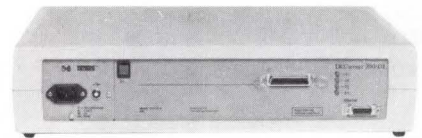
- **Multiple Sessions**—Users can establish and maintain multiple sessions to several service nodes. Only one session is active at a time and users can access the different sessions without repeating a login dialog.
- **Load Balancing**—When more than one node offers the same service, the server connects to the node with the highest rating for the service desired. This rating is based on the current loading on the nodes that offer the service.
- **Automatic Sessions Failover**—The server provides increased reliability and redundancy by allowing terminals logically connected to a failed host to access other hosts on the LAN.

- Terminal Request Management—The server eliminates terminal “blocking” (a limitation of data switches) by managing multiple terminal requests logically instead of physically. The LAT software allows the terminal server to effectively “multiplex” many terminal access requests over a single physical line.
- Terminal Connection Management—Users can establish a logical connection (session) to any local service node that implements the LAT protocol. Users connect to the services offered rather than the node itself. All the standard system utilities and applications supported by the node are available to the user.
- Security—The server provides multiple levels of security for terminal access to network hosts, preventing unauthorized users from accessing network resources.
- PC File Transfer—poly-XFR File Transfer for IBM Personal Computers.

LAN Configuration Using Terminal Servers



NBG-163-01

DECserver 200*DECserver 200**DECserver 200/MC**DECserver 200/DL*

The DECserver 200 is a network terminal switch for 802.3/Ethernet local area networks. It supports the simultaneous operation of up to eight terminals at speeds up to 19.2 Kb/s full duplex. Two versions of the DECserver 200 are available: DECserver 200/MC and DECserver 200/DL.

The following capabilities are supported by the DECserver 200/MC (Modem Control):

- EIA-232-D line interface
- Modem Control—The DECserver 200 provides modem support for asynchronous modems (Digital's modems or BELL 103, 212, and 2400 baud modems)
- LED enhanced visual communication monitors
- Connection to Non-LAT Hosts—The DECserver 200/MC provides transparent logical terminal connections to hosts that do not implement the LAT protocol. In this type of configuration, the DECserver 200 becomes the 802.3/Ethernet connection and protocol support for these hosts. Users can access LAT and non-LAT hosts directly via a DECserver 200. A host that supports XON/XOFF, ASCII standards, and EIA-232-D interfaces can be connected to the DECserver 200.

The DECserver 200/DL (Data Leads) has a single 36-pin connector capable of supporting eight DECconnect ports (DEC423). A special cable is required to connect the DECserver 200/DL to equipment that can interface to DEC423 signals. DECserver 200/DL does not support modems or applications with devices that require modem control signals. The DECserver 200/DL is intended for applications requiring only data leads to serial terminals or printers. Refer to "DECconnect" in this section for more information.

Features

- Terminal Device/Session Management Protocol (TD/SMP) supports these functions on VT330 and VT340 terminals:
 - Two terminal sessions can be active simultaneously, regardless of which session is displayed on the screen.
 - Users can concurrently display the interaction with two sessions on a divided screen.
 - While the user is interacting with one session, the other session can continue processing.

Refer to Terminal Server Overview in this section for other DECserver 200 features.

Specifications

Physical Characteristics:

- Height: 11.75 cm (4.63 in)
- Width: 48.90 cm (19.25 in)
- Depth: 32.07 cm (12.63 in)
- Weight: 5.44 kg (12 lb)
- Environmental Class: C (Refer to Appendix B for details.)

Prerequisite Hardware

- All 802.3/Ethernet physical channel hardware.
- Either an 802.3/Ethernet transceiver, a DELNI, or DESTA and transceiver drop cable.

Prerequisite Software

- DECserver 200 software must be downline loaded from one of the following load hosts: DECnet-VAX, DECnet-11M, DECnet-11M-PLUS, DECnet-Micro/RSX, and ULTRIX-32.
- For service node support, one of the following operating systems is required: VMS, MicroVMS, RSX-11M-PLUS with DECnet-11M-PLUS, Micro/RSX with DECnet Micro/RSX, ULTRIX-32.

▲ Refer to the Software Product Description for the version number requirements.

Terminal Server Manager Optional Software

The Terminal Server Manager/VMS is a software tool that allows a user at a VAX host to remotely observe and control Digital terminal servers anywhere in an extended local area network. For more information, refer to Terminal Server Manager in this section.

Ordering Information

Order the DECserver 200 hardware, a country kit for 240-V versions, and at least one copy of the software. Cables to connect terminals and modems must be ordered separately.

The DECserver 200 hardware includes the license to run DECserver 200 software. Software on the appropriate distribution medium must be purchased for the host that downline loads the DECserver 200.

The DECserver 200 country kit includes a power cord, hardware manual, and rackmounting brackets. The 240-V versions of the DECserver 200 require a country kit; the 120-V versions include the country kit. A 120-V country kit for the U.S. and Canada is listed to retrofit models originally ordered for 240 V.

DECserver 200 Hardware Order Codes

Option	Order Code
8-line DECserver 200, 120 V, supports 8 EIA-232-D physical terminal connections. Includes country kit.	DSRVB-AA
8-line DECserver 200, 120 V, supports DEC423 data-only terminal connections. Includes SER adapter kit and country kit.	DSRVB-BA
8-line DECserver 200, 240 V, supports 8 EIA-232-D physical terminal connections. Requires country kit.	DSRVB-AB
8-line DECserver 200, 240 V, supports 8 DEC423 data-only terminal connections. Includes SER adapter kit; requires country kit.	DSRVB-BB

DECserver 200 Power Cord Order Codes

Country	Order Code
Australia, New Zealand	DSRVB-KZ
Belgium, Finland, France, Holland, Norway, Spain, Sweden	DSRVB-LA
Canada (English and French), United States	DSRVB-KA
Denmark	DSRVB-KD
Italy	DSRVB-KI
India	DSRVB-LJ
Israel	DSRVB-KT
Japan	DSRVB-KJ
Switzerland (French and German)	DSRVB-LB
United Kingdom	DSRVB-KE
West Germany	DSRVB-KG

DECserver 200 Software Order Codes for VMS

Option	Order Code
Materials and Installation:	
Distribution and documentation	QA-VCBAA-H#
Documentation only	QA-VCBAA-GZ
Software revision right-to-copy	QL-VCBAA-HZ
Installation Service	QT-VCBAA-I#

#Supported media: 3, 5, G, M, Y

DECserver 200 Software Order Codes for ULTRIX and RSX

Option	Order Code		
Materials and Installation	ULTRIX-32	Micro/RSX	RSX-11M-PLUS
Distribution and documentation	Q*Z14-HG Q*Z14-HM	QYZ06-H3 QYZ06-H5	QRZ06-HH QRZ06-HM
Software revision right-to-copy	Q*Z14-HZ	QYZ06-HZ	QRZ06-HZ
Documentation only	QLZ14-GZ	QYZ06-GZ	QRZ06-GZ

Supported processors (): VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8500/8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M); VAX 8974/8978 (2)

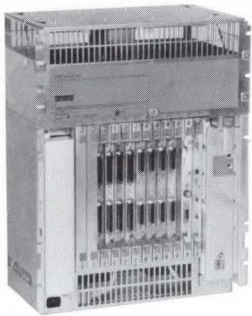
¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

Terminal Cables

To connect terminals to the DECserver 200/MC, order the following cables. (When ordering cables refer to "Communications Cables" in Section 3 for cable options and be sure to specify length, for example, BC22F-25.)

- BC22E—Full modem 16-wire cable for modem connections.
- BC22F—Full modem 25-wire cable for modem connections.
- BC22R—Recommended null modem cable for host systems and other devices, including those that utilize CTS/RTS flow control.
- BC17D—Null modem cable for host systems and other devices that do not utilize CTS/RTS flow control.

DECserver 550



The DECserver 550 terminal server is a terminal switch capable of connecting large concentrations of terminals, serial printers, and modems to one or many hosts on an 802.3/Ethernet local area network. It can also be used to connect other vendors' processors to the local area network, allowing access to terminal-server users. It is the high-end companion to the DECserver 200 terminal server.

The DECserver 550 high-density compact packaging supports up to 128 terminal connections via eight integral card slots that support terminal interface options:

- The CXY08 with modem control provides eight EIA-232-D 25-pin connections.
- The CXA16 provides 16 EIA-423-A modular-jack local connections for local terminals or serial printers.
- The CXB16 provides 16 EIA-422 modular-jack connections to terminals in harsh environments located at distances up to 4,000 feet.

▲ For more information on the CX modules, refer to "Q-bus Communications Controllers" in Section 3.

A fully populated DECserver 550 with EIA-423-A or EIA-422 interface options supports a maximum of 128 terminal devices. A fully populated DECserver 550 with EIA-232-D interface options supports a maximum of 64 devices. Or, any combination of interface options, up to eight total, can be mixed within the same enclosure.

The DECserver 550 with CXY08 EIA-232-D interface provides a non-LAT 802.3/Ethernet interface that connects non-Digital equipment, including processors, modems, protocol converters, Data PBXs, and virtually any device with a serial port that supports asynchronous EIA-232-D connections with modem control.

The DECserver 550 in many ways performs like a Data PBX. It can co-exist with or replace existing Data PBXs as part of a migration path to 802.3/Ethernet local area networks.

The DECserver 550 is available in two versions: one for rackmounting into a Digital Satellite Equipment Room (SER) or 19-inch utility cabinets, and one with cabinet enclosures for the office floor.

802.3/Ethernet Communications Servers

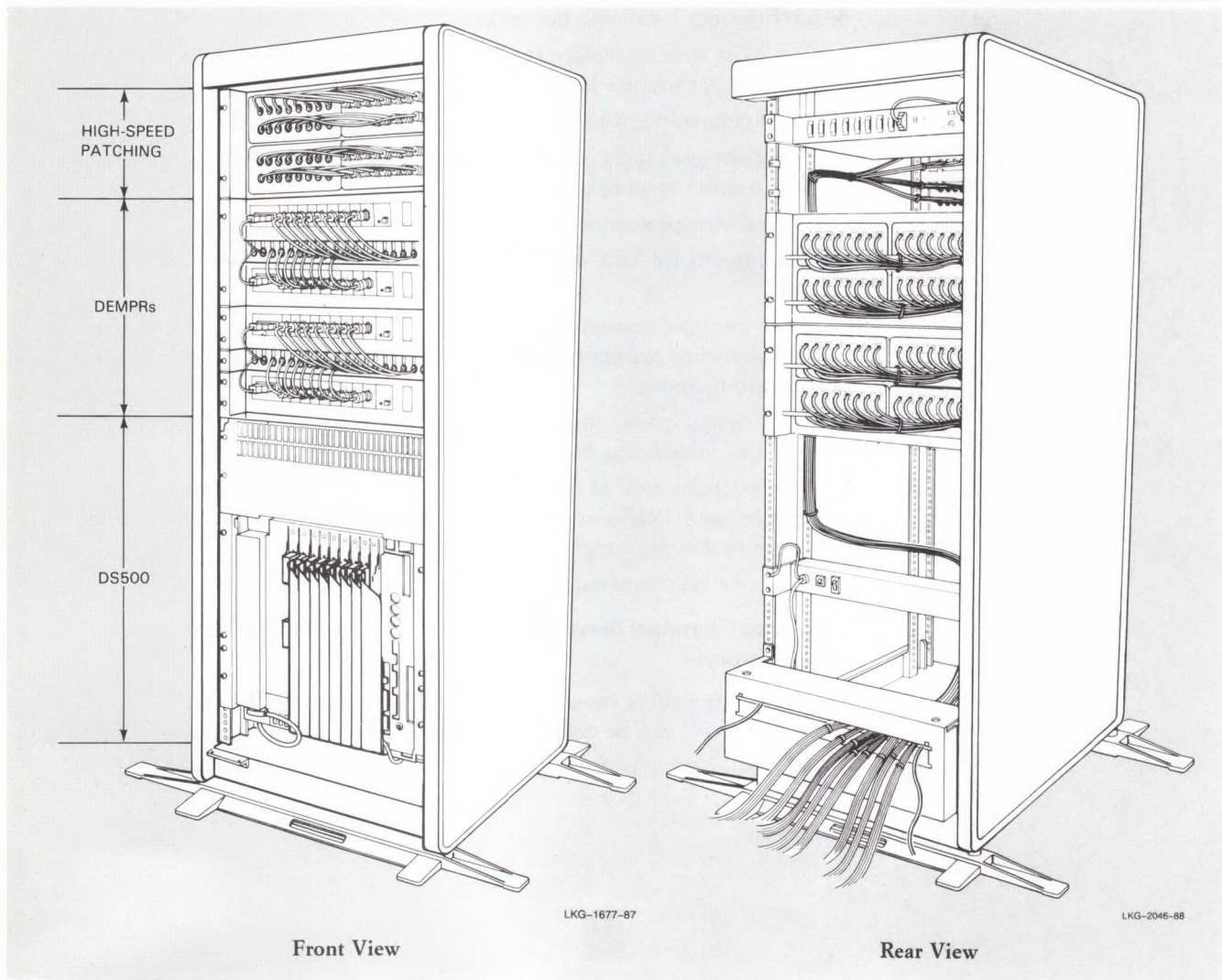
Features

- Ideally suited for connecting large concentrations of terminal devices to 802.3/Ethernet local area networks.
- Can co-exist with or replace traditional Data PBX switches as a migration path to 802.3/Ethernet local area networks.
- Protocol compatible with the family of Digital terminal servers.
- High-density packaging supports a large number of terminal connections from a compact footprint size.
- Decreased cost-per-connection as the number of users increase.
- Printer support for VAX and MicroVAX systems allows users to share printers.
- Supports multiple sessions, up to a total of 512 per DECserver 550. Users can simultaneously maintain multiple sessions to several hosts, resulting in greater productivity.
- Modular design allows incremental growth from eight to 128 terminal connections, depending on the interface modules selected.
- Accommodates a total of 64 lines with eight CXY08 controllers, or 128 lines with eight CXA16 or CXB16 controllers, or any combination of the three (up to a total of eight controllers).
- Includes one year hardware and software warranty.

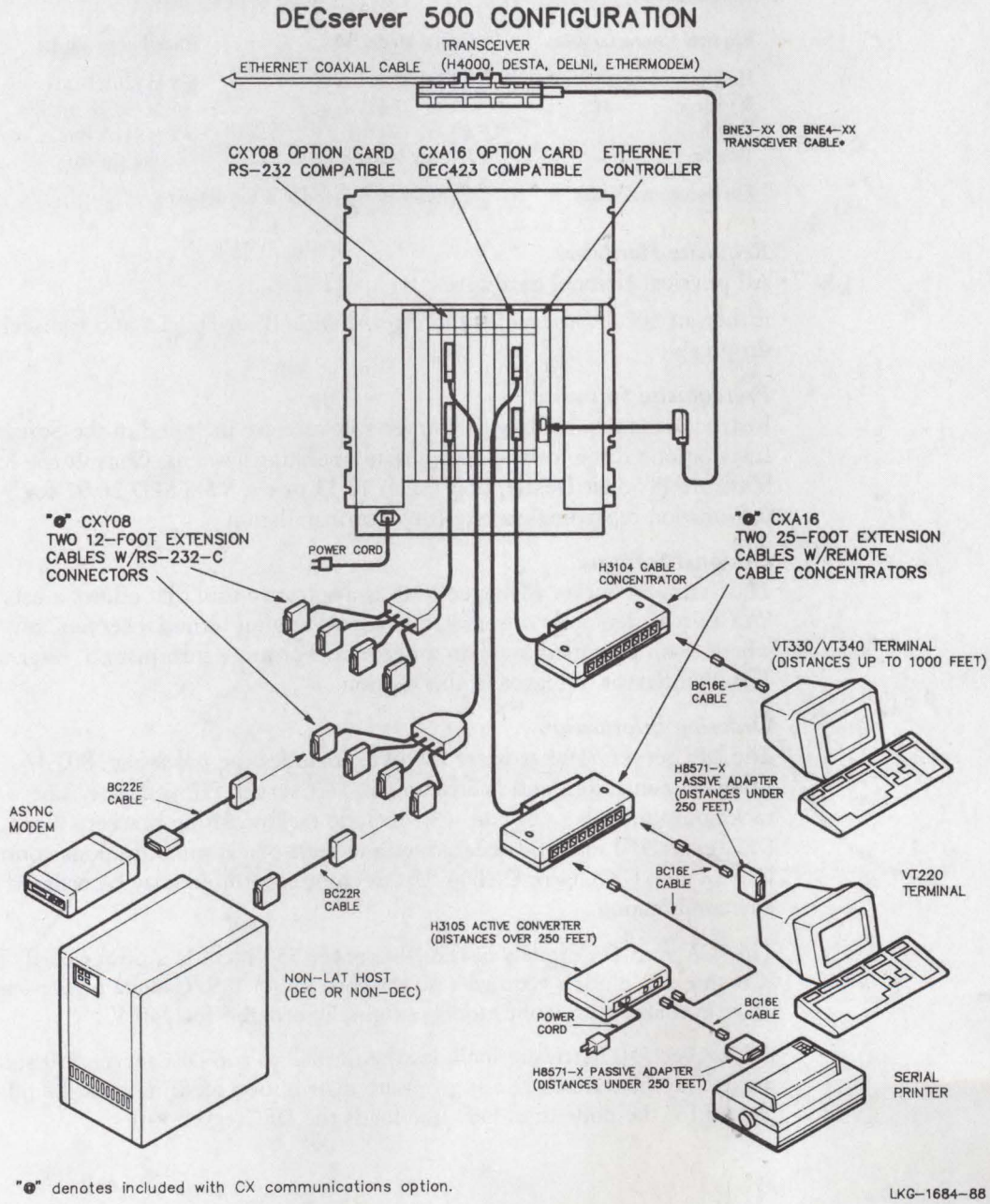
▲ Refer to “Terminal Server Overview” in this section for other terminal server features.

The following figures shows how the DECserver 550 with CXA16 (no modem control) can be configured for the Office Communications Cabinet.

DECserver 500 Rackmounted in an H9646-E Office Communications Cabinet



DECserver 550 Non-rackmounted, Standalone Configuration



802.3/Ethernet Communications Servers

<i>Specifications</i>		
Physical Characteristics	Office Model	Rackmount Model
Height	.69 m (27 in)	.66 m (26.25 in)
Width	.53 m (21 in)	.46 m (18.28 in)
Depth	.45 m (17.8 in)	.29 m (11.5 in)
Weight	39.5 kg (85 lb)	28.3 kg (61 lb)
Environmental Class	C (Refer to Appendix B for details.)	

Requisite Hardware

- All physical channel hardware.
- Either an 802.3/Ethernet transceiver, a DELNI, or DESTA and transceiver drop cable.

Prerequisite Software

Instructions for installing the server software are included in the Software Installation Guide for the appropriate operating systems. Consult the RSX Software Product Description (SPD) 18.53 or the VMS SPD 26.97 for information regarding prerequisites for installation.

Optional Software

The Terminal Server Manager/VMS is a software tool that allows a user at a VAX host to remotely observe and control Digital terminal servers anywhere in an extended local area network. For more information, refer to Terminal Server Manager in this section.

Ordering Information

The DECserver 550 hardware (DSRVS) includes the processor, 802.3/Ethernet controller, and license to run DECserver 550 software. The rackmount models (-CA and -CB) include rackmounting brackets. Each DECserver 550 must be ordered with at least one communications controller: CXY08, CXA16, or CXB16. Up to eight controllers may be ordered in any combination.

The -CA and -DA models of the DECserver 550 include a power cord. The -CB and -DB models require a power-cord kit. A U.S./Canada power-cord kit is available to retrofit models originally ordered for 240 V.

DECserver 550 hardware includes the license to run DECserver 550 software. The software on the appropriate distribution medium must be purchased for the node that downline loads the DECserver 550.

802.3/Ethernet Communications Servers

DECserver 550 Hardware Order Codes

Option	Order Code
DECserver 550 rackmount model, 120 V. Includes power cord kit.	DSRVS-CA
DECserver 550 rackmount model, 240 V. Requires power cord kit.	DSRVS-CB
DECserver 550 floor model, 120 V. Includes power cord kit.	DSRVS-DA
DECserver 550 floor model, 240 V. Requires power cord kit.	DSRVS-DB
Each DECserver 550 must be ordered with at least one of the following communications controllers:	
Factory-installed 16-line asynchronous communications controller for DEC423 (EIA-423-A) signaling standard.	CXA16-AA
Factory-installed 16-line asynchronous communications for EIA-422 signaling standard.	CXB16-AA
Factory-installed 8-line asynchronous communications controller for EIA-232-D signaling standard.	CXY08-AA
The following may be ordered as field add-on options:	
Field-installed 16-line asynchronous communications controller for DEC423 (EIA-423-A) signaling standard.	CXA16-AF
Field-installed 16-line asynchronous communications controller for EIA-422 signaling standard.	CXB16-AF
Field-installed 8-line asynchronous communications controller for EIA-232-D signaling standard.	CXY08-AF

DECserver 550 Power Cord Order Codes

Option	Order Code
United States, Canada	BN20A-2E
Japan	BN20B-2E
Australia, New Zealand	BN20C-2E
Belgium, Finland, France, West Germany, Holland, Norway, Spain, Sweden	BN20D-2E
Ireland, United Kingdom	BN20E-2E
Switzerland	BN20F-2E
Denmark	BN20H-2E
Italy	BN20J-2E
India, South Africa	BN20K-2E
Israel	BN20L-2E

DECserver 550 Software Order Codes

Option	VMS	RSX	MicroRSX
Media and documentation ¹	QA-03KAA-HM	QRZ46-HM	QYZ46-H3
	QA-03KAA-H3	QRZ46-HH	QYZ46-H5
	QA-03KAA-H5		
Software revision right-to-copy	QL-03KAA-HZ	QRZ46-HZ	QYZ46-HZ
Documentation only	QA-03KAA-GZ	QRZ46-GZ	QYZ46-GZ
Installation service	QT-03KAA-IM	QRZ46-IM	QYZ46-I3
	QT-03KAA-I3	QRZ46-IH	QYZ46-I5
	QT-03KAA-I5		

¹The following processors are not supported as downline-load hosts for VMS: MicroVAX I, VAXstation I, and VAX-11/725.

MUXserver 100/DECmux II Remote Terminal Server

The MUXserver 100/DECmux II Remote Terminal Server connects up to 16 remote asynchronous terminals, personal computers, and printers via a pair of modems and a leased phone line to an 802.3/Ethernet local area network. The MUXserver 100 connects to the LAN and functions as a terminal server for remote devices. The DECmux II connects devices at the remote site and functions with the MUXserver 100 as a statistical multiplexer to send data to the LAN.

Features

The MUXserver 100/DECmux II reduces monthly phone charges by concentrating data over one leased phone line, and it offers an efficient and low-cost method for multiplexing remote devices over one leased phone line.

▲ Refer to "Terminal Server Overview" in this section for other MUXserver 100 features.

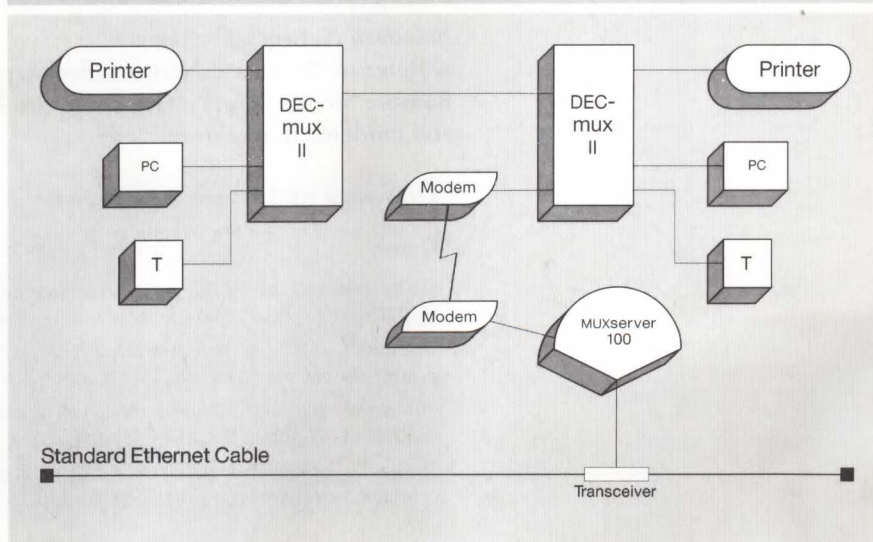
Specifications

Physical Characteristics	MUXserver 100 (DSRZA)	DECmux II (DFMZA)
Height	9.52 cm (3.75 in)	11.43 cm (4.5 in)
Width	45.7 cm (18 in)	35.29 cm (13.5 in)
Depth	30.48 cm (12 in)	22.35 cm (8.8 in)
Weight	6.8 kg (15 lb)	2.95 kg (6.5 lb)
Power Requirements		
Low-range line voltage	100 Vac to 120 Vac (-BA versions)	
High-range line voltage	200 Vac to 240 Vac (-BB versions)	
Frequency tolerance	50/60 ±3 Hz	50/60 ±3 Hz
Maximum ac watts drawn	50	33
Maximum heat dissipation	393 Btu/h	210 Btu/h
Environmental Class	C (See Appendix B for details.)	

Configurations

Each DECmux II can connect up to eight remote devices. Because each MUXserver 100 can accept up to 16 channels, two DECmux IIs can be linked to one MUXserver 100. Also, each MUXserver 100 can accept up to two composite links. A MUXserver 100 is linked to a DECmux II through a leased phone line and two external modems operating at a maximum speed of 19.2 Kb/s. Configurations include

- Sixteen users at one site: Two DECmux IIs can be linked at the same remote site with an EIA-232-D cable (maximum distance: 50 feet) or an EIA-422 cable (maximum distance: 3,280 feet) to accommodate up to 16 users.
- Sixteen users at two sites: Each site can have up to eight users connected to a DECmux II. Each site connects through a phone link to one MUXserver 100.
- Two sites with route-through: If there are two separate remote sites that are located close to each other, one site can be routed through the second site by linking two DECmux IIs with two modems and a leased phone line. Each site can have a maximum of eight users.
- One local site and one remote site: If only eight remote devices need 802.3/Ethernet connection, eight local devices can also be linked to the MUXserver 100 through a DECmux II. The MUXserver 100 is locally linked to a DECmux II with an EIA-422 cable.

MUXserver 100/DECmux II Configuration

NBG-167-00

Prerequisite Hardware

- One MUXserver 100 with one or two DECmux IIs plus user port cables.
- One 3002 or equivalent leased phone line and one pair of external modems and cables, where needed.
- All 802.3/Ethernet physical channel hardware.
- An 802.3/Ethernet transceiver, DESTA, or DELNI and transceiver drop cable.

Prerequisite Software

- To downline load MUXserver 100 software, one or more load hosts on the LAN must run one of the following:
 - DECnet-VAX
 - DECnet-11M-PLUS
 - DECnet-Micro/RSX
 - DECnet-ULTRIX

See the Software Product Description for the version number requirements.

- Service node support is available on the following operating systems:
 - VMS
 - RSX-11M-PLUS
 - Micro/RSX
 - ULTRIX-32

Remote printer support is available only for VMS and MicroVMS operating systems.

▲ See the Software Product Description for the software version number requirements.

Optional Software

The Terminal Server Manager/VMS (TSM) is a software tool that allows a user at a VAX host to remotely observe and control Digital terminal servers anywhere in an extended local area network. For more information, refer to Terminal Server Manager in this section.

Standard Network Packages

▲ Refer to “Standard Network Packages” in this section to order the Remote Site Package, which combines MUXserver 100 hardware, cables, and modems in one order code.

MUXserver 100/DECmux II Hardware Order Codes

Option	Order Code
MUXserver 100, 120 V (supports 16 remote devices connected to DECmux II ports.) Includes U.S. country kit.	DSRZA-BA
DECmux II, 120 V (supports 8 EIA-232-D Terminal, PC, or printer connections). Includes U.S. country kit.	DFMZA-BA
MUXserver 100, 240 V (supports 16 remote devices connected to DECmux II ports.) Requires country kit.	DSRZA-BB
DECmux II, 240 V (supports 8 EIA-232-D Terminal, PC, or printer connections). Requires country kit.	DFMZA-BB

MUXserver 100/DECmux II Software Order Codes for VMS

Option	Order Code
Load host operating system	VMS/MicroVMS
Single-use License ¹ (A license is required for each CPU.)	Q*ZAW-UZ
Materials and Installation	
Distribution and documentation	Q*ZAW-H#
Software revision right-to-copy	Q*ZAW-HZ
Documentation only	QLZAW-GZ
Installation Service	Q*ZAW-I#

Supported processors (): MicroVAX 2000 (3); VAX-11/725/730 (C); VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8500/8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M); VAX 8974/8978 (2)

#Supported media: 3, 5, M, Y

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

MUXserver 100/DECmux II Software Order Codes for ULTRIX and RSX

Option	Order Code		
Load host operating system	ULTRIX-32/32m	Micro/RSX	RSX-11M-PLUS
Single-use License ¹ (A license is required for each CPU.)	Q*ZCK-UZ	QYDAW-UZ	QJDAW-UZ
Materials and Installation:			
Distribution and documentation	Q*ZCK-H#	QYDAW-H3	QJDAW-H3
		QYDAW-H5	QJDAW-H5
Software revision right-to-copy	Q*ZCK-HZ	QYDAW-HZ	QJDAW-HZ
Documentation only	QLZCK-GZ	QYDAW-GZ	QJDAW-GZ

Supported processors (): MicroVAX II (Z); MicroVAX 2000 (3); VAX-11/725/730 (C); VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8500/8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M)

#Supported media: 3, 5, M, Y

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

Required Cables

To configure the MUXserver 100/DECmux II, order the following cables. When ordering cables refer to Communications Cables in Section 3 for cable options and be sure to specify the length, for example, BC22F-25.

Cable	Order Code
Modem cable to connect external modem to MUXserver 100 or DECmux II.	BC22F
Null modem cable to connect two DECmux IIs.	BC17D
Null modem cable to connect terminals, personal computers, or printers to DECmux II user ports.	BC22D

Note that EIA-422 cables are not sold as a Digital standard product. However, documentation is provided so that customers can make their own cables or Digital Field Service can custom-make them for an additional charge.

MUXserver 100/DECmux II Country Kits

The U.S. MUXserver 100/DECmux II (DSRZA-BA/DFMZA-BA) includes a U.S./Canada country kit. The non-U.S. MUXserver 100/DECmux II (DSRZA-BB/DFMZA-BB) requires a country kit. Each country kit includes a power cord, hardware documentation, and country-specific items. Be sure to order the appropriate country kit as a separate line item.

MUXserver 100/DECmux II Country Kit Order Codes

Country	MUXserver 100 Order Code	DECmux II Order Code
Australia	DSRZA-KZ	DFMZA-KZ
Belgium	DSRZA-LA	DFMZA-LA
Canada (English and French)	DSRZA-KA	DFMZA-KA
Denmark	DSRZA-KD	DFMZA-KD
Finland	DSRZA-LA	DFMZA-LA
France	DSRZA-LA	DFMZA-LA
Holland	DSRZA-LA	DFMZA-LA
Italy	DSRZA-KI	DFMZA-KI
India	DSRZA-LJ	DFMZA-LJ
Israel	DSRZA-KT	DFMZA-KT
Japan	DSRZA-KJ	DFMZA-KJ
New Zealand	DSRZA-KZ	DFMZA-KZ
Norway	DSRZA-LA	DFMZA-LA
Spain	DSRZA-LA	DFMZA-LA
Sweden	DSRZA-LA	DFMZA-LA
Switzerland (French and German)	DSRZA-LB	DFMZA-LB
United Kingdom	DSRZA-KE	DFMZA-KE
United States*	DSRZA-KA	DFMZA-KA
West Germany	DSRZA-KG	DFMZA-KG

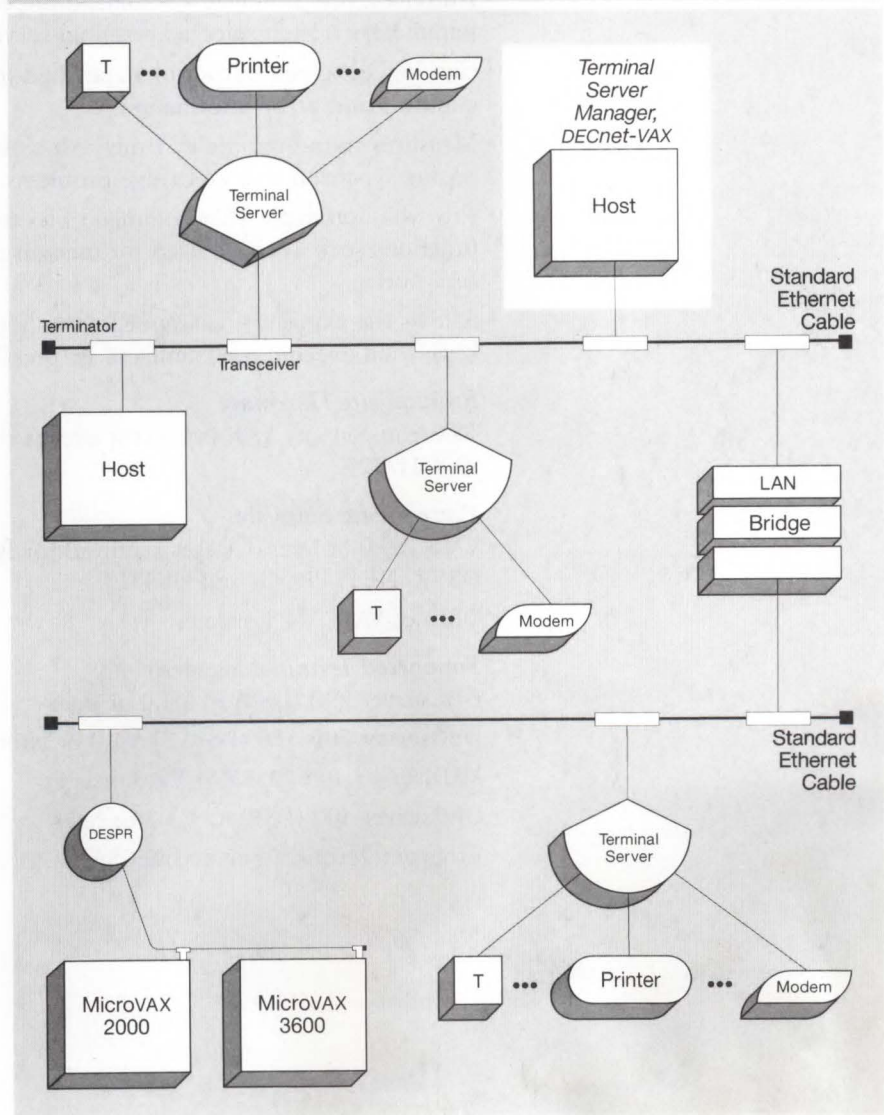
*The U.S. version of the MUXserver 100 (DSRZA-BA) includes a country kit. A U.S. country kit is also available as a separate line item.

Terminal Server Manager

The Terminal Server Manager/VMS (TSM) software allows a network manager at a VAX/VMS host to control and observe terminal servers anywhere in an extended local area network. TSM allows the manager to configure, monitor, and control Digital's family of terminal servers including the DECserver 100, 200 and 500/550, MUXserver 100, and Ethernet Terminal Server.

TSM integrates the functions of NCP TSC and DSVCONFIG in a product that allows the use of command files to help automate terminal server management. TSM exceeds the capabilities of NCP CONNECT in both configuration and fault management.

Terminal Server Manager Configuration



NBG-168-01

802.3/Ethernet Communications Servers

Features

- Allows a manager to group terminal servers based on server type, floor location, or department. Commands can be executed on a portion or on all servers, saving time.
- Automatically updates the DECnet database with information about each terminal server on the network, allowing easy access to all servers by name rather than LAN address.
- Allows generic command files to operate on single, group, or all servers in the network, saving time and providing flexibility.
- Tests LAT printers that are set up with LATCP and informs the manager of any printer queue setup problems or printer hardware problems.
- Automatically produces a command file configuration template containing parameters from a selected terminal server on the network.
- Can log all screen output to a specified file for review, useful for saving counters and error information.
- Measures round-trip delay from host to server or servers, useful in diagnosing synchronous line bridge problems.
- Provides automatic TSM command files to perform common server set-up functions such as those used for modem ports, printer ports, and reverse-LAT ports.
- Allows the manager to assign commonly used TSM commands to keyboard keys, then execute the command by pressing the key.

Prerequisite Hardware

TSM runs on any VAX processor except the MicroVAX I, VAXstation I, or VAX-11/725.

Prerequisite Software

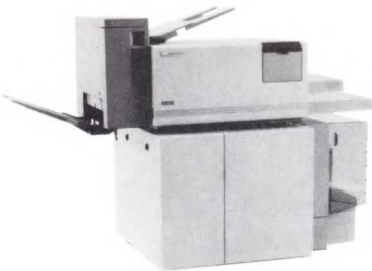
- VMS, V5.0 or later. Classes required for fully functional product are Base, DRV, NET, PROG, and UTIL.
- DECnet-VAX, V4.5 or later

Supported Terminal Servers

- DECserver 200 (DSRVB) V1.0 or later
- DECserver 500/550 (DSRVS) V1.0 or later
- MUXserver 100 (DSRZA) V2.0 or later
- DECserver 100 (DSRVA) V1.2 or later
- Ethernet Terminal Server (DECSA) V2.1 or later

Terminal Server Manager/VMS Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license ¹	QL-VDHA*-AA
Cluster license ²	QL-VDHA*-AB
Initial license, primary and cluster ³	QL-VDHA*-CA
Monthly rental, single-use ³	QL-VDHA*-DA
Monthly rental, cluster ³	QL-VDHA*-DB
Materials and Installation	
Distribution and documentation	QA-VDHAA-H#
Documentation only	QA-VDHAA-GZ
Software revision right-to-copy	QL-VDHA*-HZ
Installation service	QT-VDHA*-I#
U.S. Software Services⁴	
DECsupport service	QT-VDHA*-9#
Basic service	QT-VDHA*-8#
Self-maintenance service	QT-VDHA*-3#
Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B); VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C); VAXserver 3500/3600/3602 (C); VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K); VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800/8820 (D), VAX 8974 (V), VAX 8978 (5)	
#Supported media (#): RX01 (Y), RX50 (3), TK50 (5), 1600 bpi magtape (M), TU58 (G)	
¹ For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.	
² Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.	
³ Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.	
⁴ For service agreements in other countries, consult a local Digital sales representative.	

PrintServer 40

The PrintServer 40 is a monochromatic, high-speed laser printer that provides a shared printer resource on an 802.3/Ethernet LAN to VMS or MicroVMS client systems. It offers high-quality text, graphics, and scanned images. It handles multiple paper sizes, uses multiple fonts and point sizes, and prints directly on overhead transparencies or labels.

The PrintServer 40 employs PostScript, the industry standard, as its page description language. PostScript enables the PrintServer 40 to produce highly professional, complex documents with rotated type, textures, patterns, halftones, and images in any size and shape. Because not all application software currently supports PostScript, three VMS translators are included. These translators convert data syntaxes of ANSI (ASCII and Sixels), ReGIS, and Tektronix 4010/4014 to PostScript, which is then sent to the PrintServer 40.

802.3/Ethernet Communications Servers

The PrintServer 40 is downline-loaded and managed from a VMS or MicroVMS system running the VAX PrintServer 40 Support Host software. The PrintServer 40 is accessed by suitably configured VMS or MicroVMS systems running the VAX PrintServer 40 Client software. **▲ For more information on the VAX PrintServer 40 Support Host software, refer to Software Product Description (SPD) 27.68. For more information on the VAX PrintServer 40 Client software, refer to SPD 27.67.**

Features

- Electrophotographic printing of up to 40 pages per minute on plain paper and transparencies, using dry toner, heat and pressure fusing.
- High-speed 802.3/Ethernet connection for VAX and MicroVAX systems to support distributed processing.
- High-duty cycle—typically up to 50,000 to 60,000 pages per month.
- Accommodates multiple paper sizes, cut sheet paper, transparencies, and predrilled paper.
- Three paper input trays provide capacity of up to 2500 sheets of various media combinations.
- Employs PostScript as its standard page description language. (Information on PostScript training from Digital is available by calling 1-800-332-5656 or 1-508-276-4300.)
- Multiple fonts with 29 resident PostScript typefaces, including the symbol/math set.
- Resolution of 300 by 300 dots per inch for text, graphics, and scanned images.
- Translates ANSI/sixels, ReGIS, and Tektronix 4010/4014 protocols.
- Accounting functions can record page-usage and system-performance data, useful to a system manager.
- “Layup” functions permit multiple images on a single sheet of paper.

Prerequisite Software

- VMS operating system V5.0
- DECnet-VAX V5.0

Ordering Information

Order PrintServer 40 hardware, cables, and software.

The PrintServer 40 hardware includes the licenses to use the Client and Support Host software. Customers must order one copy each of the Client and Support Host software on the appropriate distribution medium.

For H4005/DELNI connection, right-angle cables must be ordered. The last two digits of the order code specify the length of the cable, measured in feet.

802.3/Ethernet Communications Servers

PrintServer 40 Hardware Order Codes

Option	Order Code
U.S. model: PrintServer 40, 40 ppm 802.3/Ethernet printer, 220/240 V, 60 Hz, attached power cord. Client and Support Host licenses are included.	LPS40-AA
International model: PrintServer 40, 40 ppm 802.3/Ethernet printer, 200/208/220/240 V, 50 Hz, detached power cord. Client and Support Host licenses are included.	LPS40-A3
Cables	
IEEE 802.3/Ethernet PVC-jacketed right angle male-to-female transceiver cable	BNE3K-10
	BNE3K-20
	BNE3K-40
IEEE 802.3/Ethernet plenum-rated right angle male-to-female transceiver cable	BNE3M-10
	BNE3M-20
	BNE3M-40
Consumable Parts	
Toner cartridges, package of 6 for approximately 60,000 pages total	LPS4X-AA
Developer and replaceable parts for approximately 100,000 pages	LPS4X-AB
Silicon oil, package of 4 for approximately 60,000 pages total	LPS4X-AC

PrintServer 40 Software Order Codes

Option	Order Code
VMS Support-host media	QA-798A*-H#
VMS Client media	QA-797A*-H#
Support-host documentation	QA-798AA-GZ
Client documentation	QA-797AA-GZ
#Supported media (#): RX50 (3), TK50 (5), 1600 bpi magtape (M)	

DECrouter 200

The DECrouter 200 provides communications between systems running DECnet software and systems on an 802.3/Ethernet local area network. Systems that can connect to the DECrouter 200 include the Digital Rainbow, the Digital Professional 300 series, the IBM PC, IBM PC AT, or any system running asynchronous DECnet-VAX or DECnet-RSX.

The DECrouter 200 handles up to eight local and remote connection at line speeds up to 19.2 Kb/s. It has a maximum throughput rate of 170 packets per second when all eight lines are running at maximum speed. **▲ For more information on performance, refer to Appendix A.**

The DECrouter 200 communications server software runs on a dedicated hardware base (the DSRVC) to provide the routing functions for up to eight DECnet Phase IV end nodes. It performs the routing functions on the LAN to allow Phase IV end nodes not directly connected to the LAN to communicate with directly-connected Phase IV nodes. The DECrouter 200 can also be the designated router on the LAN, allowing end nodes to communicate with nodes off the LAN.

The DECrouter 200 implements Phase IV DECnet asynchronous DDCMP routing and network management. It can be used to connect to Phase III nodes to provide Phase III networks with connectivity to Phase IV nodes.

The DECrouter 200 supports intra-area (Level 1) routing for transporting messages between nodes; it does not support inter-area (Level 2) routing. The DECrouter 200 transports messages between Phase III or Phase IV routing end nodes in the same area. End nodes connected directly to the LAN must use the DECrouter 200 or Phase IV host-routing nodes on the same LAN for message routing off that LAN.

Features

- Eight asynchronous lines with dial-in capability.
- Supports standard EIA-232-D connections and standard Ethernet AUI connections. ThinWire connects to the network via the DESTA Ethernet Station Adapter.
- Supports Phase IV enhancements (path-splitting, out-of-order packet caching).
- Provides full network management.
- Includes a monitor that shows such useful data as line utilization and speeds, other nodes on the network, and the designated router.

Installation and Host System Configurations

The DECrouter 200 can be downline-loaded from a DECnet-VAX or DECnet-ULTRIX system. **▲ Refer to the respective order code tables for a list of supported processors.** (Note that ULTRIX and DECnet-ULTRIX do not support the VAX-11/782 configuration.)

Prerequisite Hardware

A valid 802.3/Ethernet configuration is required to downline-load the DECrouter 200. The load host for the DECrouter 200 must be a DECnet Phase IV node with 802.3/Ethernet controller, and must be connected to the same LAN segment as the DECrouter 200.

The load host must have one of the following devices to read the distribution medium: 1600 bpi magnetic tape, RX50 floppy diskette, or TK50 tape cartridge.

Prerequisite Software

The software must be downline loaded by one of the following systems:

- VMS with DECnet-VAX, V4.2 or later
- ULTRIX-32, V1.2 or later, and DECnet-ULTRIX, V1.1 or later
- ULTRIX-32m, V1.2 or later, and DECnet-ULTRIX V1.1 or later

▲ For more information, refer to Software Product Description (SPD) (27.72).

DECrouter 200 Hardware Order Codes

Description	Order Code
DECrouter 200, EIA-232-D version, 120 V	DSRVC-AA
DECrouter 200, EIA-232-D version, 240 V	DSRVC-AB

Cable Requirements

One of the following cables must be used to connect to the DECrouter 200 asynchronous port:

- BC22D—EIA-232-D/CCITT V.24 null modem cable used to connect directly to locally situated nodes that do not require modem control signals.
- BC17D—EIA-232-D/CCITT V.24 null modem cable used to connect directly to locally situated nodes that require modem control signals.
- BC22E—EIA-232-D/CCITT V.24 cable used to connect to modems and modem-type devices.

The DECrouter 200 hardware (DSRVC) requires a transceiver cable to connect the integral 802.3/Ethernet port to the transceiver. The DSRVC may be connected to

- Standard baseband or broadband 802.3/Ethernet transceivers—requires a BNE3(H,K,L, or M) up to 50 meters, or a BNE4(C or D) up to 12.5 meters.
- DELNI Local Network Interconnect—requires a BNE3(H,K,L, or M) up to 50 meters, or a BNE4(C or D) up to 12.5 meters.
- DESTA ThinWire Ethernet Station Adapter—requires a BNE (H, K, L, or M) up to 50 meters, or a BNE4(C or D) up to 12.5 meters.

DECrouter 200 Country Kits

Description	Order Code
DECrouter 200 Country Kit	DSRVC-K*
	DSRVC-L*
*Refer to the Price List for more information.	

802.3/Ethernet Communications Servers

DECrouter 200 Software Order Codes for VMS

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-VDJA*-AA
Cluster member ²	QL-VDJA*-AB
Initial license, primary and cluster ³	QL-VDJA*-CA
Monthly rental, single-use ³	QL-VDJA*-DA
Monthly rental, cluster ³	QL-VDJA*-DB
Software revision right-to-copy	QL-VDJA*-HZ
Materials and Installation	
Distribution and documentation	QA-VDJAA-H#
Documentation only	QA-VDJAA-GZ
Installation service	QT-VDJA*-I#
U.S. Software Services⁴	
DECsupport service	QT-VDJA*-9#
Basic service	QT-VDJA*-8#
Self-maintenance service	QT-VDJA*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/725/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RL02 (H), RX33 (7), TK50 (5)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/725/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

DECrouter 200 Software Order Codes for ULTRIX

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license ¹	Q*Z51-UZ
Initial license ²	Q*Z51-1P
Periodic payment ²	Q*Z51-JP
Materials and Installation	
Distribution and documentation	Q*Z51-H#
Software revision right-to-copy	Q*Z51-HZ
Documentation only	QLZ51-GZ
Installation service	Q*Z51-I#
U.S. Software Services³	
DECsupport service	Q*Z51-9#
Basic service	Q*Z51-8#
Self-maintenance service	Q*Z51-3#

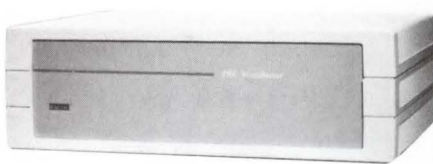
Supported processors (): MicroVAX II (Z); VAXstation II (4); MicroVAX 2000 (3); MicroVAX 3500/3600 (0); VAXserver 3500/3600/3602 (1); VAXstation 3200/3500 (1); VAX-11/725/730 (C); VAX-11/750 (D); VAX-11/780/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8500/8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M)

#Supported media: 5, M

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXstation, VAX-11/700 series, or VAX 8600/8650.

³For non-U.S. service agreements, consult a local Digital sales representative.

DEC MicroServer

The DEC MicroServer is the hardware base for the DECrouter 2000, the X25router 2000, and the DECnet/SNA Gateway-ST, providing connection whenever communication is required from an 802.3/Ethernet LAN into a Wide Area Network (WAN). Network users can access destinations across a worldwide geography via either a DECnet network, a Packet Switched Data Network (X.25), or an IBM SNA network, by connecting the DEC MicroServer to the 802.3/Ethernet network.

The DEC MicroServer allows DECnet backbone networks to use leased lines or X.25 public data networks. It can also provide a network-to-network connection from DECnet to SNA.

The DEC MicroServer is packaged in a LAN Bridge 100-type enclosure that can be placed on a desktop or mounted in a standard 19-inch rack. The hardware, a single-board communications engine, comprises a MicroVAX II chip set, two Mbytes of on-board memory, one Ethernet interface port (IEEE 802.3 compatible), power supply, and four synchronous communications ports.

Features

- With high line speed support, users benefit from cost-effective tariffs for higher speed telecommunications services and X.25 public data networks.
- Compatibility with CCITT X.25 PSDNs allows users to build global networks, utilizing the most competitive worldwide public networks.
- Efficient use of bandwidth improves price/performance and lowers cost of network ownership.

Specifications

Physical Characteristics	With Plastic	Without Plastic
Height	16.2 cm (6.4 in)	13.3 cm (5.3 in)
Width	49.4 cm (19.4 in)	43.6 cm (17.2 in)
Depth	31.3 cm (12.3 in)	29.8 cm (11.7 in)
Weight	8.1 kg (18 lb)	6.9 kg (13 lb)
Power Requirements		
Low-range line voltage	120-87 to 132 V	120-87 to 132 V
High-range line voltage	240-174 to 264 V	240-174 to 264 V
Frequency tolerance	47 to 63 Hz	47 to 63 Hz
Maximum ac watts drawn	150 W	150 W
Maximum heat dissipation	500 BTU/hr	500 BTU/hr
Environmental Class	A (See Appendix B for details.)	

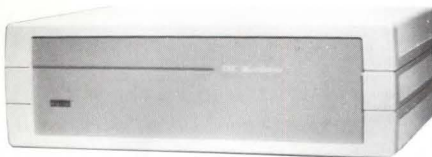
Ordering Information

The DEC MicroServer is packaged with the DECrouter 2000, X25router 2000, and DECnet/SNA Gateway-ST. **▲ Refer to the appropriate product description for ordering information.**

Refer to the order codes below only when ordering spare hardware for any of these packages. Note that the options below do not include cables, licenses, media or documentation.

DEMSA Order Codes

Option	Order Code
DEC MicroServer configured for 120 Vac	DEMSA-AA
DEC MicroServer configured for 240 Vac	DEMSA-AB

DECrouter 2000

The DECrouter 2000, a combination hardware/software product that runs on the DEC MicroServer (DEMSA) hardware unit, is a dedicated routing system that supports both intra-area (Level 1) and inter-area (Level 2) routing for Phase IV nodes on the LAN, or Phase III or Phase IV remote nodes connected to one of the four synchronous lines. The DECrouter 2000 is compatible with Phase V implementations.

The product supports DDCMP point-to-point and multipoint links and "path splitting" between two or more equal-cost paths. Path splitting means that DECnet traffic can share two equal-cost routes between source and destination nodes, providing higher performance as well as an alternative path if one route fails. Note that the destination end node must be VMS V4.1 or later, which supports reordering of out-of-order packets.

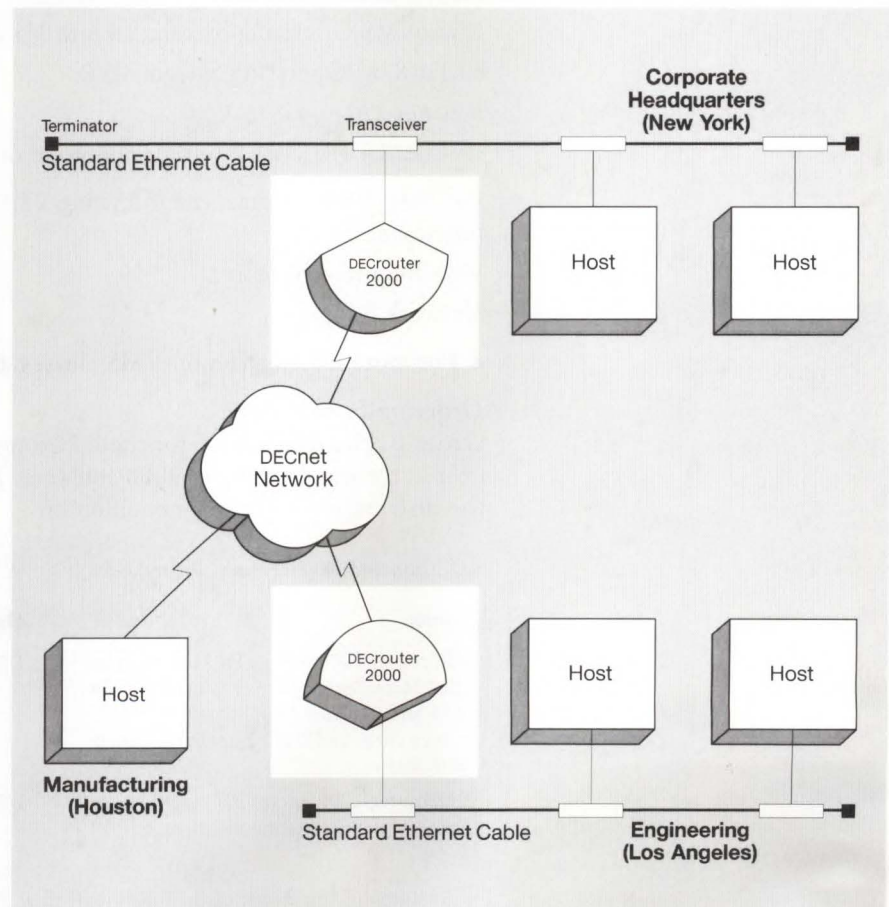
The DECrouter 2000 supports full- or half-duplex communications over four synchronous lines at speeds up to 64 Kb/sec or two synchronous lines at speeds up to 256 Kb/sec. Adapter cables provide the necessary interchange circuits for each synchronous line.

▲ Refer to Software Product Description 28.85 for further information.

DEC MicroServer (DEMSA)

The DEC MicroServer provides the hardware base for the DECrouter 2000, for interconnect whenever communication is required from an Ethernet LAN into a Wide Area Network (WAN). ▲ For further information regarding the DEC MicroServer, refer to its product description in this section.

LAN Configuration Using a DECrouter 2000



NBG-169-01

Features

- Provides synchronous connections to remote DECnet system and LANs in a wide area network or between remote LANs using DECnet.
- Operates at speeds up to 128 Kb/s for two lines, or 64 Kb/s for one line.
- Can communicate with remote Phase III nodes in the same DECnet area.

Prerequisite Hardware

Any VAX processor specified in the order code table. Every load host on which the DECrouter 2000 software is installed must contain:

- A valid DECnet-VAX or DECnet-ULTRIX system configuration. **▲ Refer to the DECnet and appropriate operating system SPDs.**
- A supported connection on the same LAN as the DECrouter 2000.
- An appropriate device available to read the software during installation. **▲ Refer to the order code table for supported devices.**

Prerequisite Software

For each VAX system acting as a load host/dump receiver, one of the following:

- VMS Operating System V4.4 to V5.0
- MicroVMS Operating System V4.4 to V4.7
- ULTRIX-32 Operating System V1.2
- DECnet-VAX V4.4 to V5.0
- DECnet-ULTRIX V1.2 (either end node or full-function)

For VMS V5.0 systems, the following VMS classes are required to be fully functional:

- VMS Required Saveset
- Network Support

▲ For more information on VMS classes and tailoring, refer to SPD 25.01.

Ordering Information

Order the hardware base for the DECrouter 2000, which includes the license for the DECrouter 2000 software. Also order at least one copy of the distribution and documentation kit.

DECrouter 2000 Hardware Order Codes

Option	Order Code
DECrouter 2000 Server Package includes DEC MicroServer hardware (120 V), two V.35 and two EIA-232-D adapter cables, power cord, and DECrouter 2000 license with warranty.	DEMSA-D*
DECrouter 2000 Server Package for Ireland. Includes components listed above.	DEMSA-EE

*Replace the * with one of the following codes: A (United States, Mexico), D (Denmark), E (United Kingdom), G (West Germany), I (Italy), K (Switzerland), P (France), T (Israel), X (Austria, Belgium, Finland, Netherlands, Norway, Sweden, Portugal, Spain)

DECrouter 2000 Software Order Codes

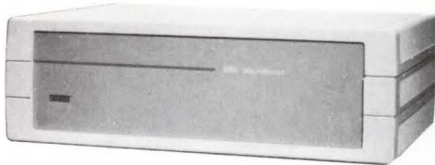
Option	VMS	ULTRIX-32
Materials and Installation		
Distribution and documentation	QA-VI8AA-H#	QA-VI9AA-H#
Software revision right-to-copy	QL-VI8H*-HZ	QL-VI9H*-HZ
Documentation only	QA-VI8AA-GZ	QA-VI9AA-GZ
Installation service	QT-VI8A*-I#	QT-VI9A*-I#
U.S. Software Services¹		
DECsupport service	QT-VI8A*-9#	QT-VI9A*-9#
Basic service	QT-VI8A*-8#	QT-VI9A*-8#
Self-maintenance service	QT-VI8A*-3#	QT-VI9A*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#) for VMS: RX50 (7), TK50 (5), 1,600 bpi magtape (M)

Supported media (#) for ULTRIX: TK50 (5), 1,600 bpi magtape (M)

¹For service agreements in other countries, consult a local Digital sales representative.

X25router 2000

The X25router 2000, a combination hardware/software product that runs on the DEC MicroServer (DEMSA) dedicated hardware unit, acts as an X.25 gateway for an 802.3/Ethernet local area network. This product provides access to one or more PSDNs for any system on the LAN that runs VAX P.S.I. Access software. It also provides access to any DECnet system that uses the PSDN to carry DECnet traffic to remote Digital systems, as well as providing one end of a point-to-point connection using standard ISO protocols, which conform to both CCITT and ISO standards.

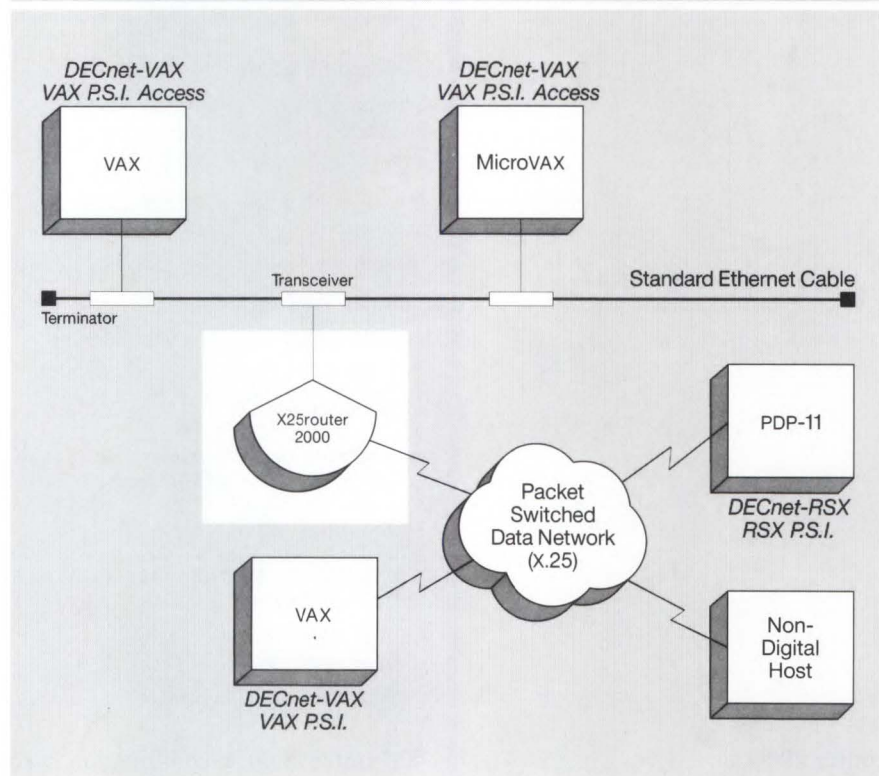
As with the DECrouter 2000, the X25router 2000 supports both Level 1 and Level 2 area routing. Adapter cables provide the necessary interchange circuits for each synchronous line. Performance is approximately 170 packets per second for DECnet circuits over X.25.

▲ Refer to Software Product Description 28.86 for further information.

DEC MicroServer (DEMSA)

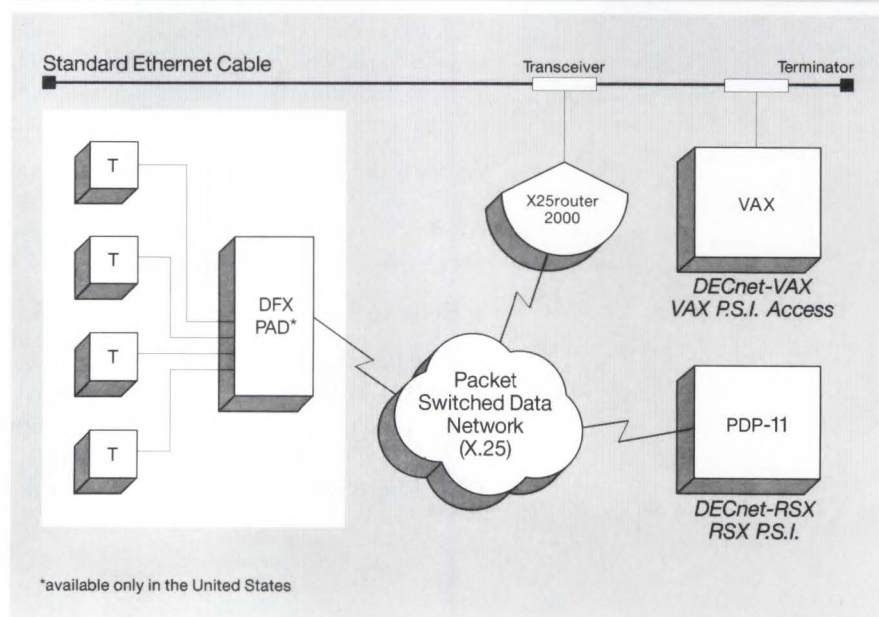
The DEC MicroServer provides the hardware base for the X25router 2000, for interconnect whenever communication is required from an Ethernet LAN into a Wide Area Network (WAN). ▲ For further information on the DEC MicroServer, refer to its product description in this section.

X25router 2000 Configuration (Digital-to-non-Digital Host)



NBG-109-01

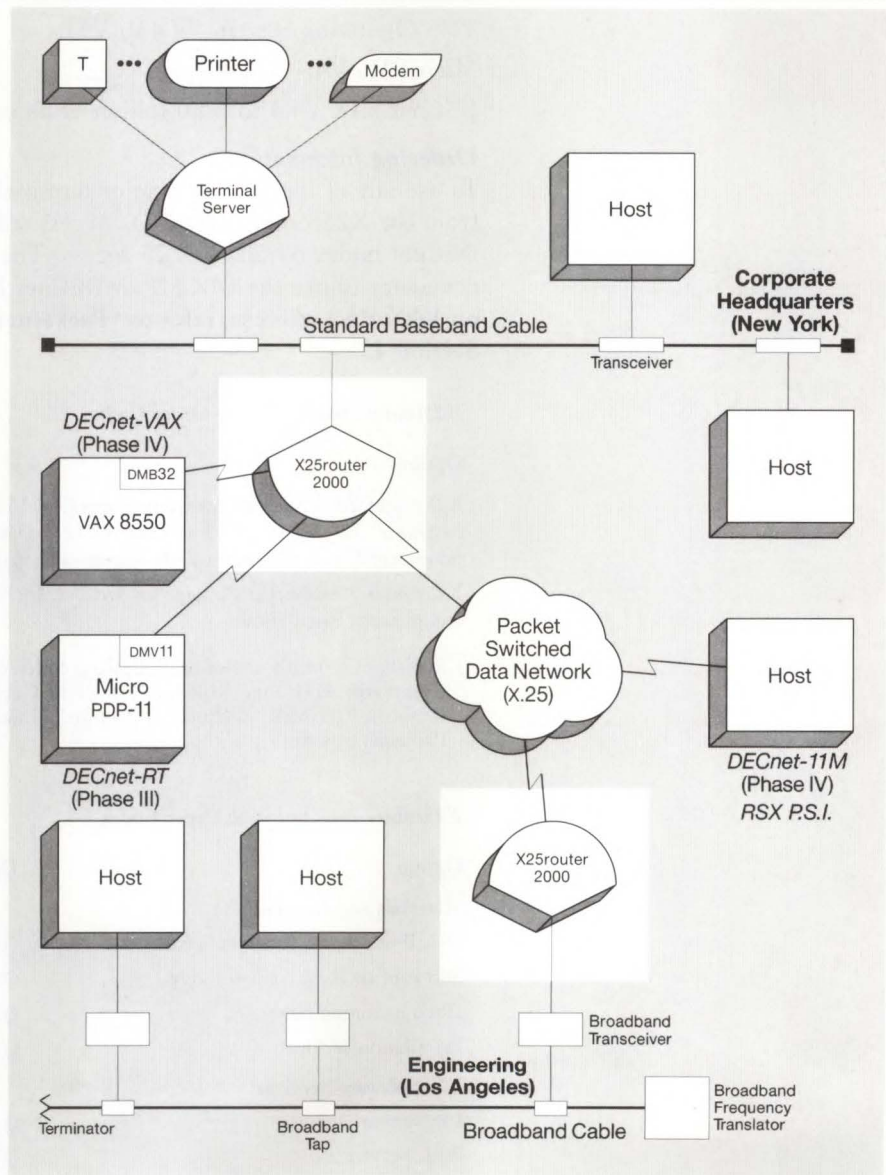
X.25/X.29 Terminal Access Configuration



*available only in the United States

NBG-110-01

X25router 2000 Configuration (DECnet-to-DECnet only)



NBG-220-01

Features

- Performs all the functions of the DECrouter 2000 plus connects systems on the LAN to X.25 PSDNs.
- Can run both DECnet and X.25 protocols concurrently.
- Allows DECnet to be connected to up to four X.25 PSDNs simultaneously.

Prerequisite Hardware

Any VAX or MicroVAX system, as specified in the X25router Software Order Code Table.

Prerequisite Software

For each VAX system acting as a load host or dump receiver:

- VMS Operating System V4.4 to V5.0
- MicroVMS V4.4 to V4.7
- DECnet-VAX V4.4 to V5.0 (either end node or full-function)

Ordering Information

To use any of the host-to-host or terminal-host capabilities of an X.25 link from the X25router, VAX P.S.I. Access software must be installed on DECnet nodes requiring X.25 access. The P.S.I. Access software is not necessary to use the DDCMP or DECnet DLM circuits. ▲ For information on VAX P.S.I. Access, refer to "Packetnet Communications Software" in Section 4.

X25router 2000 Hardware Order Codes

Option	Order Code
X25router 2000 Server Package includes DEC MicroServer hardware (120 V), two V.35 and two EIA-232-D adapter cables, power cord, and X25router 2000 license with warranty.	DEMSA-X*
X25router 2000 Server Package for Ireland. Includes components listed above.	DEMSA-YE

*Replace the * with one of the following codes: A (United States, Mexico), D (Denmark), E (United Kingdom), G (West Germany), I (Italy), K (Switzerland), P (France), T (Israel), X (Austria, Belgium, Finland, Netherlands, Norway, Sweden, Portugal, Spain)

X25router 2000 Software Order Codes

Option	Order Code
Materials and Installation	
Distribution and documentation	QA-V1AAA-H#
Software revision right-to-copy	QL-V1AA*-HZ
Documentation only	QA-V1AAA-GZ
Installation service	QT-V1AA*-I#
U.S. Software Services¹	
DECsupport service	QT-V1AA*-9#
Basic service	QT-V1AA*-8#
Self-maintenance service	QT-V1AA*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): RX33 (7), TK50 (5), 1,600 bpi magtape (M)

¹For service agreements in other countries, consult a local Digital sales representative.

DECnet/SNA Gateway for Channel Transport

The DECnet/SNA Gateway for Channel Transport, a combination hardware/software product that runs on DEC ChannelServer dedicated hardware, operates as part of both the DECnet and IBM SNA networks, allowing users in either network to share systems, applications, and network resources.

The DEC ChannelServer attaches directly to both the 802.3/Ethernet local area network and an IBM S/370 byte multiplexer, block multiplexer, or selector channel.

▲ Refer to “Digital/IBM Communications Software” in Section 4 for more information.

DECnet/SNA Gateway for Synchronous Transport

The DECnet/SNA Gateway for Synchronous Transport, a combination hardware/software product that runs on DEC MicroServer dedicated hardware, connects a DECnet 802.3/Ethernet local area network to as many as four remote SNA networks over synchronous communications lines.

▲ Refer to “Digital/IBM Communications Software” in Section 4 for more information.

Standard Network Packages make it easier for customers to configure and order network products because they include the major communications products required to implement specific network solutions. This modular approach to network design and ordering can be effectively utilized in networking applications ranging from small standalone work groups to large multiple-site installations.

Standard Network Packages work with existing Digital equipment in current system installations. All Digital computer systems having DECnet capability can be used with the Standard Network Packages.

The packages are organized into four categories based on typical user requirements. Three of the categories are based on geographic considerations. The fourth provides the capability to integrate another vendor's network into the Digital network.

The four categories of Standard Network Packages are

- Local Area Work Group Interconnection.
- Extended Local Area Interconnection.
- Wide Area Interconnection.
- Multivendor Interconnection.

Availability

Standard Network Packages are available only in the United States.

Introduction to Standard Network Packages

Local Area Work Group Interconnection

Local Area Work Group Interconnection provides connectivity among users that are typically involved in related activities and are located on the same floor. Four packages are available:

- DECconnect Integrated Communications Package, which provides integration and full access to the communication technologies used in the office: low-speed data, high-speed data, voice (telephone), and video. This system uses a faceplate at the user office to provide easy “plug-in” access.
- Low-speed Work Group Package, which provides network access for areas where the equipment used in work groups includes terminals, printers, and personal computers in terminal emulation mode.
- High-speed Work Group Package, used in areas where equipment is primarily PCs and/or workstations, and the applications require rapid transfer of large amounts of data.
- IBM PC Interconnection Package, a special application of the High-speed Work Group Package for IBM personal computers with full utilization of the Digital network.

Extended Local Area Interconnection

Extended Local Area Interconnection links individuals, groups, or departments in geographically distinct work areas that are relatively close to each other. Three packages are available:

- Building Package, which links floors of a building together in a common network.
- Site Package, which connects multiple buildings in a site, such as a university campus or an office complex.
- Computer Room Package, which connects up to eight computers in one location to the network through one interface. Each of the computers may, in turn, support its own local area network.

Wide Area Interconnection

Wide Area Interconnection provides a network link between remote sites. A typical application links headquarters with manufacturing plants, sales offices, and distribution centers. Two packages are available:

- Wide Area Package, which connects two geographically dispersed local area networks.
- Remote Site Package, which allows users, at a geographically remote site with no computer/network, to gain access to an organization's local area network via a leased line.

Multivendor Interconnection

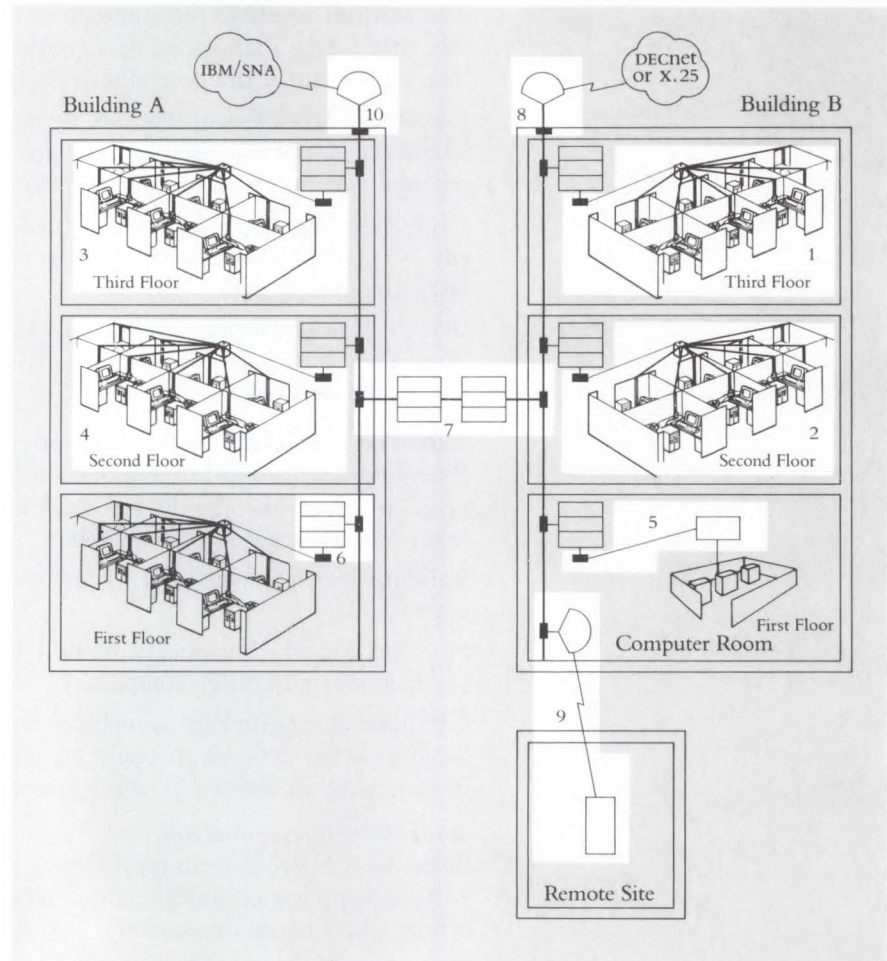
Multivendor Interconnection allows information to be transferred between a Digital network and the network of another vendor. One package is available:

- DECnet/IBM SNA Package, which allows communication between an IBM SNA network and a DECnet network. Users may send and retrieve information or perform specific functions on IBM host systems connected to the SNA network.

Introduction to Standard Network Packages

The relationship of the Standard Network Packages in a large network is illustrated in the following figure. The network configuration is simplified in the diagram in order to clearly indicate the purpose of each package.

Relationship of Standard Network Packages in a Large Network



- ¹DECconnect Integrated Communications Package
- ²Low-speed Work Group Package
- ³High-speed Work Group Package
- ⁴IBM PC Interconnection Package
- ⁵Computer Room Package
- ⁶Building Package
- ⁷Site Package
- ⁸Wide Area Package
- ⁹Remote Site Package
- ¹⁰DECnet/IBM SNA Package

Service Solutions

Digital's service solutions are an important part of an ongoing commitment to meet the customer's needs. Digital can tailor a service solution to meet requirements for designing, implementing, or operating a Digital network. The services available include network design consulting, network installation (for hardware, software, and cabling), ongoing maintenance and remedial support, and network-management tools and support. Refer to Section 6, "Manageability", for more information.

All hardware products sold in Standard Network Packages include a one-year warranty from Digital.

Ordering Standard Network Packages

Each Standard Network Package consists of one or two product areas:

- Network hardware products (required for all packages)
- Network software products (required for many packages)

A product description and ordering table for each Standard Network Package is contained in the following pages. *The exact ordering requirements for these products must be followed.* This ensures that all the appropriate hardware and software necessary to implement the desired network solution are ordered. The installation of standard 802.3/Ethernet backbone cable, to which the electronic hardware connects, is not included in the Standard Network Packages. Digital custom designs and installs the backbone cable as needed, to meet specific customer requirements.

In addition to the products that are required for each base package, there may be the need to order additional network hardware, software, and/or services to provide the desired network solution. The need for these optional products and services vary according to customer requirements of such things as number of offices, type of equipment requiring connection, physical facility layouts, and existing customer software. The optional products can also be ordered to expand an existing network installation, where the customer already has many of the required base package components. The most common of these optional products are listed in the ordering tables of each Standard Network Package.

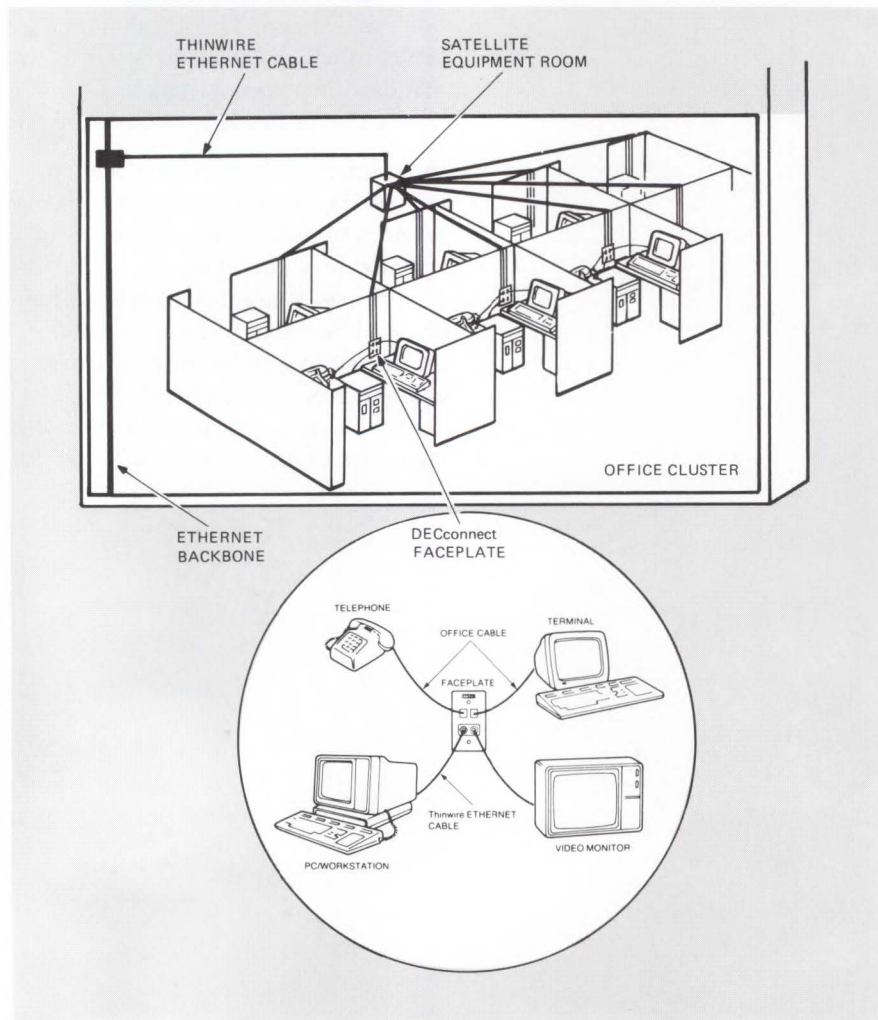
Local Area Work Group Interconnection

DECconnect Integrated Communications Package

Local Area Work Group Interconnection provides connectivity among users that are typically involved in related activities and are located on the same floor. Local Area Work Group Interconnection enhances work communications, allows effective and efficient sharing of computer resources, and provides information consistency through a common database.

The DECconnect Integrated Communications Package includes all of the hardware and software necessary to establish a Local Area Network using Digital's DECconnect strategy. The DECconnect solution utilizes satellite equipment rooms (SER) as the centralized location for the required electronic hardware and wiring connections. The required cables radiate from the SER to each office/user location, where a DECconnect faceplate provides convenient user access to low-speed (terminal), high-speed (work system), and voice (telephone) communications. The following figure illustrates the DECconnect configuration in an office environment. Refer to "DECconnect" in Section 2 for additional information.

DECconnect System

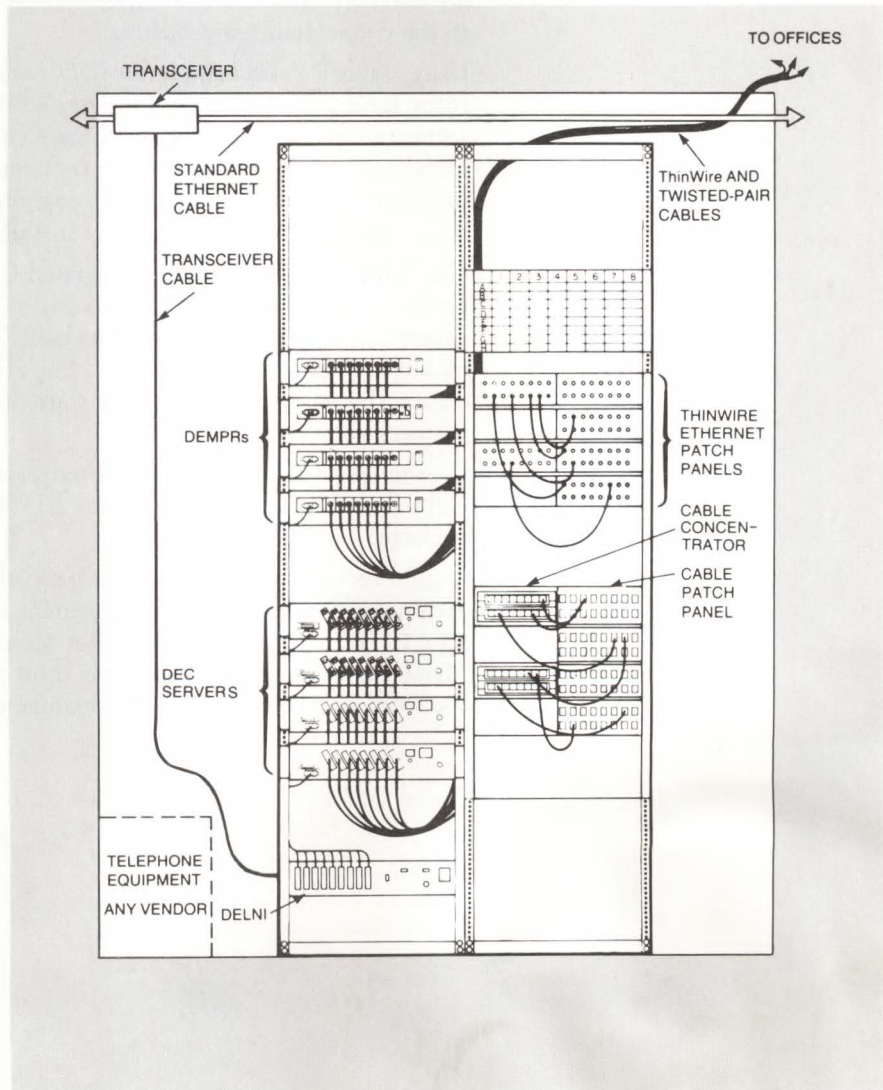


Local Area Work Group Interconnection

The number of offices (users) and type of devices (low-speed/high-speed) that are connected on the local area network largely determines the number of required satellite equipment rooms and hardware products. The physical office layout on the floor is another important consideration when designing the appropriate DECconnect solution. Wiring of the backbone cable in the building (for connection to the SER) is part of the DECconnect Package. Digital performs this function on a custom basis to meet individual customer needs.

The following figure illustrates the hardware configuration of a typical satellite equipment room in a network that requires both low- and high-speed connections.

Satellite Equipment Room Configuration



Local Area Work Group Interconnection

Ordering Guidelines for the DECconnect System

The configuration guidelines and ordering rules in this section provide a methodology for selecting the appropriate number of DECconnect package components to meet various networking needs. To determine the appropriate quantity of hardware and software products required to implement the network, follow these steps:

- Order one satellite equipment room rack (DEPKF-S1) for each 64 offices, or part thereof. Additional satellite equipment rooms may be required if physical distances between offices are large or if a high proportion of offices utilizes low- and high-speed connections simultaneously.
- Determine the total number of low- and high-speed connections for all offices (for each SER). Refer to the following sections on Low-speed and High-speed Work Group Packages for additional detail. Find the appropriate letter in Table 2.1 (Low-speed/High-speed Connections) corresponding to the connection requirements.
- Using Table 2.2, find the letter (DECconnect Ordering Matrix) selected from Table 2.1. Read across the row to determine the quantity of hardware, software, and service product components to order. Repeat these steps for each multiple of 64 offices to be connected or portion thereof. Add together the quantities of similar components to determine the total order requirements for the DECconnect installation.
- Use Table 2.3 (DECconnect Integrated Communications Package Order Codes) to fill in the cumulative totals of each component in the quantity column next to the corresponding order code. All quantities were determined previously from Table 2.2. The above steps must be followed to ensure that all necessary products are ordered to complete the desired network solution.
- Customers using unshielded twisted-pair office cabling should order one eight-line Twisted-pair Starter Kit (H3300-AA) for every base or add-on package.
- Digital recommends the use of a network management product with local area networks. If network management is required, order either NMCC/VAX ETHERnim or NMCC/DECnet Monitor. Refer to "Network and System Management Products" in Section 6 for product descriptions. Order both the software license and media/documentation kit.

Local Area Work Group Interconnection

Table 2.1 Low-speed/High-speed Connections

Number of Required High-speed Connections	Number of Required Low-speed Connections								
	0	1-8	9-16	17-24	25-32	33-40	41-48	49-56	57-64
0	—	A	B	C	D	E	F	G	H
1-8	I	J	K	L	M	N	O	P	Q*
9-16	R	S	T	U	V	W	X	Y*	Z*
17-24	A2	B2	C2	D2	E2	F2	G2*	H2*	N/A
25-32	I2	J2	K2	L2	M2	N2*	O2*	N/A	N/A
33-40	P2	Q2	R2	S2	T2*	U2*	N/A	N/A	N/A
41-48	V2	W2	X2	Y2*	Z2*	N/A	N/A	N/A	N/A
49-56	A3	B3	C3*	D3*	N/A	N/A	N/A	N/A	N/A
57-64	E3	F3*	G3*	N/A	N/A	N/A	N/A	N/A	N/A

*In floor-package configurations with over 64 connections, up to 80 can be supported within the standard rack; a slot is available for an additional DECserver 200 or DEMPR. In these cases two base packages must be ordered.

Local Area Work Group Interconnection

Table 2.2 DECconnect Ordering Matrix

Selected Letter from Table D	Required Package Component Order Number			
	DEPKL-01	DEPKL-A1	DEPKH-01	DEPKH-A1
A	1			
B	1	1		
C	1	2		
D	1	3		
E	1	4		
F	1	5		
G	1	6		
H	1	7		
I			1	
J		1	1	
K		2	1	
L		3	1	
M		4	1	
N		5	1	
O		6	1	
P		7	1	
Q*	1	7	1	
R			1	1
S		1	1	1
T		2	1	1
U		3	1	1
V		4	1	1
W		5	1	1
X		6	1	1
Y*	1	6	1	1
Z*	1	7	1	1
A2			1	2
B2		1	1	2
C2		2	1	2
D2		3	1	2

*In floor-package configurations with over 64 connections, up to 80 can be supported within the standard rack; a slot is available for an additional DECserver 200 or DEMPR. In these cases two base packages must be ordered.

Local Area Work Group Interconnection

Table 2.2 *DECconnect Ordering Matrix (Continued)*

Selected Letter from Table D	Required Package Component Order Number			
	DEPKL-01	DEPKL-A1	DEPKH-01	DEPKH-A1
E2		4	1	2
F2		5	1	2
G2*	1	5	1	2
H2*	1	6	1	2
I2			1	3
J2		1	1	3
K2		2	1	3
L2		3	1	3
M2		4	1	3
N2*	1	4	1	3
O2*	1	5	1	3
P2			1	4
Q2		1	1	4
R2		2	1	4
S2		3	1	4
T2*	1	3	1	4
U2*	1	4	1	4
V2			1	5
W2		1	1	5
X2		2	1	5
Y2*	1	2	1	5
Z2*	1	3	1	5
A3			1	6
B3		1	1	6
C3*	1	1	1	6
D3*	1	2	1	6
E3			1	7
F3*	1		1	7
G3*	1	1	1	7

*In floor-package configurations with over 64 connections, up to 80 can be supported within the standard rack; a slot is available for an additional DECserver 200 or DEMPR. In these cases two base packages must be ordered.

Local Area Work Group Interconnection

Table 2.3 DECconnect Integrated Communications Package Order Codes

Product Description	Order Code	Quantity
Satellite equipment room		
SER rack	DEPKF-S1	_____
Low-speed products (Refer to Table 2.5 for contents)		
Low-speed Base Package	DEPKL-01	_____
Low-speed Add-on	DEPKL-A1	_____
DECserver 200 software media and documentation (order one per load host computer)	QA-VCBAA-H#	_____
High-speed products (Refer to Table 2.7 for contents)		
High-speed Base Package	DEPKH-01	_____
High-speed Add-on	DEPKH-A1	_____
Optional Unshielded Twisted-pair Ethernet eight-line Starter Kit	H3300-AA	_____
#Refer to "DECserver 200" in Section 2 for distribution media.		

Low-speed Work Group Package— Terminal Interconnection

The Low-speed Work Group Package links devices operating at speeds between 75 b/s and 19.2 Kb/s (terminals, printers, and personal computers in terminal emulation mode) to a local area network. The preconfigured base package supplies the products required to connect up to eight terminals to the 802.3 Ethernet backbone cable of the network.

Network Hardware Products

The Low-speed Base Package includes the following products:

- One baseband Ethernet transceiver
- One Local Network Interconnect (DELNI)
- One DECserver 200/DL Terminal Server (DSRVB-A1) with software license and cable kit
- One DEC423 Cable Kit (H3104-B)
- Two baseband transceiver cables

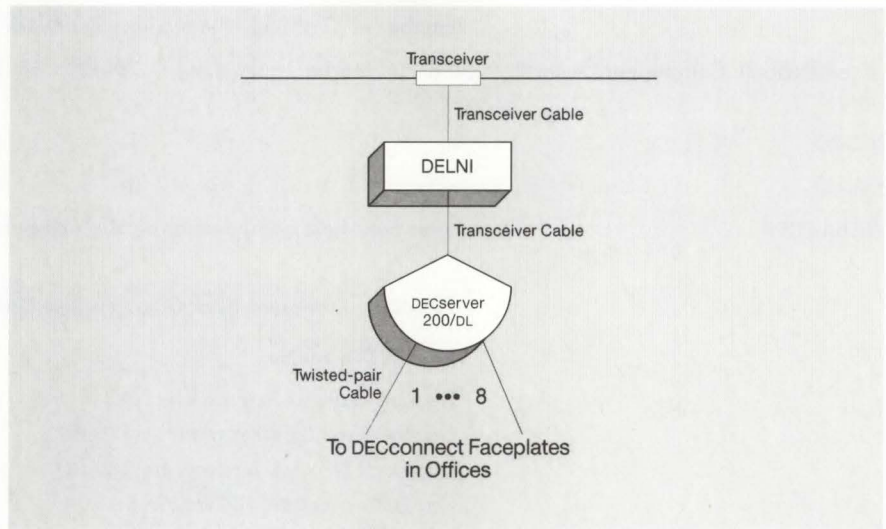
Network Software

- DECserver 200 software media and documentation (one per load host)

The following figure details the hardware configuration of the network products provided in the Low-speed Base Package. Add-on packages allow for the connection of up to 56 additional terminals, in multiples of 8, to the base network connection outlined above.

Local Area Work Group Interconnection

Low-speed Work Group Package—Terminal Interconnection Configuration



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Ordering Guidelines for Low-speed Work Group Package

Use Table 2.4 (Low-speed Work Group Package Ordering Matrix) to determine the quantity of products required to satisfy each terminal connection (low-speed). Use the table each time a distinct work group and/or a work group of more than 64 offices is connected to the network backbone. To use the table,

- List all of the distinct work groups and the number of users within each work group.
- If a distinct work group has more than 64 users, divide it by 64 and round up to the next whole number. For ordering purposes in using the table, the one large work group is treated as several different work groups. (As an example, assume that there are two work groups consisting of 14 users and 80 users. The second work group of 80 would be treated as two groups because 80 divided by 64 rounds up to 2.)
- Use Table 2.4 once for each work group by reading down the appropriate column corresponding to the number of low-speed connections in that work group to determine the exact quantity of each package component listed on the left, for example, DEPKL-01 or DEPKL-A1. (In the example above, the matrix would be used once for the first work group of 14 users and two more times for the larger work group of 80. The breakdown of the larger work group into two groups should consider relative office locations and future expansion requirements. In this example, the larger group could become two groups of 40 each, one group of 64 and one group of 16, or other combinations totaling 80.)
- After using the matrix for each work group, add together the quantities of each package component to find the total order requirements for each component.
- Use Table 2.5 (Low-speed Work Group Package Order Codes) to compile the complete order by filling in the quantities that were determined above. Follow all product order requirements exactly.

Local Area Work Group Interconnection

Table 2.4 Low-speed Work Group Package Ordering Matrix

Required Package Component Order Number	Number of Terminal Connections Per Work Group							
	1-8	9-16	17-24	25-32	33-40	41-48	49-56	57-64
DEPKL-01	1	1	1	1	1	1	1	1
DEPKL-A1	—	1	2	3	4	5	6	7
QA-VCBAA-H#	1 per load host computer (typically one per local area network)							

Table 2.5 Low-speed Work Group Package Order Codes

Product Description	Order Code	Quantity
Network hardware base package One baseband Ethernet transceiver (H4005) One Local Network Interconnect (DELNI) One DECserver 200/DL Terminal Server with software license and cable kit One DEC423 Cable Kit (H3104-B) Two transceiver cables (BNE3L-05)	DEPKL-01	_____
Network hardware add-on package One DECserver 200/DL Terminal Server One transceiver cable (BNE3L-05)	DEPKL-A1	_____
Network Software¹ DECserver 200 software media and documentation (One required per load host computer)	QA-VCBAA-H#	_____

#Refer to "DECserver 200" in Section 2 for distribution media.

¹The level of software service contract must be the same for both the DECserver 200 software. Refer to Software Product Description 27.53.xx.

High-speed Work Group Package— Work System Interconnection

The High-speed Work Group Package links workstations, personal computers, and low-end systems operating at speeds greater than 19.2 Kb/s to a local area network. The preconfigured base package supplies the products required to connect up to eight work systems to the backbone cable of the network.

Network Hardware Products

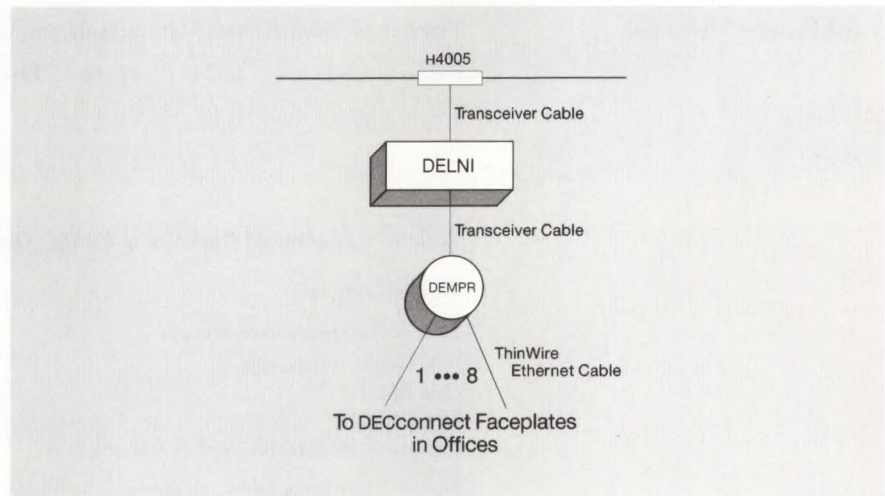
The High-speed Base Package includes the following products:

- One baseband Ethernet transceiver
- One Local Network Interconnect (DELNI)
- One ThinWire Ethernet Multiport Repeater (DEMPR)
- Two baseband transceiver cables

The following figure details the hardware configuration of the network products provided in the high-speed base package. Add-on packages allow for connecting up to 56 additional work systems, in multiples of 8, to the base network connection outlined above.

Local Area Work Group Interconnection

High-speed Work Group Package—Work System Interconnection Configuration



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Ordering Guidelines for High-speed Work Group Package

Use Table 2.6 (High-speed Work Group Package Ordering Matrix) to determine the quantity of products and services required to satisfy each work-system connection situation. The matrix should be used each time a distinct work group and/or a work group of more than 64 offices is connected to the network backbone. To use the ordering matrix,

- List all the distinct work groups and the number of users within each work group.
- If a distinct work group has more than 64 users, divide it by 64 and round up to the next whole number. For ordering purposes in using the matrix, one large work group is treated as several smaller work groups. (As an example, assume that there are two work groups consisting of 14 users and 80 users. The second work group of 80 would be treated as two groups because 80 divided by 64 rounds up to 2.)
- Use Table 2.6 once for each work group by reading down the appropriate column corresponding to the number of high-speed connections in that work group to determine the exact quantity of each package component that is listed on the left, for example, DEPKH-01 or DEPKH-A1. (In the example above, the matrix would be used once for the first work group of fourteen users, and two more times for the larger work group of 80. The breakdown of the larger work group into two groups should consider relative office locations and future expansion requirements. In this example, the larger group could become two groups of 40 each, one group of 64 and one group of 16, or other combinations totaling 80.)
- Customers using unshielded twisted-pair office cabling should order one 8-line Twisted-pair Starter Kit (H3300-AA) for every base or add-on package.
- After using the table for each work group, add together the quantities of each package component to find the total order requirements for each component.
- Use Table 2.7 (High-speed Work Group Package Order Codes) to compile the complete order by filling in the quantities that were determined above. Follow all product order requirements exactly.

Local Area Work Group Interconnection

Table 2.6 High-speed Work Group Package Ordering Matrix

Required Package Order No.	Number of Work System Connections per Work Group							
	1-8	9-16	17-24	25-32	33-40	41-48	49-56	57-64
DEPKH-01	1	1	1	1	1	1	1	1
DEPKH-A1	—	1	2	3	4	5	6	7

Table 2.7 High-speed Work Group Package Order Codes

Product Description	Order Code	Quantity
Network hardware base package One H4005 transceiver One DELNI One DEMPR Two transceiver cables (BNE3L-05)	DEPKH-01	_____
Network Hardware add-on package One DEMPR One transceiver cable (BNE3L-05)	DEPKH-A1	_____
Optional hardware Unshielded Twisted-pair Ethernet 8-line Starter Kit	H3300-BA	_____

IBM PC Interconnection Package

The IBM PC Interconnection Package provides the hardware and software products necessary to connect up to eight IBM PCs to the Digital network. This is accomplished through the use of an 802.3/Ethernet controller in each of the IBM PCs, which enables communications on the network. The IBM PCs connect to the 802.3/Ethernet backbone through a multiport repeater (DEMPR), which consolidates the eight connections through one transceiver.

Network Hardware

The IBM PC Interconnection Base Package includes the following products:

- One baseband Ethernet transceiver
- One baseband transceiver cable
- One ThinWire Ethernet Multiport Repeater
- Eight 802.3/Ethernet communications controllers with software licenses for DECnet/PCSA Client software

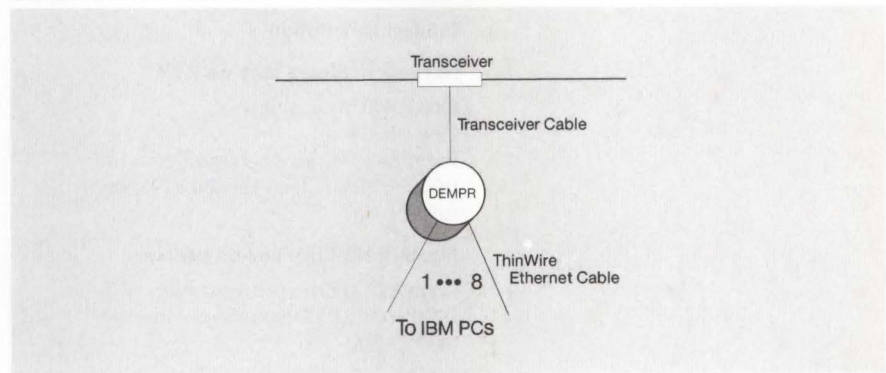
Network Software

- One DECnet/PCSA Client software media and documentation (one required per network)

The following figure details the hardware configuration of the network products provided in the IBM PC Interconnection Package. This configuration is appropriate when up to eight IBM PC connections are required. (When more than eight IBM PC network connections are required from the same transceiver, refer to "Ordering Guidelines for More Than Eight IBM PCs.")

Local Area Work Group Interconnection

IBM PC Interconnection Package



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Ordering Guidelines for Eight or Fewer IBM PCs per Work Group

Use the IBM PC Interconnection Package Order Code Table to compile the complete order by filling in the quantities determined:

- Order one hardware base package for each eight IBM PC connection in a distinct office area. (If there are more than eight users in the same work group, up to 64 IBM PCs in total, refer to "Ordering Guidelines for More than Eight IBM PCs per Work Group.")
- Customers using unshielded twisted-pair office cabling should order one 8-line Twisted-pair Starter Kit (H3300-AA) for every base or add-on package.
- Order the DECnet-DOS software media and documentation (QVA05-HI). Only one of these order codes is required per network. When many IBM PC users are connected to the network, it may be desirable to order additional software media and documentation kits.

Ordering Guidelines for More than Eight IBM PCs per Work Group

When there are more than eight IBM PCs per work group, use the High-speed Work Group Package order codes as well as IBM PC Add-on order codes as follows:

- Follow the ordering guidelines for the High-speed Work Group Package to determine the number of High-speed Hardware Base and High-speed Add-on Packages needed.
- For every eight IBM PCs (or portion thereof), order one IBM PC Add-on Package from the following table. (The IBM PC Add-on Package consists of eight IBM PC 802.3/Ethernet controller boards.)
- Order the DECnet-DOS software media and documentation (QVA05-HI). Only one is required per network. When many IBM PC users are connected to the network, it may be desirable to order additional software media and documentation kits.

Local Area Work Group Interconnection

<i>IBM PC Interconnection Package Order Codes</i>		
Product Description	Order Code	Quantity
Network hardware base package One H4005 transceiver One DEMPR Eight 802.3/Ethernet controllers with DECnet/PCSA Client software licenses (DEPCA-BA)	DEPKP-01	_____
Network hardware add-on package Eight 802.3/Ethernet controllers with DECnet/PCSA Client software licenses (DEPCA-BA)	DEPKP-A1	_____
Optional hardware Unshielded Twisted-pair Ethernet 8-line Starter Kit	H3300-AA	_____
Network software One DECnet/PCSA Client software media and documentation (one required per network)	QVA05-HI	_____

Extended Local Area Interconnection links individuals, groups, or departments in geographically distinct work areas that are relatively close to each other. Extended Local Area Interconnection enhances communication between individuals and departments that are not easily accessible to each other, facilitates better decision making through more timely and accurate information flow, and provides effective and efficient use of computing power and support resources.

Computer Room Package

The Computer Room Package provides the base network hardware necessary to link up to eight computers within a computer room environment to an existing 802.3/Ethernet backbone. Any systems with Digital 802.3/Ethernet communication controllers and DECnet software can be used with this package. Depending on internal cabling, computers may be located up to 40 meters from the transceiver in this package.

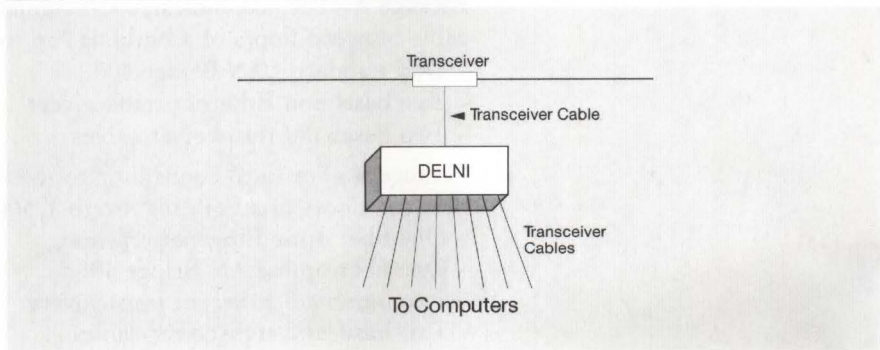
Network Hardware Products

The Computer Room Package includes the following products:

- One Local Network Interconnect (DELNI)
- One baseband Ethernet transceiver
- One baseband transceiver cable

The following figure details the hardware configuration of the network products provided in the Computer Room Package. Note that, because of variations in distance between the Local Network Interconnect (DELNI) and computers being connected to the network, the transceiver cables are available only on a custom basis.

Computer Room Package Configuration



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Computer Room Package Ordering Guidelines

Use the Computer Room Package Order Code Table to compile the complete order by filling in the quantities that are determined below.

- Order one base network hardware package for each group of eight computers in the computer room.
- Digital can provide the required cabling and installation to connect each computer to the DELNI on a custom basis.
- Customers who are new to network concepts and operation should order the NETstart Plus Network Startup Package (QSC34-SZ).

Extended Local Area Interconnection

- Digital recommends the use of a network management product with local area networks. If network management is required, order either NMCC/VAX ETHERnim or NMCC/DECnet Monitor. Refer to "Network and System Management Products" in Section 6 for product descriptions. Order codes for both the software license and media/documentation are required.

Computer Room Package Order Codes

Product Description	Order Code	Quantity
Network hardware		
One DELNI	DEPKC-01	_____
One H4005 transceiver		
One transceiver cable (BNE3L-05)		
Optional Network service		
NETstart Plus Network Startup Package	QSC34-SZ	_____

Building Package

The Building Package combines two 802.3/Ethernet segments into an extended local area network (LAN) and isolates local traffic within each segment. This package delivers 10 Mb/s 802.3/Ethernet capability in either of two configurations: Package A connects two floors of a building, up to 100 meters apart, for use with standard baseband cable (not included); Package B connects two floors of a building, up to 1,500 meters apart, for use with fiber optic cable (not included).

The Building Package includes the following products:

Network Hardware Products

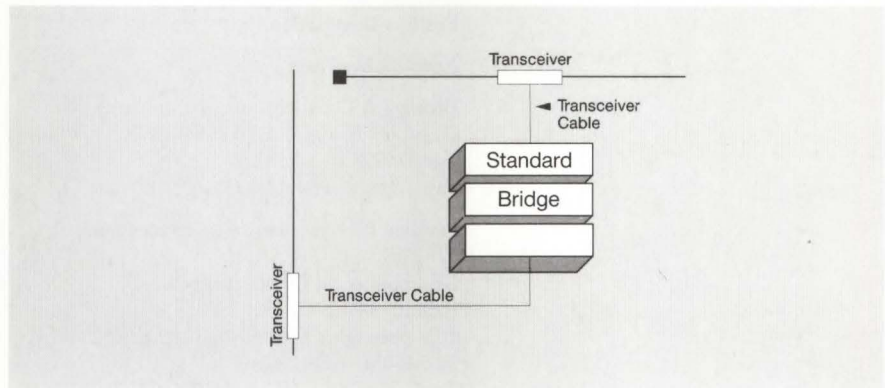
Order one of the following packages:

- Package A—For economical, local connections to the standard baseband cable between floors of a building, up to 100 meters:
 - One standard LAN Bridge 100
 - Two baseband Ethernet transceivers
 - Two baseband transceiver cables
- Package B—For local connection to the 802.3/Ethernet fiber optic cable between floors of a building, up to 1,500 meters:
 - One fiber optic Ethernet repeater
 - One fiber optic LAN Bridge 100
 - Two baseband Ethernet transceivers
 - Two baseband transceiver cables

The following figures detail the hardware configuration of the network products provided in each of the two Building Package alternatives.

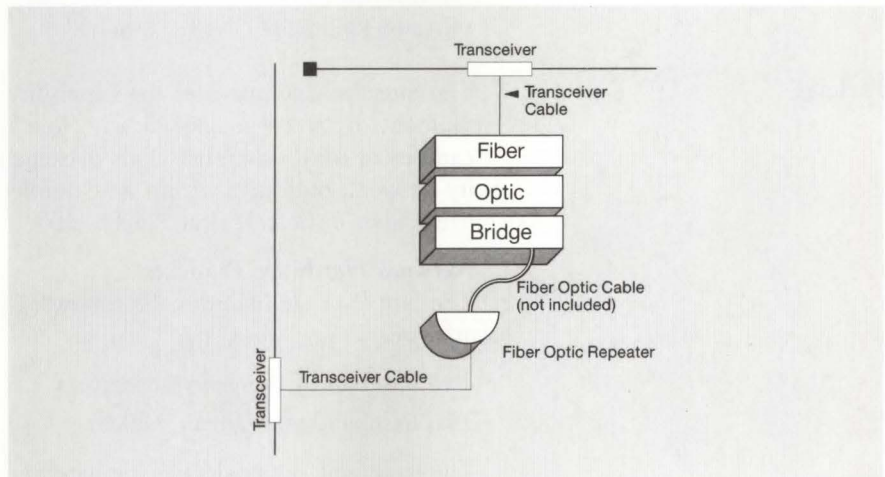
Extended Local Area Interconnection

Building Package A Configuration



NBG-177-00

Building Package B Configuration



NBG-178-00

Building Package Ordering Guidelines

Use the Building Package Order Code table to compile the complete order by filling in the quantities determined:

- Determine the base network hardware package required to connect the floors and/or buildings in the network. Order one hardware package for each Building Package.
- Customers new to network concepts and operation should order one NETstart Plus Network Startup Package (QSC34-SZ) per building.
- Customers who require long-range network planning should order one Network Planning and Design Package (QSNET-SZ) per building.
- Digital recommends the use of a network-management product with local area networks. If network management is required, order either NMCC/VAX ETHERnim or NMCC/DECnet Monitor. **▲ Refer to “Network and System Management Products” in Section 6 for product descriptions.** Order codes for both the software license and media/documentation are required.

Digital can provide the design and installation of standard and fiber optic cabling on a custom basis. They are not included in the Building Package.

Extended Local Area Interconnection

<i>Building Package Order Codes</i>		
Product Description	Order Code	Quantity
Network hardware		
Package A (local connections) includes One LAN Bridge 100 (DEBET-AA) Two H4005 transceivers Two transceiver cables (BNE3L-05)	DEPKB-B1	_____
Package B (local fiber optic connections) includes One fiber optic Ethernet repeater (DEREP-RH) One fiber optic LAN Bridge 100 (DEBET-RH) Two H4005 transceivers Two transceiver cables (BNE3L-05)	DEPKB-B2	_____
Optional network services		
NETstart Plus Network Startup Package	QSC34-SZ	_____
Network Planning and Design Service	QSNET-SZ	_____

Site Package

The Site Package provides the capability to join 802.3/Ethernet network segments between geographically close buildings, such as a university campus or office complex. This package delivers 10 Mb/s Ethernet capability between buildings within an extended local area, up to 3,000 meters using fiber optic cable (not included).

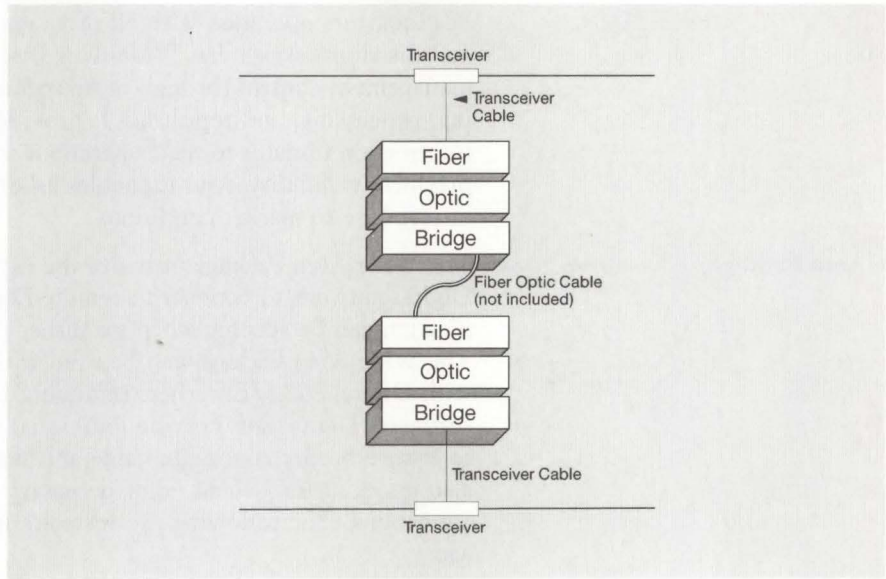
Network Hardware Products

The Site Package includes the following products:

- Two Fiber Optic LAN Bridge 100s
- Two baseband Ethernet transceivers
- Two baseband transceiver cables

The following figure details the hardware configuration of the network products provided in the Site Package.

Site Package Configuration



NBG-179-00

Site Package Ordering Guidelines

Use the Site Package Order Code Table to compile the complete order by filling in the quantities determined:

- Determine the base network hardware package required to connect the floors and/or buildings in the network. Order one hardware package for each Site Package.
- Customers who are new to network concepts and operation should order one NETstart-Plus Network Startup Package (QSC34-SZ) per building.
- Customers who require long-range network planning should order one Network Planning and Design Package (QSNET-SZ) per building.
- Digital recommends the use of a network management product with local area networks. If network management is required, order either NMCC/VAX ETHERnim or NMCC/DECnet Monitor. Refer to "Network and System Management Products" in Section 6 for product descriptions. Order codes for both the software license and media/documentation are required.

Site Package Order Codes

Product Description	Order Code	Quantity
Network hardware		
Two fiber optic LAN Bridges 100s (DEBET-RH)	DEPKB-B3	_____
Two H4005 transceivers		
Two transceiver cables (BNE3L-05)		
Optional Network services		
NETstart Plus Network Startup Package	QSC34-SZ	_____
Network Planning and Design Service	QSNET-SZ	_____

Wide Area Interconnection provides for network access between sites that are geographically remote from one another. A typical application links a headquarters operation with all of its manufacturing plants, sales offices, and distribution centers. Wide Area Interconnection facilitates better management control through more accurate and timely information gathering, processing, and reporting. It provides immediacy and uniformity for information updates to field operations in areas such as pricing, policy, and product availability. And it enables an organization to coordinate its efforts in response to market conditions.

Wide Area Package

The Wide Area Package provides the capability for customers with a local Digital network to connect to remote Digital networks or systems. Communication can be accomplished via either private or public data networks. The Wide Area Package can be used with any standard systems or CPUs with Digital 802.3/Ethernet communications controllers and DECnet software. Digital can provide individual site survey and installation plans to ensure proper routing of cable and placement of electronics. Digital can also quote materials and labor necessary to route and install the appropriate cabling. The following products are included in the Wide Area Package:

Network Hardware Products

- One baseband Ethernet transceiver
- One baseband transceiver cable
- One DECnet Router Server hardware (DECSA-EA)
- One DECSA U.S. Country Kit (DECSK-AA)

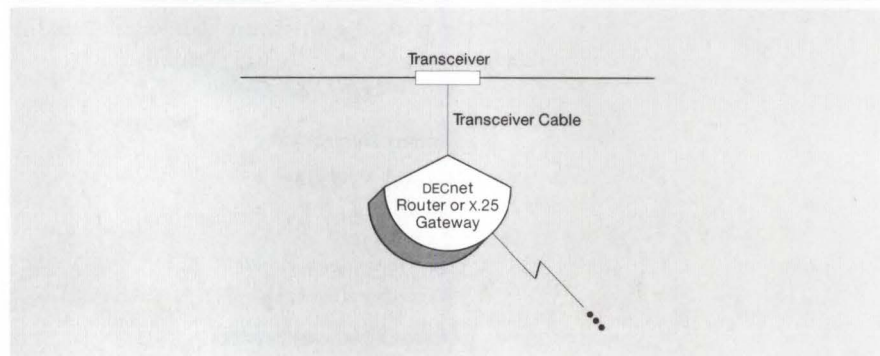
Network Software

Order one of the following:

- DECnet Router Server software (Q*725-xx), or
- DECnet Router/X.25 Gateway software (Q*727-xx)

The following figure details the hardware configuration of the network products provided in the Wide Area Package.

Wide Area Package Configuration



NBG-180-00

Wide Area Package Ordering Guidelines

Use the Wide Area Package Order Code Table to compile the complete order by filling in the quantities determined below.

- Order one base network hardware package (DEPKR-01) for each Wide Area Package.

Wide Area Interconnection

- Order one of the following software packages for each Wide Area Package (* refers to the CPU that will downline-load the software; # refers to the distribution medium)
 - DECnet Router Server license (Q*725-UZ) with media and documentation (Q*725-H#), or
 - DECnet Router/X.25 Gateway license (Q*727-UZ) with media and documentation (Q*727-H#)

Note that the level of software service contract must be the same for both the CPU operating system and the DECnet Router Server or DECnet/X.25 Gateway software. Refer to Software Product Description (SPD) 30.34 or SPD 30.41.

- Customers who are new to network concepts and operation should order one NETstart Plus Network Startup Package (QSC34-SZ) per building.
- Customers who require long-range network planning should order one Network Planning and Design Package (QSNET-SZ) per building.
- Digital recommends the use of a network-management product with local area networks. If network management is required, order the NMCC/DECnet Monitor. Refer to “Network and System Management Products” in Section 6 for a product description. Order Codes for both the software license and media/documentation are required.

Wide Area Package Order Codes

Product Description	Order Code	Quantity
Network hardware		
One H4005 transceiver	DEPKR-01	_____
One transceiver cable (BNE3L-05)		
One DECSA DECnet router server		
One DECSA U.S. Country Kit		
Network software¹		
For the DECnet Router Server, order the following license and media:		
DECnet Router Server software license (one per package)	Q*725-UZ	_____
DECnet Router Server software media and documentation (one per package)	Q*725-H#	_____
For DECnet Router/X.25 Gateway, order the following license and media:		
DECnet Router/X.25 Gateway software license (one per package only)	Q*727-UZ	_____
DECnet Router/X.25 Gateway software media and documentation (one per package)	Q*727-H#	_____
Optional Network services		
NETstart Plus Network Startup package	QSC34-SZ	_____
Network Planning and Design Service	QSNET-SZ	_____

*Refer to “DECnet Router Server Software Order Codes” in Section 2 and to “DECnet Router/X.25 Gateway Software Order Codes” in Section 4, for a list of supported processors and distribution media.

¹The level of software service contract must be the same for both the CPU operating system and the DECnet Router Server or DECnet Router/X.25 Gateway software. Refer to the appropriate Software Product Descriptions.

Wide Area Interconnection

Remote Site Package

The Remote Site Package links terminals, printers, and personal computers (in terminal emulation mode) in a remote site to an 802.3/Ethernet local area network via one leased phone line. The products in this package combine terminal server and statistical multiplexing techniques to enable remote site connection.

The Base Package supplies the products and services required to connect up to eight remote devices over a leased phone line to a local area network; the base package plus the add-on package connect up to 16 devices. External modems that run at 9.6 Kb/s are used in this package to connect over the leased phone line.

Network Hardware Products

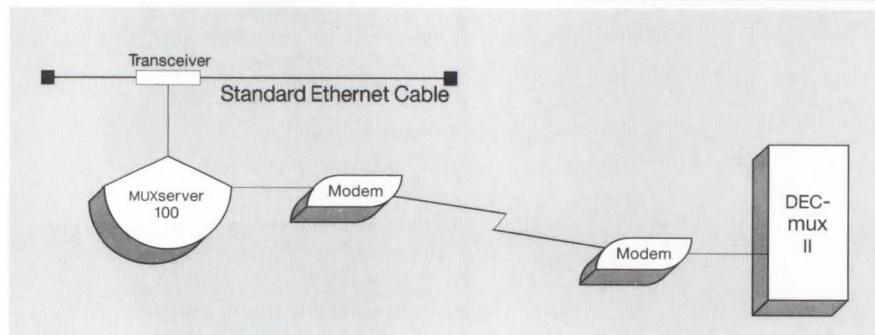
The Remote Site Base Package includes the following products:

- One baseband Ethernet transceiver
- One baseband transceiver cable
- One MUXserver 100 (DSRZA-BA)
- One DECmux II (DFMZA-BA)
- Two 9.6 Kb/s synchronous modems (DF129-AA)
- Two modem cables

Network Software

- MUXserver 100 software media and documentation (one per load host)
- MUXserver 100 software license (one per MUXserver 100)

Remote Site Base Package Configuration



NBG-181-00

Wide Area Interconnection

Remote Site Package Order Codes

Product Description	Order Code	Quantity
Network hardware		
Base Package includes	DEPKM-01	_____
One H4005 transceiver		
One transceiver cable (BNE3L-05)		
One MUXserver 100 (DSRZA-BA)		
One DECmux II (DFMZA-BA)		
Two 9.6 Kb/s synchronous modems (DF129-AA)		
Two modem cables (BC22F-10)		
Add-on package includes	DEPKM-A1	_____
One DECmux II (DFMZA-BA)		
One connection cable (BC17D-10)		
Network software		
MUXserver 100 software license (one required per MUXserver 100)	Q*ZAW-UZ	_____
MUXserver 100 software media and documentation (one required per load host)	Q*ZAW-H#	_____

*Refer to "MUXserver 100/DECmux II Remote Terminal Server" in Section 2 for a list of supported processors and distribution media.

Multivendor interconnection allows information to be transferred between a Digital network and the network of another vendor, and enables the information to be used on either system. Multivendor interconnection protects a company's investment in existing equipment, and provides freedom of choice for future equipment decisions.

DECnet/IBM SNA Package

The DECnet/IBM SNA Package allows communication with an IBM SNA network using the 802.3/Ethernet-based DECnet/IBM SNA and the DECnet/IBM SNA Access Routines. DECnet/SNA Access Routines are software packages, residing on a VAX or MicroVAX host, that allow users to perform specific functions on IBM host systems connected to the SNA network.

Three DECnet/SNA Access Routines are included in the DECnet/SNA Package as listed below. ▲ **For detailed product descriptions of all DECnet/IBM SNA Access Routines, refer to "Digital/IBM Communications Software" in Section 4.**

The following products are included in the DECnet/IBM SNA Package:

Network Hardware

- One baseband Ethernet transceiver
- One baseband transceiver cable
- One 802.3/Ethernet-based DECnet/SNA Gateway (DECSA-FA)
- One 802.3/Ethernet-based DECnet/SNA Gateway U.S. Country Kit (DECSK-AA)

Network Software

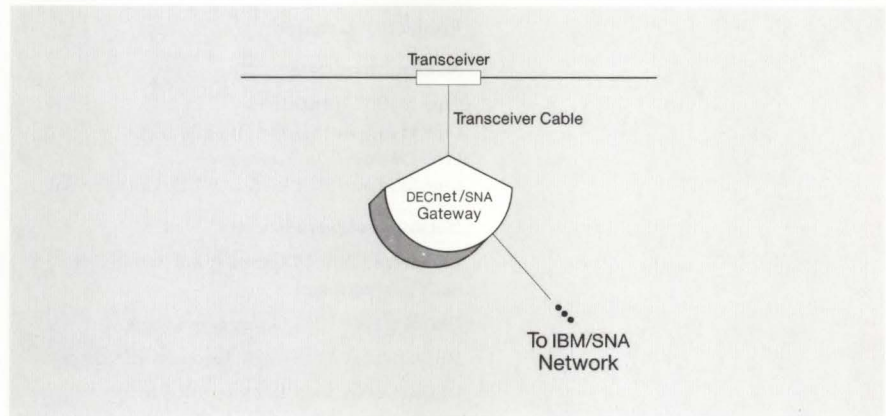
- DECnet/SNA Gateway software
- DECnet/SNA VMS Gateway Management software
- DECnet/SNA VMS 3270 Terminal Emulator
- DECnet/SNA VMS Remote Job Entry

Network Service

- DECnet/SNA Gateway Software Installation and Orientation

The following figure details the hardware configuration of the network products provided in the DECnet/IBM SNA Package.

DECnet/IBM SNA Package Configuration



NBG-182-00

DECnet/IBM SNA Package Ordering Guidelines

Use the DECnet/IBM SNA Package Order Code table to compile the complete order by filling in the quantities that are determined below.

- Order one base network hardware package for each DECnet/IBM SNA Package (DEPKS-01)
- Order the DECnet/SNA Gateway software, license, and documentation
- Order all the required DECnet/SNA Access Routines. Both a software license code and a media/documentation code are required for each Access Routine. Refer to the order code table.

Note that the level of software service contract must be the same for both the CPU operating system and the DECnet/SNA Gateway software. ▲ Refer to Software Product Description 30.15.

- Order one DECnet/SNA Gateway Software Installation and Orientation Service for each DECnet/IBM SNA Package.
- For customers who are new to network concepts and operation, order one NETstart Plus startup service per building.
- For customers who require long-range network planning, order one Network Planning and Design Package per building.
- Digital recommends the use of a network management product with local area networks. If network management is required, order the NMCC/DECnet Monitor. Refer to "Network and System Management Products" in Section 6 for a product description. Order codes for both the software license and media/documentation are required.

Multivendor Interconnection

DECnet/IBM SNA Package Order Codes

Product Description	Order Code	Quantity
Network hardware		
One H4005 transceiver	DEPKS-01	_____
One transceiver cable (BNE3L-05)		
One DECnet/SNA Gateway		
One DECnet/SNA Gateway U.S. Country Kit		
Network software licenses¹		
DECnet/SNA VMS Gateway software (one each per package)	Q*545-UZ	_____
DECnet/SNA VMS Gateway management	Q*452-UZ	_____
DECnet/SNA VMS 3270 Terminal Emulator	QL-454A*-AA	_____
DECnet/SNA VMS Remote Job Entry	QL-453A*-AA	_____
Network software media and documentation¹		
DECnet/SNA Gateway software (one each per package)	Q*545-H#	_____
DECnet/SNA VMS Gateway Management	Q*452-H#	_____
DECnet/SNA VMS 3270 Terminal Emulator	QA-454AA-H#	_____
DECnet/SNA VMS Remote Job Entry	QA-453AA-H#	_____
Network service		
Software installation and orientation	QSF01-SZ	_____
Optional network services		
NETstart Plus Network Startup Package	QSC34-SZ	_____
Network Planning and Design Service	QSNET-SZ	_____

*Refer to "DECnet/SNA Access Routines and Programming Interfaces" in Section 4 for a list of supported processors and distribution media.

¹The level of software service contract must be the same for both the CPU operating system and the DECnet/SNA Gateway software. ▲ Refer to Software Product Description 30.15.

Section 3

Connectivity: Communications Hardware

This section contains the following topics...

Ordering Information

VAXBI Communications Controllers

Q-bus Communications Controllers

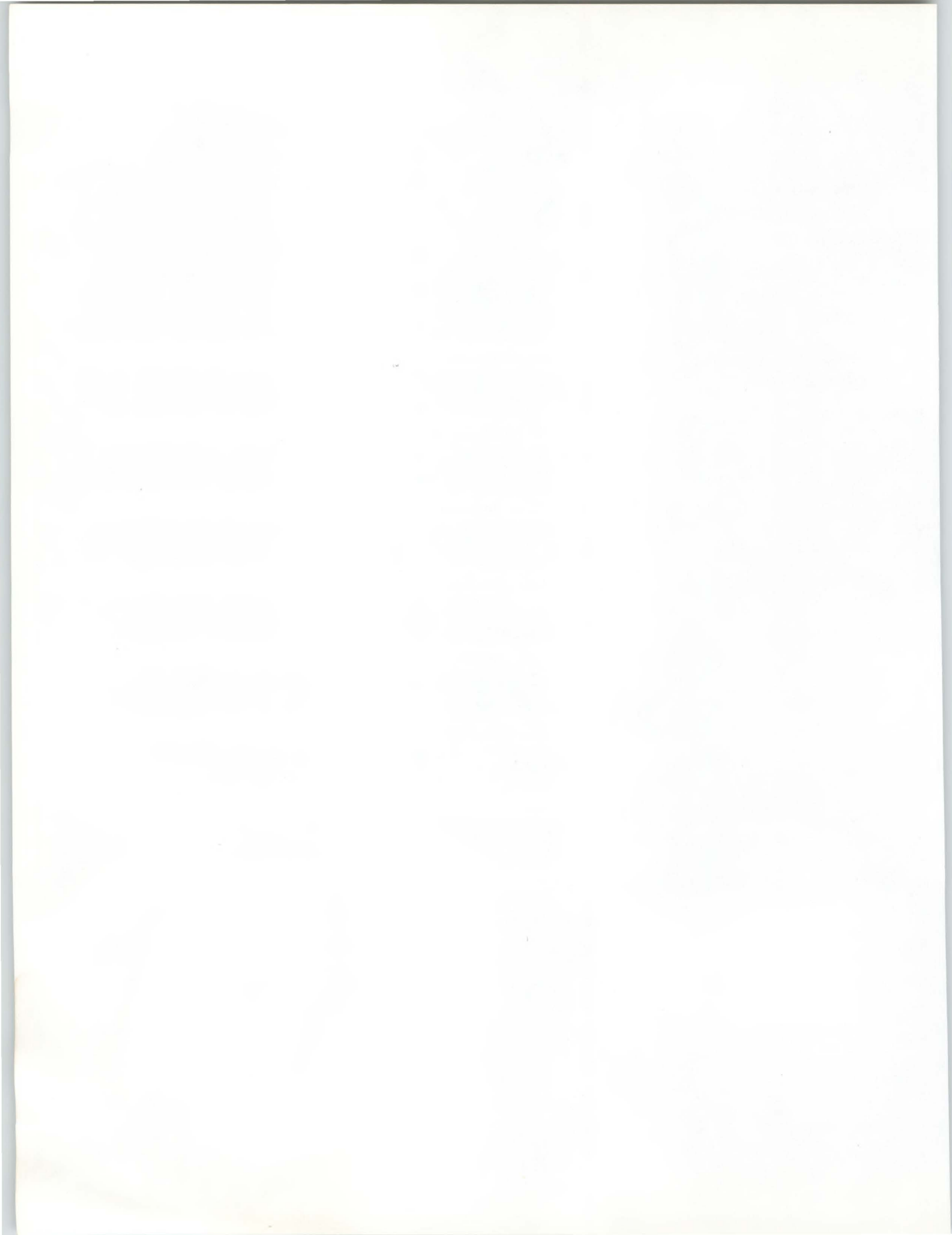
MicroVAX 2000 Communications Controllers

UNIBUS Communications Controllers

Communications Processors

Modems

Cables



Connectivity: Communications Hardware

Asynchronous and synchronous communications hardware is used in both Digital-to-Digital and Digital-to-non-Digital environments to transmit data between computers or from terminals to computers. Transmission methods, or protocols, used for asynchronous connections differ from those used for synchronous connections.

Asynchronous transmission, a character-oriented protocol, is primarily used in terminal-to-host communications. Asynchronous transmission is uniquely suited to the low-speed, intermittent data transmission from terminals to hosts. Synchronous transmission, on the other hand, is a more efficient block-oriented protocol that transmits an entire block of characters at one time. Synchronous transmission is used primarily for high-speed communications between computers. Note that although Digital's terminal-to-computer connections are asynchronous, IBM and many other vendors use synchronous terminal-to-computer connections.

When data is sent across most telephone lines, the digital signals of computers must be translated into the analog signals used with telephone equipment. This is accomplished through modems. Computer devices are connected to modems through standard interfaces. EIA-232-C/CCITT V.28, EIA-422/CCITT V.11, EIA-423-A/CCITT V.10, and CCITT V.35 are examples of such interface standards. All Digital communications interfaces that include an industry-standard interface can be used to connect Digital systems to a Private Branch Exchange (PBX) via a modem.

A network is a flexible configuration of interconnected terminals, computers, and other intelligent devices (nodes). Nodes can be either close together (local) or far apart (remote). Some devices, because of their high speed, operate only in a local area. Because low-speed devices can be connected across phone lines, they can be used in remote applications as well as locally.

This section includes product descriptions and configuring and ordering information for Digital's asynchronous and synchronous hardware communications products, modems, statistical multiplexers, and cables.

▲ For information on Digital's 802.3/Ethernet products, refer to Section 2.

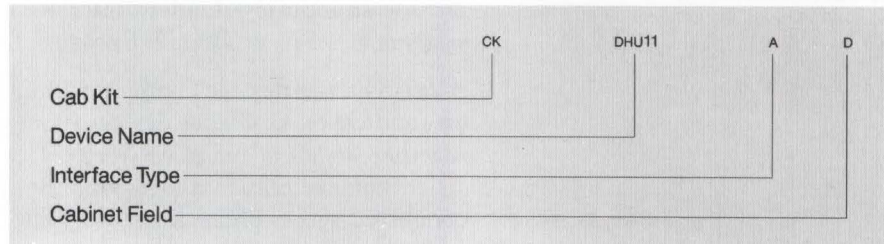
Note: Synchronous products do not support the use of internal clocking.

To order a communications device, order both the base option module and the specific cabinet kit required to install the module on your system. A cabinet kit includes the appropriate cabling, filter assembly, and brackets. Several cabinet kits are available for each option because various length internal cables and mounting brackets are required for different system cabinets.

UNIBUS communications options can be mounted in Digital's older, unshielded cabinets by ordering a cabinet kit that includes an adapter bracket. To determine whether a cabinet is shielded or not, examine the back of it. A shielded cabinet will have metal panels with I/O connection panel inserts or blank metal plates mounted in the spaces between the panels. An unshielded cabinet may have other devices mounted in the back. However, the CPU box and disk enclosures will be visible from the back of an unshielded cabinet.

For example, to order a 16-line multiplexer for a VAX-11/780 system, order a DHU11-M (base option) and a CK-DHU11-AD (cabinet kit to install a DHU11 on a VAX-11/780 system). The following figure and tables explain the hardware order code designations.

Parts of a Cabinet-kit Order Code



NBG-183-00

Interface Types for Cabinet Kits

Char	Electrical Mechanical Interface
A	EIA-232 (with full modem control)
B	V.35
C	Integral modem
D	EIA-232 (with limited modem control)
E	EIA-422/449
F	EIA-423-A/449
H	20 Ma
J	Fiber optic
K	802.3/Ethernet
L	Multifunction device (see device user's guide for detailed description)
M,N	Base options designations
R	CCITT V.11
S	CCITT/X.21
U	50-pin multi-interface support (see device user's guide for detailed description)
1-9	Multiple interface types in a single option, for example, half-synchronous and half-asynchronous

Communications Hardware Ordering Information

Cabinet Field Designations for Cabinet Kits

Char	Shielded Cabinets	Cable
A	BA123 box	21 inches
B	BA23 box	12 inches
C	PDP-11/23 PLUS	30 inches
D	PDP-11, DECSYSTEM-20, VAX-11/750 expanded cabinet, VAX-11/780 systems	10 feet
E	PDP-11/84, VAX-11/730 systems, VAX-11/750 kernel	7 feet
F	VAX-11/725, 5 panel, PDP-11/84 box, MicroPDP-11/83 cabinet, MicroVAX II cabinet	3 feet
J	VAXBI (8500, 8800)	5 feet
L	VAX-11/725, 2 panel	4 feet
M	VAXBI (VAX 8200/8300) systems	8 feet
W	VAXBI (8800 expansion cabinet)	15 feet
Y	All VAX system expanded cabinets for DMZ32 only	10 feet
Char	Unshielded Cabinets	
1	10-ft Cable/Mount in H9544-SJ or 74-27292-01 (Depends on option)	
2	10-ft Cable	
3	25-ft Cable	

Cable Ordering Information

The order codes for external cables required by the communications devices are listed in "Communications Cables" at the end of this section.

VAXBI Communications Controllers

The following table summarizes the features of Digital's asynchronous and synchronous VAXBI communications controllers.

<i>VAXBI Communications Controllers</i>			
	DMB32		DHB32
Type	Asynchronous	Synchronous	Asynchronous
Number of lines	8	1	16
Direct Memory Access (DMA)¹	Yes	Yes	Yes
Maximum speed (Consult SPD)²	38.4 Kb/s	64 Kb/s for HDLC, SDLC; 19.2 Kb/s for DDCMP; 9.6 Kb/s for others	38.4 Kb/s simultaneously on four channels with custom driver; 19.2 Kb/s simultaneously on two channels with VMS
Software support	DECnet-VAX	DECnet-VAX; DMB32 synchronous device driver (prerequisite); VAX P.S.I. ⁵	DECnet-VAX
Operating system support	VMS	VMS	VMS
MultiCPU access³	No	No	No
Modem control⁴	Full	Full	Yes (with EIA-232 Cabinet Kit)
Primary buying reason	Interface to VAXBI systems, 8 asynchronous lines, 1 synchronous line, 1 printer port		Direct connection to VAXBI for asynchronous devices

¹DMA (Direct Memory Access) is the ability to move multi-character messages between a communication line and CPU memory without interrupting the CPU. This capability yields higher performance.

²Actual device speed and throughput depend on current Digital operating system, system configuration, and applications.

³MultiCPU access is the ability to send a message directly to two or more CPUs without routing the message through another CPU.

⁴Modem control refers to the number of signals available to control modem functions on U.S. and European modems. Full modem control includes nine to eleven signals. Limited modem control is five signals. No modem control means only send and receive signals are present for each line.

⁵Can be integrated with DECnet—P.S.I. must be present.

DHB32

The DHB32 is an asynchronous communications controller that enables up to 16 terminals, modems, or serial printers to communicate directly with a VAXBI processor. The DHB32 emulates the asynchronous portion of Digital's DMB32 communications controller by using similar architecture and the same software driver. The functions offered by the eight asynchronous channels on the DMB32 are extended to 16 channels on the DHB32. Unlike the DMB32, the DHB32 has neither a synchronous communications line nor a parallel printer channel.

The DHB32 is available in an EIA-232-D or DEC423 (EIA-423) version. The EIA-232 version has a distribution panel for 16 asynchronous channels with modem control. The DEC423 version has 14 DECconnect channels for connection to terminals, plus two channels that can be switched to DEC423 for terminals or EIA-232 for modem control.

Using the standard VMS driver, the DHB32 can operate 16 channels simultaneously at the following maximum throughput speed: 19.2 Kb/s for two channels and 9.6 Kb/s for 14 channels. Using a custom-developed driver, it can operate four channels simultaneously at maximum throughput speed of 38.4 Kb/s.

Features

- Allows maximum of 16 terminals, modems, or serial printers to communicate directly with a VAXBI processor.
- Provides full modem control with full-duplex, auto-answer, dialup operation.
- Has programmable split-speed operation with automatic flow control of transmitted and received data.
- Includes a full range of diagnostics compatible with the DMB32.
- Provides DECconnect terminal connection with DEC423 (EIA-423) version.

Prerequisite Software

The DHB32 uses the asynchronous portion of the DMB32 device driver, which is included with VMS Operating System V4.6 or later.

Specifications

Mounting Code: One VAXBI slot

Power Requirements:

- dc amps drawn at 5 Vdc: 5.56
- dc amps drawn at 12 Vdc: 0.42
- dc amps drawn at -12 Vdc: 0.42

VAXBI nodes: 1

I/O Panel Units: 8 for EIA-232, 4 for DEC423

Ordering Information

Order the DHB32-M controller and the appropriate cabinet kit. Cabinet kits include the distribution panel, a loopback connector for diagnostic testing, six adapter cables to connect the module to the distribution panel, and a user guide.

External device cables for the DHB32 must be ordered separately. The DEC423 version requires the H3104-B cable and cable concentrator.

VAXBI Communications Controllers

DHB32 Order Codes

Option	Order Code
Controller	
16-line asynchronous communications controller for VAXBI processors.	DHB32-M
Cabinet Kits	
For EIA-232-D system installation, select one of the following cabinet kits:	
EIA-232-D cabinet kit for VAX 82xx/83xx.	CK-DHB32-AM
EIA-232-D cabinet kit for VAX 85xx/87xx/88xx	CK-DHB32-AJ
EIA-232-D cabinet kit for VAX 85xx/87xx/88xx external VAXBI channels.	CK-DHB32-AN
For DEC423 system installation, select one of the following cabinet kits:	
DEC423 cabinet kit for VAX 82xx/83xx.	CK-DHB32-LM
DEC423 cabinet kit for VAX 85xx/87xx/88xx internal VAXBI channels, and VAX 62xx internal and external channels.	CK-DHB32-LJ
DEC423 cabinet kit for VAX 85xx/87xx/88xx VAXBI external channel	CK-DHB-LN
Cables ▲ Refer to "Communications Cables" at the end of this section for available lengths.	
Connects EIA-232-D-compatible terminals and printers.	BC22D-xx
Connects EIA-232-D-compatible asynchronous modems.	BC22E-xx
DEC423 cable and cable concentrator for eight devices. (Order two kits for connecting up to 16 DEC423 devices.)	H3104-B
Connects DEC423 terminals or printers to cable concentrator with modified modular jack connectors.	BC16E-xx

DMB32

The DMB32 is a high-performance DMA intelligent communications controller for the VAXBI family of computer systems. It provides ten communication lines—eight asynchronous terminal or modem lines, one synchronous line, and one parallel printer line, all supported from a single VAXBI backplane slot.

The eight asynchronous lines can transmit at speeds up to 38.4 Kb/s a line under specified conditions. (Actual line speed and throughput depends on the operating system and user applications.) All lines provide DMA output, full modem control, and split receive/transmit speed capability.

The one synchronous line supports message framing, and CRC generation and verification with full modem control for the HDLC, SDLC, BISYNC, DDCMP, and GEN BYTE protocols. It is capable of operating at speeds up to 64 Kb/s for HDLC and SDLC protocols, and 19.2 Kb/s for DDCMP. Other protocols are supported at 9.6 Kb/s speeds. (The actual throughput depends on the operating system and application.)

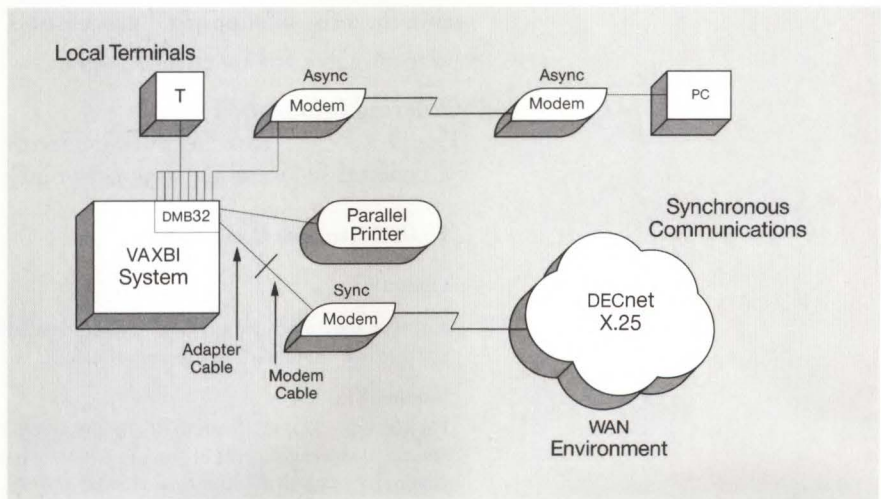
The one parallel printer line supports LP32 generic printer specifications, including the LP25, LP26, LP27, LXY12, LXY22, and LG01 parallel printers.

VAXBI Communications Controllers

Features

- Asynchronous communications:
 - Eight communication lines, EIA-232-D compatibility
 - Line speeds up to 38.4 Kb/s (application dependent)
 - DMA output optimizes terminal I/O performance
 - Split receive/transmit speeds on a per-line basis
 - Full modem control supports full- and half-duplex point-to-point modems
- Synchronous communications:
 - One communication line with EIA-232-D, EIA-422-A, EIA-423-A, and V.35 compatibility
 - Line speeds up to 64.0 Kb/s (application-dependent)
 - DMA input and output
 - Full modem control supports full- and half-duplex point-to-point modems
- Parallel printer line supports a wide range of Digital parallel printers, including LP25, LP26, LP27, LP32, LXY12, LXY22 and LG01.
- Comprehensive self-test through ROM-based diagnostics performs extensive functional tests of the DMB32 circuitry at each power-up or reset.

DMB32 Typical Configuration



NBG-186-00

Adapter Cables

The appropriate two-foot adapter cable must be ordered to connect the DMB32 50-pin D-subminiature connector to the selected synchronous communication device. ▲ **Refer to the DMB32 Hardware Order Code Table for ordering information.** The adapter cable can be ordered through the *DECdirect Plus* catalog.

VAXBI Communications Controllers

Distribution Panel

The distribution panel is four panels wide, does not require power, and attaches to the back of the computer system cabinet containing the module. The panel contains eight 25-pin D-subminiature connectors for asynchronous lines, one 50-pin D-subminiature connector for the synchronous line, and one 37-pin D-subminiature connector for the printer port.

Specifications

Mounting Code: One VAXBI slot

– One distribution panel (H3033), four-panel width

Power Requirements:

– dc amps drawn at 5 V: 6.75 A

– dc amps drawn at 12 V: 300 mA

– dc amps drawn at –12 V: 425 mA

Environmental Class: C ▲ Refer to Appendix B for details.

Required Software

- VMS Operating System V5.0 or later
- DMB32 Wide Area Network Device Driver, required to use the synchronous line with VMS

Required Hardware

- A VAXBI system configuration ▲ Refer to the DMB32 software order code table for a list of supported processors.
- Adapter cable for synchronous line

Ordering Information

The VAX Wide Area Network device driver for the synchronous line must be ordered separately to support point-to-point communications with VMS.

DMB32 Hardware Order Codes

Option	Order Code
Includes base module only. For system installation, select the appropriate cabinet kit and external cables.	DMB32-M
Cabinet Kits	
For use with VAX 8840, 8830, 8820, 8810, 8800, 8700, 8550, and 8530 internal VAXBI channels; H9657 external VAXBI channels; and VAX 6200 series internal and external channels	CK-DMB32-LJ
For use with VAX 8250 and 8350	CK-DMB32-LM
For use with VAX 8810, 8800, 8700, 8550, and 8530 external (H9652) VAXBI channels	CK-DMB32-LN
Synchronous line adapter cables	
For use with CCITT V.35	BC19F-02
For use with EIA-232-D/CCITT V.24	BC19D-02
For use with EIA-422	BC19B-02
For use with EIA-423-A	BC19E-02

VAXBI Communications Controllers

VAX Wide Area Network Device Driver Software Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license Software revision	QL-VAWAA-AA
right-to-copy	QL-VAWHA-HZ
Materials and Installation	
Distribution and documentation	QA-VAWAA-H#
Documentation only	QA-VAWAA-GZ
Installation service	QT-VAWA*-I#
U.S. Software Services¹	
DECsupport service	QT-VAWA*-9#
Basic service	QT-VAWA*-8#
Self-maintenance service	QT-VAWA*-3#

Supported processors (): VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): TK50 (5), RX33 (7), 1,600 bpi magtape (M)

¹For service agreements in other countries, consult a local Digital sales representative.

Q-bus Communications Controllers

The following table summarizes the features of Digital's asynchronous and synchronous Q-bus communications controllers.

<i>Q-bus Communications Controllers</i>					
Device	CXA16	CXB16	CXY08	DHF11 ⁸	DHQ11
Type	Asynchronous ¹	Asynchronous ¹	Asynchronous ¹	Asynchronous	Asynchronous
Number of lines	16	16	8	16 or 32	8
DMA ²	Yes	Yes	Yes	Yes	Yes
Maximum speed (consult SPD) ³	38.4 Kb/s	38.4 Kb/s	38.4 Kb/s	38.4 Kb/s	38.4 Kb/s
Software support	DECnet-11M-PLUS, DECnet-Micro/RSX	DECnet-11M-PLUS, DECnet-Micro/RSX	DECnet-11M-PLUS, DECnet-Micro/RSX, DECnet-VAX	DECnet-RSX, DECnet-Micro/RSX, MicroPower/Pascal	DECnet-VAX, DECnet-RSX, DECnet-Micro/RSX, MicroPower/Pascal
Operating system support	RSX-11M-PLUS, Micro/RSX, VMS	RSX-11M-PLUS, Micro/RSX, VMS	RSX-11M-PLUS, Micro/RSX, VMS	VMS, RSX-11M-PLUS, Micro/RSX, RSTS/E, VAXELN, ULTRIX-32	VMS, RSX-11M-PLUS, Micro/RSX, ULTRIX-32, RSTS/E, VAXELN
MultiCPU access ⁴	No	No	No	No	No
Modem control ⁵	No	No	Full	No	Full
Primary buying reason	DEC423 (EIA-423-A) asynchronous communications (data only)	EIA-422 asynchronous communications (data only)	EIA-232-D asynchronous communications; full modem control	Fiber optic link up to 1 kilometer; environments that prevent the use of copper connections	High performance; low power consumption; dual height module with full modem control

¹Used only on Q-bus systems with BA200 series enclosures.

²DMA (Direct Memory Access) is the ability to move multi-character messages between a communication line and CPU memory without interrupting the CPU. This capability yields higher performance.

³Actual device speed and throughput depend on current Digital operating system, system configuration, and applications.

⁴MultiCPU access is the ability to send a message directly to two or more CPUs without routing the message through another CPU.

Q-bus Communications Controllers

<i>Q-bus Communications Controllers (Continued)</i>						
Device	DLVJ11	DMV11	DPV11	DSV11	DZQ11	KMV1A
Type	Asynchronous	Synchronous	Synchronous	Synchronous	Asynchronous	Asynchronous or Synchronous
Number of lines	4	1	1	2	4	1
DMA ²	No	Yes	No	Yes	No	Yes
Maximum speed (consult SPD) ³	1 line @ 38.4 Kb/s, 2 lines @ 19.2 Kb/s, 4 lines @ 9.6 Kb/s	56 or 19.2 Kb/s (Depends on the version)	56 Kb/s, 9.6 Kb/s for IBM interconnect	2 lines @ 64 Kb/s, 1 line @ 256 Kb/s; SNA limited to 1 line @ 64 Kb/s	9.6 Kb/s	64 Kb/s ⁷
Software support	DECnet-RT, DECnet-RSX, DECnet-Micro/RX	DECnet-RT, DECnet-RSX, DECnet/E, DECnet-Micro/RX, DECnet-VAX	DECnet-RT, DECnet-RSX, RSX P.S.I. ⁶ , DECnet-Micro/RX, VAX P.S.I. ⁶ , VMS/SNA	DECnet-VAX, VAX P.S.I., VMS/SNA	DECnet-RSX, DECnet-VAX, DECnet-Micro/RX	RSX-11M-PLUS Software Tools, MicroVMS Software Tools, HDLC framing, X.25 Link Level Products, VAX P.S.I. ⁶ , RSX P.S.I. ⁶
Operating system support	RSX-11M-PLUS	RSX-11M, VMS	VMS, RSX-11S, RSX-11M, RSX-11M-PLUS, Micro/RX-11S, Micro/RX-11M, Micro/RX-11M-PLUS	VMS	RSX-11M-PLUS, Micro/RX, VMS, ULTRIX-32, Micro/RSTS, RSTS/E	VMS, RSX-11S, RSX-11M, RSX-11M-PLUS, Micro/RX
MultiCPU access ⁴	No	Yes	No	No	No	No
Modem control ⁵	Limited	Full	Full	Full	Limited	Full
Primary buying reason	Lowest price; FDX configurations	DECnet point-to-point configurations across phone lines	Low cost	High performance; multiprotocol support	Dual height module with limited modem control; FDX	High performance for bit-stuff protocols; programmable for synchronous or asynchronous communications

⁵Modem control refers to the number of signals available to control modem functions on U.S. and European modems. Full modem control includes nine to eleven signals. Limited modem control is five signals. No modem control means only send and receive signals are present for each line.

⁶Can be integrated with DECnet—P.S.I. must be present.

⁷Limited to 19.2 Kb/s with VAX P.S.I. or RSX P.S.I.

⁸DECnet-VAX does not currently support this device.

CX Communications Controllers

The CX communications controllers provide asynchronous communications for Q-bus systems that use the BA200 series system enclosures. These communications controllers—the CXY08, the CXA16, and the CXB16—operate at speeds up to 38.4 Kb/s per line, and transmit data using either Direct Memory Access (DMA) or programmed output.

CXY08

The CXY08 provides eight EIA-232-D communications lines to terminals, modems, or serial printers. All lines support full modem control, which permits point-to-point dialup or leased-line operation.

CXA16

The CXA16 provides 16 DEC423 lines for data-only connections (no modem control) using the DECconnect modular plug connectors.

DEC423, a superset of EIA-423-A, supports local EIA-232-D terminal-to-host communications at 9.6 Kb/s up to distances of 200 feet with the H8571-A passive adapter. EIA-232 terminals using the H8571-A and H3105-A active adapters can take advantage of DEC423 Electrical Overstress and Electrostatic Discharge (EOS/ESD) protection, as well as increased distances up to 1000 feet at 9.6 Kb/s.

VT300 series terminals provide integral DEC423 compatibility, which allows connection to the CXA16 at operating distances of 1000 feet at 9.6 Kb/s, without the need of a passive or active adapter.

CXB16

The CXB16 provides 16 EIA-422 communications lines for data-only connections (no modem control).

The EIA-422 standard offers a high immunity to line noise, important in harsh factory, industrial, and military applications. It allows for line lengths up to 4,000 feet at all supported line speeds. (The CXB16 is used only with EIA-422-compatible terminal equipment; connection to standard VT100/200/300 series terminals is not supported.)

Features

- High throughput allows transmissions at selectable speeds up to 38.4 Kb/s per line (operating system and user application dependent). CXY08 total throughput is 50,000 char/s; CXA16 and CXB16 total throughput is 100,000 char/s (10-bit characters: 8 data, 1 stop, no parity).
- Automatic XON/XOFF flow control manages receive and transmit data flow on a per-line basis without program intervention.
- 256-character receive FIFO buffer ensures top system performance during periods of data intensive input.
- Comprehensive self-test using on-board sequencer performs an extensive test at each system or device reset.
- No cabinet kit is necessary because the bulkhead distribution panel is integral to the CX module handle.
- DMA or programmed output with CXA16 or CXB16 allows the software device driver to dynamically select appropriate transmit mode, either DMA or 64-character FIFO output, depending on user application. This helps to optimize I/O system performance.

Q-bus Communications Controllers

Software Support

The CX options are supported by the following operating systems: RSX-11M-PLUS V3.0, Micro/RSX V3.1, and VMS V4.6.

Specifications

	CXY08	CXA16	CXB16
Number of lines	8	16	16
Electrical interface standards	EIA-232	DEC423 (EIA-423)	EIA-422
Direct memory access	Yes	Yes	Yes
Modem control	Full	No	No
Mounting space	Quad slot	Quad slot	Quad slot
Asynchronous formats	5-, 6-, 7- or 8-bit characters; Odd, even, or no parity; 1, 1.5, or 2 stop bits		
Power requirements			
dc amps drawn at +5 V	1.5	1.4	1.6
dc amps drawn at +12 V	0.22	0.11	0.0
dc loads	1.5	1.5	1.5
ac loads	3.0	3.0	3.0

Ordering Information

The CX communications controllers are used with Q-bus systems that use the BA200 series system enclosure (for example, the MicroVAX 3000). Order the -AA options with the purchase of a system; order the -AF options for field-installed add-ons.

The CXA16 and CXB16 include two 25-foot extension cables (BC16D-25), each leading to a 16-connection harmonica. The CXY08 includes two 12-foot cables (BC19N-12), each providing an eight-foot run to a molded box with four EIA-232-D connections.

CX Order Codes

Option	Order Code
Factory-installed eight-line EIA-232-D asynchronous controller with modem control	CXY08-AA
Field-installed eight-line EIA-232-D asynchronous controller with modem control	CXY08-AF
Factory-installed 16-line DEC423 (EIA-423-A) asynchronous controller (data only)	CXA16-AA
Field-installed 16-line DEC423 (EIA-423-A) asynchronous controller (data only)	CXA16-AF
Factory-installed 16-line EIA-422 asynchronous controller (data only)	CXB16-AA
Field-installed 16-line EIA-422 asynchronous controller (data only)	CXB16-AF

DHF11

The DHF11 is a fiber optic terminal interface that provides a maximum of 32 full-duplex, asynchronous, DEC423 (EIA-423) serial data channels on Q-bus systems. The DHF11, based on LSI technology, multiplexes and demultiplexes 16 data lines onto one fiber optic cable.

The fiber optic terminal interface provides asynchronous connections to Digital's Q-bus products where the environment prevents copper connections between the devices and the host system. The DHF11 also provides the ability to connect remote (up to one kilometer) clusters of terminals to a Q-bus host where an 802.3/Ethernet connection is not available. Therefore, the DHF11 can be used in many applications, including data concentration, near or remote terminal interfacing, factory floor cell control, and terminal cluster control. The fiber optic terminal Q-bus controller is fully compatible with existing software drivers, so new system software drivers are not required.

The DHF11 is a quad-height module that supports one or two 16-line ports. Each 16-line port connects, via a dual fiber optic cable, to an active terminal concentrator (H3132) that handles 16 full-duplex, asynchronous DEC423 (EIA-423-A) serial data lines.

Features

- The remote-powered terminal concentrator with a DEC423 interface economically connects data terminals to remote processing equipment when an 802.3/Ethernet LAN is not installed.
- Full-duplex 38.4 Kb/s asynchronous point-to-point terminal connections over fiber optic cables up to one kilometer long provide higher bandwidth and longer distances than available with copper connections. (Operating system driver limits speed to 19.2 Kb/s for most applications.)
- The DHF11 uses high-volume 62.5/125 micron fiber optic (industry-standard) cable.
- The host-transparent, programmable split-speed reception and transmission by the terminal user allows support of split-speed terminals with host intervention.
- The DHF11 is Q-bus compatible, so it can be used with any 16-, 18-, and 22-bit address system (not supported on Q-bus processors that use the BA200 series enclosure).
- Visual indicator for terminal concentrator status allows quick check for proper operation, and selftest and background monitor diagnostics provide realtime notification of hardware failure.
- Remote maintenance mode allows line tests to be invoked from the terminal side.
- The DHF11 isolates the system from lightning (EOS) and static (ESD), making it ideal for campus and industrial installations.
- The high terminal-to-cable density reduces cable congestion at the host.
- Self-test and background monitor diagnostics provide realtime notification of hardware failure.

Q-bus Communications Controllers

Operating System Support

- MicroVMS V4.6 or later (MicroVMS has been integrated into VMS as of V5.0)
- RSX-11M-PLUS V4.0
- Micro/RSX V4.0
- RSTS/E V9.5
- VAXELN V3.1
- ULTRIX-32 V2.2 or later
- MicroPower/Pascal—MicroRSX V2.4

Specifications

Mounting Code: One quad slot

Power Requirements:

- dc amps drawn at 5 V: 5
- dc amps drawn at +12 V: 0
- dc amps drawn at –12 V: 0

Bus Loads: ac 3.7, dc 1.0

I/O Connection Panel Inserts: One size A

Ordering Information

The DHF11 includes a 10-meter fiber optic cable for each 16-line terminal concentrator, and is compatible with Digital's BN25J standard fiber optic cables. ▲ Refer to "Communications Cables" at the end of this section for specific cable lengths.

Power cords are supplied with 120 Vac products. For 240 Vac products, a power cord must be ordered for each 16-line terminal concentrator.

DHF11 Order Codes

Option	Order Code
16-line fiber optic terminal controller, 120 Vac. Includes power cord for use in the U.S., Canada, Mexico, and Japan.	DHF11-AA
32-line fiber optic terminal controller, 120 Vac. Includes power cords for use in the U.S., Canada, Mexico, and Japan.	DHF11-BA
16-line terminal concentrator upgrade for DHF11-AA, 120 Vac. Includes power cord for use in the U.S., Canada, Mexico, and Japan.	H3123-B2
16-line fiber optic terminal controller, 240 Vac. Requires power cord.	DHF11-AB
32-line fiber optic terminal controller, 240 Vac. Requires power cord.	DHF11-BB
16-line terminal concentrator upgrade for DHF11-AB, 240 Vac. Requires power cord.	H3123-B3

Q-bus Communications Controllers

DHF11 Power Cord Order Codes

Country	Order Code
Australia	BN19H-2E
Central Europe	BN19C-2E
Denmark	BN19K-2E
Italy	BN19M-2E
India	BN19S-2E
Israel	BN19U-2E
Switzerland	BN19E-2E
United Kingdom	BN19A-2E
U.S./Canada (not required)	BN19P-1K

DHQ11

The DHQ11 is a Q-bus communications controller that supplies eight asynchronous communications lines on a dual size module. The DHQ11 operates in either Direct Memory Access (DMA) or programmed-output mode.

The DHQ11 provides EIA-232-D or DEC423 (EIA-232/EIA-423) signaling to externally connected terminal devices through a choice of distribution panels, called cabinet kits. EIA-232 cabinet kits supply eight 25-pin connectors to support full modem control; DEC423 (a superset of EIA-423-A) cabinet kits supply eight DECconnect modular plug connectors, without modem control, for local terminal connections.

The DHQ11 is the logical choice for connecting local terminals, modems, and serial printers to MicroVAX II and MicroPDP-11 computer systems.

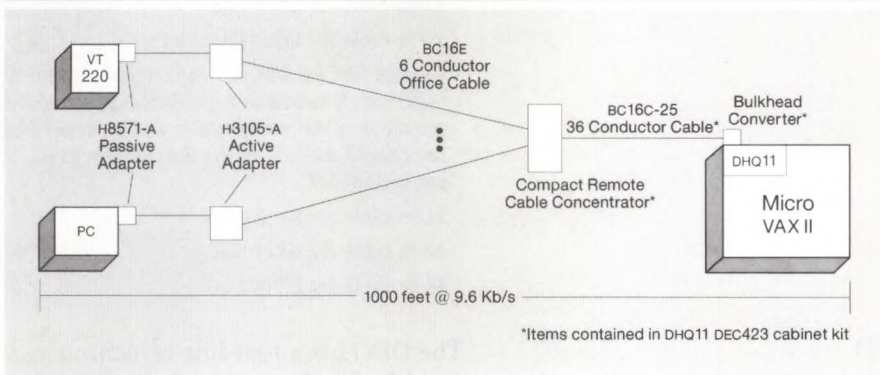
Features

- High throughput on all eight asynchronous communications lines allows transmission at selectable speeds up to 38.4 Kb/s per line, full-duplex (operating system and user application dependent), for a total throughput of 60,000 char/second (10-bit characters: 8 data, 1 stop, no parity), ideal for graphics and videotext applications.
- Compact, dual-size module leaves more backplane space available for additional communications devices.
- Low power consumption with EIA-232 cabinet kit requires only 1.4 amps from the CPU +5 V-power supply; DEC423 cabinet kit requires only 2.0 amps, leaving more power available for connecting additional peripheral devices to the backplane.
- Receive FIFO buffer of 256 characters is shared by the eight lines. This ensures top system performance during periods of data intensive input.
- DMA or programmed-output 64-character FIFO transmit buffer optimizes I/O performance by transmitting data from memory to communications channel with minimum CPU interruptions.
- Automatic XON/XOFF flow control manages data flow in either direction on a per-line basis without program intervention.
- Modem control with EIA-232 cabinet kit provides full modem control for full- and half-duplex, point-to-point communications.

Q-bus Communications Controllers

- DEC423 cabinet kit with Electrical Overstress/Electrostatic Discharge (EOS/ESD) supports local EIA-232-compatible terminals at 9.6 Kb/s. The terminals may be placed up to 200 feet from the CPU with the H8571-A passive adapter, and up to 1000 feet from the CPU with the H3105-A active and H8571-A passive adapters. ▲ **Refer to the following figure and to Section 2 for more information.**
- Onboard self-test executes an extensive test of DHQ11 circuitry each power-on or device reset. Also, a background monitor program continually tests the DHQ11 when it is not engaged in other tasks.

DHQ11 Configuration with DEC423 Cabinet Kit



NBG-185-00

CPU and Software Support

The DHQ11 is supported by the MicroVAX II, MicroPDP-11/23, MicroPDP-11/53, MicroPDP-11/73, and MicroPDP-11/83.

The DHQ11 is supported by the following operating systems: RSX, MicroRSX, RSTS/E, Micro/RSTS, VMS, ULTRIX-32, and VAXELN. It is also supported by MicroPower/Pascal.

Specifications

Mounting code: One dual slot

Power Requirements:

- dc amps drawn at +5 V: 1.4 with EIA-232 cabinet kit; 2.0 with DEC423 cabinet kit
- dc amps drawn at +12 V: 0.23

Bus Loads: ac 3.2, dc 0.5 with EIA-232 cabinet kit; ac 2.9, dc 0.5 with DEC 423 cabinet kit

I/O Connection Panel Inserts:

- 2 Size B (EIA-232)
- 1 Size B (DEC423)

Environmental Class: C ▲ **Refer to Appendix B for details.**

Q-bus Communications Controllers

DHQ11 Order Codes

Option	Order Code
Asynchronous Q-bus communication controller. Includes base module only.	DHQ11-M
For system installation, order one of the following cabinet kits: Cabinet Kits for EIA-232 connection: contain two B-size slot bulkhead distribution panels with 25-pin male connectors and associated cabling to connect the module to the distribution panels. Data cables are not included.	
21-in cable for BA123 box	CK-DHQ11-AA
12-in cable for BA23 box	CK-DHQ11-AB
36-in cable for H9642 cabinet	CK-DHQ11-AF
Cabinet kits for DEC423 connection: contain B-size slot bulkhead distribution panel with a 36-conductor cable, compact remote terminal concentrator and associated cabling to connect the control module to the distribution panel. Data cables are not included.	
21-in cable for BA123 box	CK-DHQ11-WA
12-in cable for BA23 box	CK-DHQ11-WB
36-in cable for H9642 cab	CK-DHQ11-WF

DLVJ1

The DLVJ1 is a four-line asynchronous communications controller that provides local or remote connection between Q-bus systems and EIA-232-C/CCITT V.28, EIA-422/CCITT V.11, and EIA-423-A/CCITT V.10 terminals and modems. The DLVJ1 acts as four separate devices, making program operations more convenient than with a multiplexer. The DLVJ1 operates at program or jumper-selectable speeds from 150 to 38,400 bits per second at full-duplex (1 line at 38.4 Kb/s, 2 lines at 19.2 Kb/s, or 4 lines at 9.6 Kb/s). Split-speed transmit and receive rates are supported on each line, reducing the software demand for the receive line.

The DLVJ1 is compatible with Digital's family of modems and with Bell 100 and 200 series modems and their equivalents. The DLVJ1 is not supported by MicroVMS or VMS.

Features

- Four asynchronous communications lines from a dual size board.
- Single line speed up to 38.4 Kb/s, two lines at 19.2 Kb/s each, or four lines at 9.6 Kb/s each.
- Limited modem control on all lines supports full-duplex, point-to-point modems.
- Character interrupt input/output.
- Split receive/transmit speeds on a per-line basis.
- EIA-232-C, EIA-422-A and EIA-423-A compatible.

Q-bus Communications Controllers

Specifications

Mounting Code: 1 double slot

Power Requirements:

– dc amps drawn at +5 V: 1.0

– dc amps drawn at +12 V: 0.15

Bus Loads: ac 1, dc 1

I/O Connection Panel Insert: Size B

Environmental Class: C ▲ Refer to Appendix B for details.

DLVJ1 Order Codes

Options	Order Code
EIA-232-C/CCITT V.28 interface. Includes base module only.	DLVJ1-M
For system installation select external cables and one of the following cabinet kits:	
For use with BA123 (MicroVAX II) and BA11-MA(MB) (PDP-11/23-S) boxes.	CK-DLVJ1-LA
For use with BA23 box (MicroPDP-11, MicroVAX).	CK-DLVJ1-LB
For use with dual cabinet (PDP-11/83, MicroVAX II).	CK-DLVJ1-LF
EIA-442/CCITT V.11 interface. Includes base module only.	DLVJ1-M
For system installation select external cables and one of the following cabinet kits:	
For use with BA123 (MicroVAX II) and BA11-MA(MB) (PDP-11/23-S) boxes.	CK-DLVJ1-EA
For use with BA23 box (MicroPDP-11).	CK-DLVJ1-EB
For use with dual cabinet (PDP-11/83, MicroVAX II).	CK-DLVJ1-EF

DMV11

The DMV11 is a microprocessor-controlled, single-line synchronous communications controller that provides local or remote connection between Q-bus systems and other computer systems with EIA-232-C/CCITT V.28, CCITT V.35, or EIA-423-A/EIA-449 interfaces. The DMV11 implements DDCMP in hardware and supports direct memory access data transfers, DECnet point-to-point configurations, and full modem control. It operates at speeds up to 56 Kb/s (depending on the version selected) at half- or full-duplex. Note: The maximum speed for EIA-232-C connection is 19.2 Kb/s.

Depending on the operating system and layered software, the DMV11 can support up to 12 tributaries. In point-to-point configurations, the DMV11 can communicate with DMC11, DUP11, DPV11, DMR11, DMP11, or other DMV11 controllers.

The DMV11 is compatible with Digital's family of modems and with Bell 200 series modems and their equivalents.

Q-bus Communications Controllers

Features

- Single-line synchronous communications from a dual size board.
- Line speeds up to 56 Kb/s (application-dependent).
- DMA input/output optimizes communication throughput.
- Full modem control supports full- or half-duplex communications.
- EIA-232-C, EIA-423-A/EIA-449, or V.35-compatible depending on version selected.

Specifications

Mounting Code: One quad slot (all versions)

Power Requirements:

– dc amps drawn at +5 V: 3.4 (DMV11-A, -B, -F), 3.4 (DMV11-C)

– dc amps drawn at +12 V: 0.38 (DMV11-A, -B, -F), 0.26 (DMV11-C)

Bus Loads: ac 2, dc 1 (all versions)

I/O Connection Panel Inserts:

– Size B (DMV11-A, -F)

– Size A (DMV11-B, -C)

Environmental Class: C ▲ Refer to Appendix B for details.

Q-bus Communications Controllers

DMV11 Order Codes	
Option	Order Code
Synchronous Q-bus controller for EIA-232-C/CCITT V.28, EIA-423-A/EIA-449, or CCITT V.35 interfaces. Includes base module only.	DMV11-M
Synchronous Q-bus controller for integral modem. Includes base module only.	DMV11-N
EIA-232-C/CCITT V.28 Cabinet Kits	
For EIA-232-C/CCITT V.28 system installation, select one of the following cabinet kits:	
For use with BA123 (MicroVAX II, MicroPDP-11) and BA11-MA(MB) (PDP-11/23-S) boxes.	CK-DMV11-AA
For use with BA23 box (MicroPDP-11).	CK-DMV11-AB
For use with H9642 Micro cab (MicroVAX II, MicroPDP-11).	CK-DMV11-AF
For use with CPUs that do not have an I/O connection panel. Kit contains a 10-ft cable that connects the DMV11-M module to an external device.	CK-DMV11-A2
EIA-423-A/EIA-449 Cabinets Kits	
For EIA-423-A/EIA-449 system installation, select one of the following cabinet kits:	
For use with BA123 (MicroVAX II, MicroPDP-11) and BA11-MA(MB) (PDP-11/23-S) boxes.	CK-DMV11-FA
For use with BA23 box (MicroPDP-11).	CK-DMV11-FB
For use with H9642 Micro cabinet (MicroVAX II, MicroPDP-11).	CK-DMV11-FF
For use with CPUs that do not have I/O panel. Kit contains a 10-ft cable that connects the DMV11-M module to an external device.	CK-DMV11-F3
CCITT V.35 Cabinet Kits	
For CCITT V.35 system installation, select one of the following cabinet kits:	
For use with BA123 (MicroVAX II, MicroPDP-11) and BA11-MA(MB) (PDP-11/23-S) boxes. Includes a BC17E cable for connection to modem.	CK-DMV11-BA
For use with BA23 box (Micro/PDP-11). Includes a BC17E cable for connection to modem.	CK-DMV11-BB
For use with H9642 Micro cabinet (MicroVAX II, MicroPDP-11).	CK-DMV11-BF
For use with CPUs that do not have an I/O connection panel. Kit contains a 25-ft cable that connects the DMV11-M module to an external device.	CK-DMV11-B3
Integral Modem Cabinet Kits	
For system installation with integral modem, select one of the following cabinet kits.	
For use with BA123 (MicroVAX II, MicroPDP-11) and BA11-MA(MB) (PDP-11/23-S) boxes.	CK-DMV11-CA
For use with BA23 box (MicroPDP-11).	CK-DMV11-CB
For use with H9642 Micro cabinet (MicroVAX II, MicroPDP-11).	CK-DMV11-CF
For use with CPUs that do not have an I/O connection panel. Kit contains a 25-ft cable that connects the DMV11-N module to an external device.	CK-DMV11-C3

Q-bus Communications Controllers

DPV11

The DPV11 is a low-cost, single-line synchronous programmable interface that provides local or remote connection between Q-bus systems and other computer systems with EIA-232-C/CCITT V.28 or EIA-232-C/CCITT V.11 interfaces. Operating at speeds up to 56 Kb/s at half- or full-duplex with full modem control (DDCMP/BISYNC at 56 Kb/s, HDLC/SDLC at 9.6 Kb/s), the DPV11 is programmable for either byte-oriented protocols (DDCMP or BISYNC) or bit-oriented protocols (SDLC or HDLC). The DPV11 is suited for interfacing to medium-speed synchronous lines for remote batch and remote job-entry applications and is compatible with Digital's family of modems and with the Bell 200 series modems and their equivalents.

Features

- Single-line synchronous communications from a dual size board.
- Line speeds up to 56 Kb/s (application dependent).
- Full modem control supports full and half-duplex communications.
- Character interrupt input/output.
- EIA-232-C compatible.

Specifications

Mounting Code: 1 double slot

Power Requirements:

- dc amps drawn at +5 V: 1.2
- dc amps drawn at +12 V: 0.3

Bus Loads: ac 1, dc 1

I/O Connection Panel Insert: Size A

Environmental Class: C ▲ Refer to Appendix B for details.

DPV11 Order Codes

Option	Order Code
Single-line synchronous Q-bus communications controller. Includes base module only; requires cabinet kit.	DPV11-M
Factory-installed controller for BA200 series enclosures. No cabinet kit required.	DPV11-SA
Field-installed controller for BA200 series enclosures. No cabinet kit required.	DPV11-SF
For system installation of the DPV11-M, select one of the following cabinet kits:	
For use with BA123 (MicroVAX II, MicroPDP-11) and BA11-MA(MB) (PDP-11/23-S) boxes.	CK-DPV11-AA
For use with BA23 box (MICRO/PDP-11).	CK-DPV11-AB
For use with H9642 Micro cab (MicroVAX II, MicroPDP-11).	CK-DPV11-AF
For use with CPUs that do not have an I/O connection panel. Kit contains a 25-ft cable that connects the DPV11-M module to an external device.	CK-DPV11-A3

DSV11

The DSV11 module supports synchronous communications at speeds up to 256 Kb/s for MicroVAX II and MicroVAX 3500/3600 systems. It is the preferred MicroVAX option for host-based wide area communications, with the flexibility to support two lines running different applications.

The DSV11 supports the DDCMP, HDLC, and SDLC protocols at speeds up to 256 Kb/s for one-line-only operation, and speeds up to 64 Kb/s per line for two-line operation. The Bisync protocol is also supported at speeds up to 9.6 Kb/s per line, regardless of whether one or two lines are in operation.

Up to five DSV11 modules may be included in a system box (available slots, power, and bus load permitting), except for the BA23 box where the limit is two DSV11 modules.

DECnet-VAX, VAX P.S.I., and VMS/SNA software products support the DSV11 module. Combinations of these software products can share the DSV11, with one product controlling both lines, or one product controlling one line while another product controls the second line.

The following table lists the software combinations that can control the DSV11 and the maximum line speeds they support.

Communications Application	One-line Operation (speed)	Two-line Operation (speed/line)		
		DECnet-VAX	VMS/SNA	VAX P.S.I.
DECnet-VAX	256 Kb/s	64 Kb/s	64 Kb/s	64 Kb/s
VMS/SNA	64 Kb/s	64 Kb/s	N/S*	64 Kb/s
VAX P.S.I.	64 Kb/s	64 Kb/s	64 Kb/s	64 Kb/s

*VMS/SNA does not support two DSV11 lines.

Features

- High performance.
- Multi-protocol capability supports different applications.
- Configurable communications ports support different line interfaces with one option.

Prerequisite Software

VMS V5.0 operating system for support of the Wide Area Device Driver included with the DSV11.

A synchronous device driver is available for DSV11 support under VMS V4.7 operating system. Refer to Software Product Description 28.49 for more information.

Specifications	
Mounting Code	1 quad slot
Power Requirements	
dc amps drawn at +5 V	5.43
dc amps drawn at +12 V	0.62
Bus Loads	3.9 ac, 1.0 dc
I/O Connection Panel Inserts	1 size B (BA23/BA123/H9642 only)

Q-bus Communications Controllers

Ordering Information

The DSV11 is available in versions using a cabinet kit for BA23/BA123 enclosures or with integral distribution panel for BA200-series enclosures. The DSV11 includes the Wide Area Network Device Drive software for support under the VMS V5.0 operating system—license, distribution on TK50 media, and documentation are included.

For multiple DSV11 modules on one system, order one DSV11-SA/-SF/-AA plus additional DSV11-SB/-SG/-AB options as required.

DSV11 Order Code Table

Option	Order Code
First DSV11 controller for BA200-series enclosures, factory installed. Includes software, one EIA-232 adapter cable, one V.35 adapter cable, and documentation.	DSV11-SA
Extra DSV11 modules for the same system, factory installed. Includes adapter cables only; no software or documentation.	DSV11-SB
First DSV11 controller for BA200-series enclosures, field installed. Includes software, one EIA-232 adapter cable, one V.35 adapter cable, and documentation.	DSV11-SF
Extra DSV11 modules for the same system, field installed. Includes adapter cables only; no software or documentation.	DSV11-SG
First DSV11 module for BA23/BA123/H9642 enclosures. Includes software, one EIA 232 adapter cable, one V.35 adapter cable, and documentation.	DSV11-AA
Extra DSV11 modules for the same system. Includes adapter cables only; no software or documentation.	DSV11-AB
Cabinet Kits	
For system installation of the DSV11-AA and DSV11-AB, order one of the following cabinet kits.	
Cabinet kit for BA123	CK-DSV11-UA
Cabinet kit for BA23	CK-DSV11-UB
Cabinet kit for BA123	CK-DSV11-UF
Adapter Cables	
EIA-422 adapter cable	BC19B-02
EIA-232/V.24 adapter cable	BC19D-02
EIA-423 adapter cable	BC19E-02
V.35 adapter cable	BC19F-02

Q-bus Communications Controllers

DZQ11

The DZQ11 is a four-line asynchronous communications controller that provides local or remote connection between PDP-11 and VAX Q-bus systems and EIA-232-C/CCITT V.28 and EIA-423-A/CCITT V.10 terminals, modems, or other systems. The DZQ11 operates at program-selectable speeds up to 9.6 Kb/s at full-duplex with limited modem control on each line.

The DZQ11 is compatible with Digital's family of modems and with Bell 100 and 200 series modems and their equivalents.

Features

- Four asynchronous communication lines from a dual size module.
- Line speeds up to 9.6 Kb/s.
- Limited modem control on all lines supports full-duplex, point-to-point, modems.
- Character interrupt input/output.
- EIA-232-C and EIA-423-A compatible.

Specifications

Mounting Code: 1 dual slot

Power Requirements:

- dc amps drawn at +5V: 1.0
- dc amps drawn at +12V: 0.36

Bus Loads: ac 1.4, dc 0.5

I/O Connection Panel Insert: Size B

Environmental Class: C ▲ Refer to Appendix B for details.

DZQ11 Order Codes

Option	Order Code
Four-line asynchronous Q-bus controller. Includes base module only; requires cabinet kit.	DZQ11-M
Factory-installed controller for BA200 series enclosures. Includes base module only; no cabinet kit required.	DZQ11-SA
Field-installed controller for BA200 series enclosures. Includes base module only; no cabinet kit required.	DZQ11-SF
For system installation of DZQ11-M, select the appropriate external cables and one of the following cabinet kits:	
For use with BA123 (MicroVAX II, MicroPDP-11) and BA11-MA(MB) (PDP-11/23-S) boxes.	CK-DZQ11-DA
For use with BA23 box (Micro/PDP-11, MicroVAX).	CK-DZQ11-DB
For use with H9642 Micro cabinet (MicroVAX II, MicroPDP-11).	CK-DZQ11-DF
For use with CPUs that do not have an I/O connection panel. Kit contains a 25-ft cable that connects the DZQ11-M module to eight EIA-232 or EIA-423-A devices. (Non-FCC compliant)	CK-DZQ11-D3

Q-bus Communications Controllers

KMV1A

The KMV1A is a high-performance direct-memory-access single-line programmable communications controller that provides connection between Q-bus systems with EIA-232-C/CCITT V.28, EIA-422/CCITT V.11, and EIA-423-A/CCITT V.10 interfaces. It is capable of communications speeds up to 64 Kb/s. Used on the PDP-11/23, PDP-11/23-PLUS, MicroVAX II, MicroVAX 3500, MicroVAX 3600, and MicroPDP-11 systems, it utilizes the Micro/T11 Processor to perform user-defined communications functions, thereby freeing the host to do more application computations.

The KMV1A can be programmed in synchronous or asynchronous modes. It also provides full modem support for Digital's family of modems, the Bell 200 Series or equivalent, and European PTT-approved modems.

Software Development Tools, X.25 Link Level, and HDLC Framing package are available for use under RSX-11M and RSX-11M-PLUS systems. Software support is available for VAX P.S.I. (at speeds up to 19.2 Kb/s), X.25 Link Level, and Development Tools on a MicroVAX.

Specifications

Mounting Code	1 quad slot
Power Requirements	
dc amps drawn at +5 V	2.6
dc amps drawn at +12 V	0.2
Bus Loads	ac 3, dc 1
I/O Connection Panel Insert (Compatible connections for MicroVAX 3500/3600)	Size B (PDP-11/23, MicroPDP-11, MicroVAX II) Size C (PDP-11/23-PLUS)
Environmental Class	C ▲ Refer to Appendix B for details.

Q-bus Communications Controllers

KMV1A Order Codes

Option	Order Code
Controllers	KMV1A-SF
Field-installed EIA-232-C KMV controller for BA200 series enclosure. No cabinet kit required.	
Field-installed EIA-422 KMV controller for BA200 series enclosure. No cabinet kit required.	KMV1A-SG
Field-installed EIA-423-A KMV controller for BA200 series enclosure. No cabinet kit required.	KMV1A-SH
KMV controller for MicroVAX II and MicroPDP-11 systems. Includes module only. Requires cabinet kit.	KMV1A-M
Cabinet Kits	
For KMV1A-M system installation, select one of the following cabinet kits.	
EIA-232-C for PDP-11/23 and BA123.	CK-KMV1A-AA
EIA-232-C for BA23.	CK-KMV1A-AB
EIA-232-C for PDP-11/23-PLUS.	CK-KMV1A-AC
EIA-232-C for MicroVAX II System 5 (in H9642 cabinets).	CK-KMV1A-AF
EIA-422 for PDP-11/23 and BA123.	CK-KMV1A-EA
EIA-422 for BA23.	CK-KMV1A-EB
EIA-422 for PDP-11/23-PLUS.	CK-KMV1A-EC
EIA-422 for MicroVAX II System 5 (in H9642 cabinets).	CK-KMV1A-EF
EIA-423-A for PDP-11/23s and BA123.	CK-KMV1A-FA
EIA-423-A for BA23.	CK-KMV1A-FB
EIA-423-A for PDP-11/23-PLUS.	CK-KMV1A-FC
EIA-423-A for MicroVAX II System 5 (in H9642 cabinets).	CK-KMV1A-FF
Cables for Modem Connection	
Connects KMV1A-S controllers to EIA-232-compatible modems.	BC22U-xx
Connects KMV1A-S controllers to EIA-422 or EIA-423-A compatible modems	BC22W-xx

KMV1A Optional Software Order Codes

Option	Order Code
RSX KMV software tools	QJS98-xx
RSX X.25 link level	QJS97-xx
RSX-11M HDLC framing	QJS32-xx
RSX-11M-PLUS HDLC framing	QJS39-xx
RSX-11 P.S.I./M (limited to 19.2 Kb/s)	QJD91-xx
RSX-11 P.S.I./M-PLUS (limited to 19.2 Kb/s)	QJD92-xx
VAX P.S.I. (limited to 19.2 Kb/s)	QA-071A*-xx
KMV1A VMS driver and development tools	QA-VCPA*-xx

The following table summarizes the features of Digital's MicroVAX 2000 communications controllers.

<i>MicroVAX 2000 Communications Controllers</i>		
	DHT32	DST32
Type	Asynchronous	Synchronous
Number of lines	8	1
Direct Memory Access (DMA)¹	No	No
Maximum speed (consult SPD)²	38.4 Kb/s	19.2 Kb/s
Software support	DECnet-ULTRIX ⁵	VAX P.S.I., VMS/SNA
Operating system support	VMS, ULTRIX-32	VMS
MultiCPU access³	No	No
Modem control⁴	No	Full
Primary buying reason	DEC423 (EIA-423-A) asynchronous communications; adds eight lines to MicroVAX 2000	Low-cost connection to wide area network

¹DMA (Direct Memory Access) is the ability to move multi-character messages between a communication line and CPU memory without interrupting the CPU. This capability yields higher performance.

²Actual device speed and throughput depend on Digital operating system, system configuration, and applications.

³MultiCPU access is the ability to send a message directly to two or more CPUs without routing the message through another CPU.

⁴Modem control refers to the number of signals available to control modem functions on U.S. and European modems. Full modem control includes nine to eleven signals. Limited modem control is five signals. No modem control means only send and receive signals are present on each line.

⁵DECnet-VAX does not currently support this device.

DHT32

The DHT32 is an eight-line asynchronous multiplexer for the MicroVAX 2000, application compatible with the DHQ11. It provides data-only transmission at speeds up to 38.4 Kb/s, and allows eight additional terminals or peripheral devices to connect to the MicroVAX 2000 system. With the three non-modem lines and one modem line available on the MicroVAX 2000, a total of 12 asynchronous lines can be connected to the MicroVAX 2000 system. (A "network" solution, including DECserver 200 via 802.3/Ethernet, is appropriate if more asynchronous lines are required.)

The DHT32 supports the DEC423 (EIA-423-A) standard. Terminals requiring EIA-232 connections can use an adapter. Cables that connect directly to terminals or printers are not provided as part of this option.

Note: The DST32 and the DHT32 (eight-line asynchronous communications option) are mutually exclusive, and only one can be installed in a system. If more than four asynchronous lines are required, customers can add terminals using Digital terminal servers. For synchronous communication to an IBM host, an alternate method is to use a DECnet/SNA Gateway.

Features

- Eight-line, asynchronous, terminal-expansion option gives MicroVAX 2000 a total capacity of 12 asynchronous lines.
- Performance approximates the MicroVAX II systems with DHV11/DHQ11 asynchronous controller.

Software Support

VMS and ULTRIX-32 operating systems.

Specifications

Mounting Space: Daughter-boarded to the system module; driver/receiver board located in the expansion adapter.

Power Requirements:

- dc amps drawn at +5 V: 1.50
- dc amps drawn at +12 V: 0.70
- dc amps drawn at -12 V: 0.12

Bus Loads: Private bus architecture (1 F-type logic board)

I/O Connection Panel Inserts: Located in opening C in the expansion adapter

Environmental Class: B with modified relative humidity (operating) of 10-90% (no diskette system), and 20-80% (diskette in use).

DHT32 Order Codes

Option	Order Code
Eight-line asynchronous controller includes serial line logic module, serial line driver/receiver module, 34-way internal ribbon cable, external 25-foot data cable, and eight-line data cable concentrator (H3104).	DHT32-AA

DST32

The DST32, a single-line synchronous communications controller for the MicroVAX 2000, is a fully duplexed line option with bit- or character-oriented protocol. The DST32 supports HDLC and SDLC at speeds up to 19.2 Kb/s.

The DST32 option includes the DST32 device driver license and software. Customers can use the DST32 either for VMS/SNA connection or for VAX P.S.I.

Note: The DST32 and the DHT32 (eight-line asynchronous communications option) are mutually exclusive, and only one can be installed in a system. If more than four asynchronous lines are required, customers can add terminals using Digital terminal servers. For synchronous communication to an IBM host, an alternate method is to use a DECnet/SNA Gateway.

Features

- Provides cost-effective, wide-area connection for applications supporting geographically dispersed MicroVAX 2000 systems.
- Supports SNA or X.25 (P.S.I.) networks.

Prerequisite Software

VMS/SNA V1.2 and VAX P.S.I. V4.1 under the VMS operating system, V4.6 (or later)

Hardware Specifications

Mounting Space: Daughter-boarded to the system module; driver/receiver board located in the expansion adapter.

Power Requirements:

- dc amps drawn at +5 Vac: 2.0
- dc amps drawn at +12 Vac: 0.07
- dc amps drawn at -12 Vac: 0.115

Bus Loads: Private bus architecture (1 F-type logic board)

I/O Connection Panel Inserts: Located in opening C in the expansion adapter

Environmental Class: B with modified relative humidity (operating) of 10–90% (no diskette system), and 20–80% (diskette in use).

Ordering Information

DST32 hardware comprises a controller module, a driver/receiver module, an internal ribbon cable, and an external modem adapter cable. The appropriate modem cable must be ordered separately for a specific application: BC22F-xx for DST32-AA, and BC55D-xx for DST32-AB and DST32-AC, where xx is the cable length. ▲ Refer to “Communications Cables” in this section for available cable lengths.

Also included are the device driver in both tape and diskette media, and software license.

DST32 Order Codes

Option	Order Code
Single-line synchronous communications controller for MicroVAX 2000. Includes EIA-232/V.24 modem cable with EIA-232-C adapter (supported by VMS/SNA).	DST32-AA
Single-line synchronous communications controller for MicroVAX 2000. Includes EIA-423/V.10 modem cable.	DST32-AB
Single-line synchronous communications controller for MicroVAX 2000. Includes EIA-422/V.36 modem cable.	DST32-AC

The following table summarizes the features of Digital's asynchronous and synchronous UNIBUS communications controllers.

UNIBUS Communications Controllers

Device	DHU11	DMF32		DMR11	DMZ32
Type	Asynchronous	Synchronous ⁷	Asynchronous ⁷	Synchronous	Asynchronous ⁷
Number of lines	16	1	8	1	24
DMA ¹	Yes	Yes	Yes	Yes	Yes
Maximum speed (consult SPD) ²	38.4 Kb/s	19.2 Kb/s	19.2 Kb/s	1 Mb/s	19.2 Kb/s
Software support	DECnet-VAX	DECnet-VAX, VAX P.S.I. ⁵	DECnet-VAX	DECnet-RT, DECnet-20, DECnet-10, DECnet/E, DECnet-VAX, DECnet-RSX	DECnet-VAX
Operating system support	VMS, RSX-11M, RSX-11M-PLUS, ULTRIX-32, RSTS/E	VMS	VMS	VMS, RSX-11S, RSX-11M, RSX-11M-PLUS, RSTS/E, TOPS-10, TOPS-20	VMS, ULTRIX-32
MultiCPU access ³	No	No	No	No	No
Modem control ⁴	Full	Yes	Full on two lines; none on six lines	Full	Full (optional)
Primary buying reason	DMA performance with full modem control; lowest price per line	Low cost; DMA performance; one synchronous line; eight asynchronous lines; one printer port		DECnet interface across phone lines	DMA performance with full modem control; remote distribution panel

¹DMA (Direct Memory Access) is the ability to move multi-character messages between a communication line and CPU memory without interrupting the CPU. This capability yields higher performance.

²Actual device speed and throughput depend on Digital operating system, system configuration, and applications.

³MultiCPU Access refers to the ability to send a message directly to two or more CPUs without routing the message through another CPU.

⁴Modem Control refers to the number of signals available to control modem functions on U.S. and European modems. Full modem control includes nine to eleven signals. Limited modem control is five signals. No modem control means only send and receive signals are present for each line.

UNIBUS Communications Controllers

UNIBUS Communications Controllers (Continued)

Device	DUP11	KCT32	KMS11	KMS1P
Type	Synchronous	Asynchronous or Synchronous ⁷	Synchronous	Synchronous
Number of lines	1	2	8	1
DMA ¹	No	Yes	Yes	Yes
Maximum speed (consult SPD) ²	9.6 Kb/s ⁴	2 lines @ 64 Kb/s, 1 line @ 160 Kb/s	4 lines @ 56 Kb/s, 8 lines @ 19.2 Kb/s ⁸	64 or 19.2 Kb/s (depends on the version)
Software support	IBM Internet ⁶ , RSX P.S.I., VAX P.S.I. ⁵ , DECnet-RT, DECnet-RSX	VAX-11 KCT32 Software Tools	VAX X.25 Link Level, RSX X.25 Link Level, VAX HDLC/BSC Framing, VAX P.S.I. ⁵ , RSX P.S.I. ⁵	VAX P.S.I. ⁵ , RSX X.25 Link Level, RSX P.S.I. ⁵
Operating system support	RSX-11M, RSX-11M-PLUS, RSX-11S, VMS (for VAX P.S.I.)	VMS	VMS, RSX-11M, RSX-11M-PLUS, RSX-11S	VMS, RSX-11M, RSX-11M-PLUS
MultiCPU access ³	No	No	No	No
Modem control ⁴	Full	Full	Full	Full
Primary buying reason	Low cost; host programmable protocols	Low cost for custom applications; programmable (sync or async) on VAX systems	Multiple line X.25 support, high performance	Single line X.25 support, high performance

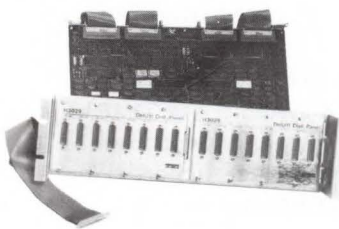
⁵Can be integrated with DECnet—P.S.I. must be present.

⁶▲ For more information, refer to “Digital/IBM Communications Software” in Section 4.

⁷VAX systems only.

⁸Limited to 19.2 Kb/s with VAX P.S.I. and RSX P.S.I.

DHU11



The DHU11 is a 16-line asynchronous communications controller with direct memory access (DMA) that provides local and remote connection between UNIBUS PDP-11 or VAX systems and EIA-232-C/CCITT V.28 or EIA-423-A/CCITT V.10 terminals, modems, serial printers, and data switches. The DHU11 supports operating speeds up to 38.4 Kbps. Actual communications speed and throughput is dependent on current Digital operating systems and system configuration. Full modem control is available on all 16 lines.

Features

- Sixteen asynchronous communications lines from a hex size board.
- Line speeds up to 38.4 Kb/s (application-dependent).
- DMA output optimizes communications throughput compared to character interrupt devices.
- Full modem control on all lines supports full- and half-duplex, point-to-point modems.
- Automatic XON/XOFF flow control allows the management of data flow in either direction on a per-line basis without program intervention.
- Split receive/transmit speeds on a per-line basis.
- Comprehensive self-test through ROM-based diagnostics provides testing of DHU11 circuitry at each power-on or reset.
- EIA-232-D and EIA-423-A compatibility.

UNIBUS Communications Controllers

Software Support

The DHU11 is supported by VMS, ULTRIX-32, RSX-11M, RSX-11M PLUS, RSTS/E, and ULTRIX-11.

Specifications

Mounting Code: 1 hex slot

Power Requirements:

- dc amps drawn at +5 V: 6.0
- dc amps drawn at +15 V: 0.4
- dc amps drawn at -15 V: 0.4

Bus Loads: ac 2.2, dc 1.0

I/O Connection Panel Inserts: 8 for -AD; 2 for -VD

Environmental Class: C ▲ Refer to Appendix B for details.

DHU11 Order Codes

Option	Order Code
EIA-232-C/CCITT V.28 and EIA-423-A/CCITT V.10 interface with full modem control and DMA. Includes base module only. For system installation, select the appropriate external cables and one of the following cabinet kits:	DHU11-M
For general-purpose expander cabinet used with the VAX-11/780, PDP-11/44, and the expander cabinet for the VAX-11/750.	CK-DHU11-AD
Remote distribution cabinet kit requires only two I/O distribution panels for shielded connection to two 8-connector distribution panels. Each distribution panel has full international modem control signals for four of the eight serial lines. Internal cable length is ten feet.	CK-DHU11-VD
For kernel cabinet of VAX-11/750, and PDP-11/84.	CK-DHU11-AE
For use with PDP-11/84 rackmount variations.	CK-DHU11-AF
For use with unshielded cabinet models. Adapter bracket included.	CK-DHU11-A1

DMF32

The DMF32, a multifunction communications controller, provides connection between modems or terminals and UNIBUS VAX systems. The DMF32 consists of an eight-line asynchronous multiplexer, a single-line synchronous interface, and a general-purpose parallel interface. It is supported by the VMS operating system, DECnet-VAX networking software, and VAX P.S.I. communications software.

The eight-line asynchronous multiplexer operates at speeds up to 19.2 Kb/s at full-duplex in either DMA mode or FIFO (first-in, first-out) mode. Two lines have full modem control and split-speed capability; the other six lines have no modem control and are for connecting local terminals only. The single-line synchronous interface operates at speeds up to 19,200 bits per second in DMA mode with full modem control and supports both bit- and byte-oriented protocols. The general purpose parallel interface operates with either a lineprinter (in DMA mode) or a user-specific device (DMA mode or FIFO mode).

The DMF32 is compatible with Digital's family of modems and with Bell 200 series modems and their equivalents.

Features

- Asynchronous communications:
 - Eight asynchronous communications lines
 - DMA output optimizes communications throughput compared to character interrupt devices
 - Line speeds up to 19.2 Kb/s (application dependent)
 - Full modem control on two lines supports full- and half-duplex, point-to-point modems
 - EIA-232-C compatible
- Synchronous communications:
 - One synchronous communications line with line speeds up to 19.2 Kb/s
 - DMA input/output optimizes communications throughput
 - Full modem control point-to-point
 - EIA-232-C compatible
- Parallel printer line supports LP27 generic specifications
- Comprehensive self-test
- Software support for VMS and ULTRIX-32

Specifications

Mounting Code: 1 hex slot

Power Requirements:

- dc amps drawn at +5 V: 8.0
- dc amps drawn at +15 V: 0.5
- dc amps drawn at -15 V: 0.5

Bus Loads: ac 6, dc 1

I/O Connection Panel Inserts: 4 panel units

Environmental Class: B ▲ Refer to Appendix B for details.

DMF32 Order Codes

Option	Order Code
Includes base module only.	DMF32-M
For system installation, select the appropriate external cables and one of the following cabinet kits:	
For use with shielded cabinets (VAX-11/780).	CK-DMF32-LD
For use with shielded cabinets (VAX-11/750).	CK-DMF32-LE
For use with cabinets without I/O connection panels. Adapter brackets included. (Non-FCC compliant)	CK-DMF32-L1

DMR11

The DMR11 is a high-performance microprocessor-controlled single-line synchronous communications controller that provides local or remote connection between PDP-11 or VAX UNIBUS systems and other computer systems with EIA-232-C/CCITT V.28, CCITT V.35, EIA-423-A/EIA-449, or EIA-422/EIA-449 interface. The DMR11 implements DDCMP in hardware and supports direct memory access data transfers, DECnet point-to-point configurations, and full modem control. It operates at speeds up to 1 Mb/s at half- or full-duplex. The DMR11 can communicate with another DMR11, DMV11, or any other synchronous interface that implements DDCMP Versions 3.1 or 4.0.

UNIBUS Communications Controllers

The DMR11 is compatible, depending on the version selected, with Digital's family of modems and with Bell 200 series and Bell 500a 11/5 modems and their equivalents.

Specifications

Mounting Code: 2 hex slots (all versions)

Power Requirements:

- dc amps drawn at +5 V: 12.0 (all versions)
- dc amps drawn at +15 V: 0.08 (DMR11-A, -C), 0.11 (DMR11-B, -E, -F)
- dc amps drawn at -15 V: 0.19 (DMR11-A, -C), 0.20 (DMR11-B, -E, -F)

Bus Loads: ac 1 (all versions), dc 1 (all versions)

I/O Connections Panel Inserts:

- 1 panel unit (DMR11-A, -B, -C, -E)
- 2 panel units (DMR11-F)

Environmental Class: C ▲ Refer to Appendix B for details.

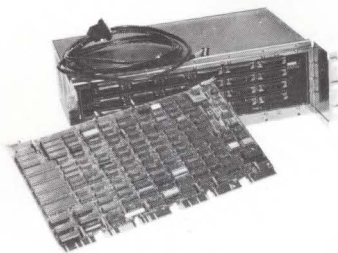
DMR11 Order Codes

Option	Order Code
Includes base module only.	DMR11-M
For installation, select the appropriate external cable and one of the following cabinet kits:	
EIA-232-C cabinet kit. For use with shielded cabinets.	CK-DMR11-AD
For use with shielded cabinets.	CK-DMR11-AL
For use with unshielded cabinets. Adapter bracket included.	CK-DMR11-A1
V.35 cabinet kit. For use with shielded cabinets.	CK-DMR11-BD
For use with shielded cabinets.	CK-DMR11-BL
For use with unshielded cabinets. Adapter bracket included.	CK-DMR11-B1
Includes integral modem for local connection. This option must be ordered with the system.*	
Integral modem cabinet kit. For use with shielded cabinets.	CK-DMR11-CD
For use with shielded cabinets.	CK-DMR11-CL
For use with unshielded cabinets. Adapter bracket included.	CK-DMR11-C1
AS/422/EIA-449 cabinet kit. For use with shielded cabinets.	CK-DMR11-ED
For use with shielded cabinets.	CK-DMR11-EL
For use with unshielded cabinets. Adapter bracket included.	CK-DMR11-E1
EIA-423-A/EIA-449 cabinet kit. For use with shielded cabinets.	CK-DMR11-FD
For use with shielded cabinets.	CK-DMR11-FL
For use with unshielded cabinets. Adapter bracket included.	CK-DMR11-F1

*Supports switch-selectable speeds over the distances noted in the following table.

Frequency	Maximum Distance	Cable
1 Mb	6,000 ft (1,830 m)	BC55S
500 Kb	7,000 ft (2,135 m)	BC55S
250 Kb	8,000 ft (2,440 m)	BC55S
56 Kb	16,000 ft (4,800 m)	BC55T

DMZ32



The DMZ32 is a 24-line asynchronous terminal interface for UNIBUS VAX computers running VMS or ULTRIX-32 operating system. It provides EIA-232-C compatibility and offers Direct Memory Access (DMA) output on all lines to optimize terminal to CPU I/O performance. The DMZ32 operates at speeds up to 19.2 Kb/s and features a distribution panel that can be located locally or remotely.

The DMZ32 distribution panel can be located locally or remotely up to 5,000 feet from the VAX computer system. Terminals can be located where needed, up to 5,000 feet from the VAX computer, without affecting the EIA-232-C specified speed/distance limitations.

In the local configuration, the DMZ32 can be mounted in the H9642-FC/FD and H9652-MF/MH UNIBUS expander cabinets or any existing 19-inch cabinet. The H9642-FC/FD can support one DMZ32 panel. The H9652-MF/MH can support one DMZ32 panel with two BA11-K boxes installed, and two panels with one BA11-K box installed.

In remote configurations, the distribution panel can be mounted in any standard 19-inch cabinet or the H9646 communications cabinet. This reduces the requirements for costly UNIBUS expander cabinets because the DMZ32 distribution panel has a self-contained power supply and fan assembly. (The distribution panel plugs into a standard 120 V electrical outlet.)

A single high-performance twisted-pair T1 cable connects the DMZ32 interface module to the remote distribution panel. The remote distribution panel then connects separate EIA-232 data cables to the individual VT100/200/300 or compatible terminals.

Cabinet Kits

The DMZ32 can be purchased with or without modem control by selecting the appropriate cabinet kit. The cabinet kit includes 15 feet of T1 cable with optional 1,000-foot lengths available. ▲ **Refer to the DMZ32 order code table for information.**

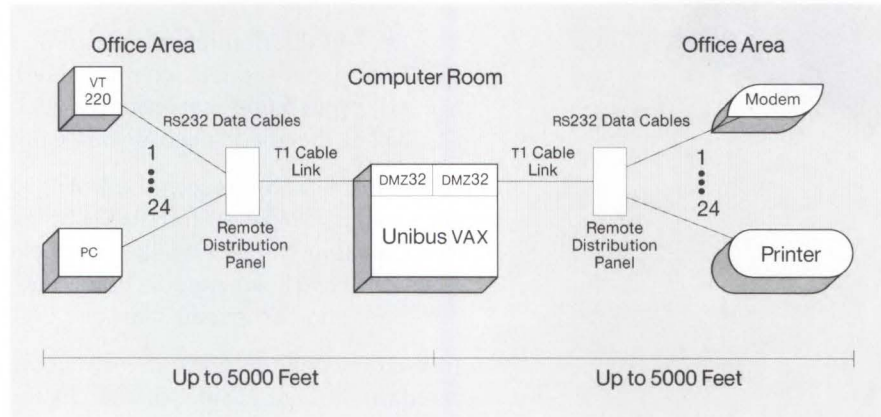
Features

- Twenty-four asynchronous communication lines from a hex size board.
- Line speeds up to 19.2 Kb/s (application dependent).
- Automatic XON/XOFF flow control allows the management of data flow in either direction on a per-line basis without program interruption.
- Full modem control with full- and half-duplex communications available on all lines with the CK-DMZ32-AY cabinet kit.
- Split receive/transmit speeds on a per-line basis optimizes CPU performance by reducing software demand on input.
- Software programmable line parameters such as speed and character length.
- Remote distribution panel lets you locate terminals up to 5,000 feet from the computer system.
- Comprehensive self-test through ROM-based diagnostics provides complete checkout of the DMZ32 circuits on each power-on or reset.

UNIBUS Communications Controllers

The following diagram illustrates a DMZ32 configuration where terminals, personal computers, modems, and serial printers are connected to a local UNIBUS VAX computer system:

DMZ32 Typical Configuration



NBG-184-00

Specifications

Mounting Code: 1 hex slot

Power Requirements:

Module

- dc amps drawn at +5 V: 9.0 A
- dc amps drawn at +15 V: 0.1 A

Distribution Panel

- 1.1A at 120 Vac
- 0.6A at 220-240 Vac

Bus Loads: ac 6.0, dc 1.5

I/O Distribution Panel Insert:

- 8 panel units (when mounted in the cabinet mentioned above)
- 1 additional panel unit for bulkhead cable connector
- 1 panel unit (if remote, for bulkhead cable connector)

Environmental Class: B ▲ Refer to Appendix B for details.

DMZ32 Order Codes

Option	Order Code
24-line DMA terminal interface	DMZ32-M
Cabinet kits include 15 feet of cable and the remote distribution panel containing 24 DB25-pin connectors.	
Cabinet Kit with modem control	CK-DMZ32-AY
Cabinet Kit without modem control	CK-DMZ32-DY
Modem control upgrade for CK-DMZ32-DY cabinet kit	DMZ32-N
1,000-ft PVC T1 cable	BC18L-LO
1,000-ft plenum-rated T1 cable	BC18M-LO

DUP11

The DUP11 is a single-line, synchronous programmable communications controller that provides remote connection between PDP-11 or VAX UNIBUS systems and other systems with EIA-232-C/CCITT V.28 interface. It operates at speeds up to 9.6 Kb/s at half- or full-duplex with full modem control. The DUP11 is programmable for either byte-oriented protocols (DDCMP or BISYNC) or bit-oriented protocols (SDLC or HDLC). The DUP11 is suited for interfacing to a medium-speed synchronous line for remote batch and remote job entry applications.

The DUP11 is compatible with Digital's family of modems and with the Bell 200 series and their equivalents.

Specifications

Mounting Code: 1 hex slot

Power Requirements:

- dc amps drawn at +5 V: 3.6
- dc amps drawn at +15 V: 0.08
- dc amps drawn at -15 V: 0.08

Bus Loads: ac 1, dc 1

I/O Connection Panel Insert: 1 panel unit

Environmental Class: C ▲ Refer to Appendix B for details.

DUP11 Order Codes

Option	Order Code
Includes base module only.	DUP11-M
For system installation, select one of the following cabinet kits:	
For use with (PDP-11/24) shielded cabinets.	CK-DUP11-AD
For use with (PDP-11/84) shielded cabinets.	CK-DUP11-AF
For use with unshielded cabinet models. Adapter bracket included.	CK-DUP11-A1

KCT32

The KCT32 is a programmable communications interface based on the Digital DCT11 chip. Its two lines provide low-cost asynchronous or synchronous communication between VAX systems and other devices with EIA-232-C/CCITT V.28, EIA-422/CCITT V.11, or EIA-423-A/CCITT V.10 and V.35 interfaces for networking or custom communications applications. The KCT32 operates at speeds up to 64,000 bits per second for two lines, and 160,000 bits per second for one line in bit synchronous mode. The KCT32 supports direct memory access with full modem control on each line. It has 56 Kbytes of user-programmable memory for implementation of custom communications functions.

Specifications

Mounting Code: 1 hex slot

Power Requirements:

- dc amps drawn at +5 V: 6.0

Bus Loads: ac 4.5, dc 1

I/O Connection Panel Insert: 1 panel unit

Environmental Class: B ▲ Refer to Appendix B for details.

UNIBUS Communications Controllers

KCT32 Hardware Order Codes

Option	Order Code
Two lines provide asynchronous or synchronous communications between VAX systems and other devices with CCITT V.35. Includes CCITT V.35 interface quad board, CCITT V.35 interface panel and test connector.	KCT32-AB
EIA-422/CCITT V.11 with basic system unit, EIA-422/CCITT V.11 interface panel and test connector.	KCT32-AE
EIA-232-C/CCITT V.28 version with basic system unit, EIA-232-C/CCITT V.28 interface panel, and connector modem test.	KCT32-FA
EIA-423-A/EIA-449 version with basic system unit, DEC423 (EIA-423-A)/EIA-449 interface panel, and EIA-423-A/EIA-449 test connector.	KCT32-FF

KCT32 Optional Software Order Code

Option	Order Code
VAX KCT32 software tools.	QA-128A*-xx

KMS11

The KMS11 is an eight-line synchronous intelligent front end that provides up to eight lines of connection between UNIBUS PDP-11 or VAX systems and other devices with EIA-232-C/CCITT V.28 or CCITT V.35 (with optional hardware module) interfaces. The KMS11 operates at speeds up to 56.0 Kb/s in half- and full-duplex with full modem control. (V.35 is required for 56.0 Kb/s.) The KMS11 supports direct memory access data transfers, X.25 Link Level, and HDLC/BSC Framing Software.

Maximum line speed depends on the software application. The X.25 link-level software is currently warranted for four lines at 56.0 Kb/s (using V.35) or eight lines at 19.2 Kb/s.

VAX P.S.I. or RSX P.S.I. is limited to 19.2 Kb/s with some restrictions on the number of lines used. (Consult the VAX P.S.I. Software Product Description 25.40 for further restrictions concerning multiple network support and DTE/DCE modes.)

Specifications

Mounting Code: 2 SU (KMS11-BD), 3 hex slots (KMS11-BE)

Power Requirements:

- dc amps drawn at +5 V: 12.5
- dc amps drawn at +15 V: 1.5
- dc amps drawn at -15 V: 0.5

Bus Loads: ac 7, dc 2

I/O Connection Panel Inserts: 8 panel units

Environmental Class: B ▲ Refer to Appendix B for details.

KMS11 Hardware Order Codes

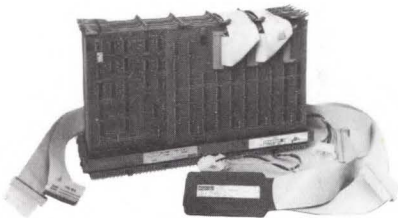
Option	Order Code
Eight-line communications multiplexer including a KMC11-B auxiliary processor unit, line terminator, modem control unit, I/O connection panel, double system unit, and internal cables.	KMS11-BD
Same as KMS11-BD without the double system unit.	KMS11-BE

KMS11 Optional Software Order Codes

Option	Order Code
VAX X.25 link level	QA-757A*-xx
RSX-11M X.25 link level	QJ757
RSX-11M-PLUS X.25 link level	QJ770
VAX HDLC/BSC framing	QA-920A*-xx
VAX P.S.I. (limited to 19.2 Kb/s)	QA-071A*-xx
RSX-11 P.S.I. (limited to 19.2 Kb/s)	QJD91
RSX-11 P.S.I./M-PLUS (limited to 19.2 Kb/s)	QJD92

*▲ Refer to the appropriate Software Product Description for a list of supported processors.

KMS1P



The KMS1P is a one-line intelligent synchronous communications controller that provides connection between PDP-11 or VAX UNIBUS systems and EIA-232-C/CCITT V.28, EIA-423-A/CCITT V.10, CCITT V.35, or EIA-422-A/CCITT V.11 interfaces. The microprocessor-based device operates at speeds up to 19.2 Kb/s (V.28 option) or 64 Kb/s (V.35 option) in half- or full-duplex and full modem control. The KMS1P supports direct memory access data transfers, the VAX P.S.I. and RSX P.S.I. software packages, and RSX X.25 Link Level software.

Specifications

Mounting Code: 2 hex slots

Power Requirements:

- dc amps drawn at +5 V: 10.5
- dc amps drawn at +15 V: .15
- dc amps drawn at -15 V: .20

Bus Loads: ac 5, dc 1

I/O Connection Panel Insert: 1 panel unit

Environmental Class: B ▲ Refer to Appendix B for details.

UNIBUS Communications Controllers

KMS1P Order Codes

Option	Order Codes
Single-line programmable synchronous intelligent communications controller. Includes microprocessor and line unit modules.	KMS1P-M
For system installation, select one of the following cabinet kits:	
Cabinet kit for X.25, EIA-232-C/CCITT V.28 interface	CK-KMS1P-AD
Cabinet kit for X.25, CCITT V.35 interface	CK-KMS1P-BD
Cabinet kit for X.25, EIA-422/CCITT V.11 interface	CK-KMS1P-ED
Cabinet kit for X.25, EIA-423-A/CCITT V.10 interface	CK-KMS1P-FD

KMS1P Optional Software Order Codes

Option	Order Code
VAX P.S.I.	QA-071A*-xx
RSX-11 P.S.I./M	QJD91-xx
RSX-11 P.S.I./M-PLUS	QJD92-xx
RSX-11M X.25 link level	QJ757-xx
RSX-11M-PLUS X.25 link level	QJ770-xx

KXT11-AB

The KXT11-AB is PDP-11 (T11) 16-bit, single-board computer suitable for communications applications running in ROM or RAM. The processor can support up to 32 Kbytes of RAM, 32 Kbytes of ROM, two asynchronous serial line units, 24 parallel lines, a realtime clock, and Q-bus expansion.

The KXT11-AB is supported by RT-11, V5.1 or later, MicroPower/Pascal, and MACRO-11.

Specifications

Mounting Code: One double slot

Power Requirements:

- dc amps drawn at +5 V: 2.8 A maximum
- dc amps drawn at +12 V: 1.1 mA maximum

Bus Loads: ac 2.7 unit loads; dc .5 unit load

Environmental Class: C ▲ Refer to Appendix B for details.

KXT11-AB Order Code

Option	Order Code
SBC-11/21 single-board, 16-bit processor with 16 Kbytes static RAM.	KXT11-AB

KXJ11-CA

The KXJ11-CA is a PDP-11 (J11) 16-bit, single-board processor that can act as a realtime processor, co-processor, or communications processor. As a communications processor, the KXJ11-CA can offload the main processor by handling low and intermediate levels of communications protocol.

Applications for the KXJ11-CA may be written in either MicroPower/Pascal (V2.3 or later) or MACRO-11. Peripheral Processor Tool Kits are used by the host to communicate with the application on the KXJ11-CA. The tool kits support use of the KXJ11-CA as a slave processor in PDP-11 Q-bus system that run RT-11, RSX-11M, or Micro/RSX, and in MicroVAX II systems that run MicroVMS.

▲ For more information on the Peripheral Processor Tool Kits, refer to the applicable Software Product Descriptions: SPD 12.70.xx for RT-11, SPD 13.25.xx for RSX, SPD 18.48.xx for Micro/RSX, and SPD 28.29.xx for MicroVMS.

Features

- PDP-11 (J11) processor with Q-bus compatibility
- 512 Kbytes of RAM that can be programmed as shared memory on the Q-bus
- Expansion of basic ROM up to 64 Kbytes
- Two channels for direct memory access
- Two fully programmable synchronous/asynchronous lines
- One asynchronous serial console port
- Three 16-bit programmable timers
- 20-bit programmable parallel port (4 control lines and 16 data lines)

Specifications

Mounting Code: one quad slot

Power Requirements:

- dc amps drawn at +5 V: 6.0 A maximum
- dc amps drawn at +12 V: 2.0 A maximum

Bus Loads: ac 3.0 unit loads; dc 0.5 unit load

Environmental Class: C ▲ Refer to Appendix B for details.

KXJ11-CA Order Codes

Option	Order Codes
Single-board PDP-11 (J11) 16-bit processor.	KXJ11-CA
KXJ11-CA User's Guide.	EK-KXJCA-UG

KXT11-CA

The KXT11-CA is a PDP-11 (J11) 16-bit, single-board processor that can operate as a standalone processor or a peripheral processor.

Applications for the KXT11-CA may be written in either MicroPower/Pascal or MACRO-11. Peripheral Processor Tool Kits are used by the host to communicate with the application on the KXT11-CA. The tool kits support use of the KXT11-CA as a slave processor in PDP-11 Q-bus systems that run RT-11, RSX-11M, or Micro/RSX, and in MicroVAX II systems that run MicroVMS.

▲ For more information on the Peripheral Processor Tool Kits, refer to the applicable Software Product Descriptions: SPD 12.70.xx for RT-11, SPD 13.25.xx for RSX, SPD 18.48.xx for Micro/RSX, and SPD 28.29.xx for MicroVMS.

Features

- PDP-11 (T11) processor with Q-bus compatibility
- 32 Kbytes RAM with battery-backup support
- Expansion of basic ROM up to 32 Kbytes
- Two channels for direct memory access
- Two fully programmable synchronous/asynchronous lines
- One asynchronous console port
- Three 16-bit programmable timers
- 20-bit programmable parallel port (4 control lines and 16 data lines)

Communications Processors

Specifications

Mounting Code: One quad slot

Power Requirements:

- dc amps drawn at +5 V: 4.0 A maximum
- dc amps drawn at +12 V: 0.4 A maximum
- Battery backup at +5 V: 20 mA maximum

Bus Loads: ac 2.0 unit loads; dc 1.0 unit load

Environmental Class: C ▲ Refer to Appendix B for details.

KXT11-CA Order Code

Option	Order Code
Single-board PDP-11 (T11) 16-bit processor.	KXT11-CA

This product set is available in the United States and Canada.

Ordering Information

▲ **To order modems, refer to the Dialup-line Modem Charts and the Private/leased-line Modem Charts, then turn to the specific product description for ordering information.**

The 100 series modems are available in desktop and rackmount options. The 200 series modems are available only in desktop models.

For more information, call the Computer Special Systems Support Team at 1-800-832-6277.

Dialup-line Modem Charts

Asynchronous Communications	Full Duplex				Half Duplex
Data Rate	2400 b/s (1200 b/s) (300 b/s)	2400 b/s (1200 b/s) (300 b/s)	2400 b/s (1200 b/s) (300 b/s)	1200 b/s (600 b/s) (300 b/s)	2400 b/s (1200 b/s)
Functional Compatibility	CCITT V.22/ V.22 bis BELL 212A/103J	CCITT V.22/ V.22 bis BELL 212A/103J	CCITT V.22/ V.22 bis BELL 212A/103J	CCITT V.22 BELL 212A/103J	DF126 (CCITT V.26)
Digital Modem	DF242*	DF224*	DF124	DF212*	DF126

Synchronous Communications	Full Duplex				Half Duplex
Data Rate	2400 b/s (1200 b/s)	1200 b/s (600 b/s)	2400 b/s (1200 b/s)	2400 b/s (1200 b/s)	2400 b/s (1200 b/s)
Functional Compatibility	CCITT V.22/ V.22 bis BELL 212A	CCITT V.22 BELL 212A	CCITT V.22/ V.22 bis BELL 212A	CCITT V.22/ V.22 bis BELL 212A	DF126 (CCITT V.26) BELL 201B/C
Digital Modem	DF242*	DF212*	DF124	DF224*	DF126

*Desktop only

Private/Leased-line Modem Chart

Asynchronous Communications	Full Duplex	
Data Rate	2400 b/s (1200 b/s)	2400 b/s (1200 b/s)
Functional Compatibility	CCITT V.22/ V.22 bis BELL 212A/103J	DF126 (CCITT V.26)
Digital Modem	DF124	DF126

Synchronous Communications	Full Duplex				Half Duplex
Data Rate	9600 b/s (7200 b/s) (4800 b/s)	4800 b/s (2400 b/s)	2400 b/s (1200 b/s)	2400 b/s (1200 b/s)	4800 b/s (2400 b/s)
Functional Compatibility	CCITT V.29	CCITT V.27	CCITT V.26 BELL 201B	CCITT V.22 bis BELL 212A	CCITT V.27
Digital Modem	DF129	DF127	DF126	DF124	DF127

Modems

DF100 Series

The DF100 series of modems provides remote connection between Digital systems. DF100 series modems operate in either asynchronous or synchronous mode at half- or full-duplex at speeds ranging from 300 b/s to 9.6 Kb/s, depending on the version selected. They support standard EIA-232-C and EIA-423-A interfaces and are compatible with Bell 103/212A, 201 B/C, and CCITT V.22 bis/V.27/V.29 modems. DF100 series modems are FCC-approved for direct connection to telephone lines on all Public Switched Telephone Networks (PSTN) and Private/Lease Telephone Networks (P/LTN) in the U.S. and Canada.

The DF100 series of modems was designed to utilize three standard enclosures: one for standalone desktop modem applications (DF100-DT), one for multiple modem (rackmount) applications (DF100-RM), and one for the DFM series of statistical multiplexers.

The *DF124* is a 1.2- or 2.4-Kb/s, full-duplex asynchronous and synchronous modem for dialup and leased-line telephone networks. It has an integral autodialer and is designed to support desktop, multiple (rack) modem, and DFM statistical multiplexer configurations.

The DF124 modems have all the features of the Scholar Plus modems ▲ refer to “**Scholar Plus Modems**”, including access and dial-in security, “AT” compatibility, and MNP and X.PC error correction. When used in a leased-line application, the DF124 detects faltering line conditions and drops back to a preset dialup line. The DF124 is compatible in operation to CCITT V.22 bis, CCITT V.22, Bell 212A, and Bell 103 modems.

The *DF126* is a 2.4-Kb/s synchronous/asynchronous half-duplex dialup line and full-duplex leased line modem. It can also be used in leased-line multipoint communication environments. It includes an asynchronous integral autodialer that can also be used for synchronous communications when a BC22Y-01 adapter cable and customer-written software are used. The modem is designed for use in desktop, multiple modem (rack), and DFM statistical multiplexer configurations. The DF126 is compatible in operation to Bell 201 B/C CCITT V.26 modems.

The *DF127* is a 4.8-Kb/s synchronous, half-duplex, full-duplex, leased line modem that is CCITT V.27-compatible. It is designed for use in desktop, multiple modem (rack), and DFM statistical multiplexer configurations.

The *DF129* is a 9.6-Kb/s synchronous, full-duplex, leased line modem that is CCITT V.29 compatible. It is capable of fallback speeds of 7200 and 4800 b/s. The DF129 is designed for use in desktop, multiple modem (rack), and DFM statistical multiplexer configurations.

Specifications

Physical Characteristics for DF124-CA, DF126-AA, DF127-AA, DF129-AA:

- Height: 74 mm (2.91 in)
- Width: 217 mm (8.56 in)
- Depth: 292 mm (11.5 in)
- Weight: 2.62 kg (5 lb, 13 oz)

Physical Characteristics for DF124-CM, DF126-AM, DF127-AM, DF129-AM:

- Height: 25.4 mm (1 in)
- Width: 203 mm (8 in)
- Depth: 264 mm (10.4 in)
- Weight: .55 kg (1 lb, 4 oz)

Modems

Power Requirements:

Product	dc amps drawn at:		
	+5 V	+12 V	-12 V
DF124-CM	0.70	0.20	0.15
DF126-AM	0.40	0.15	0.10
DF127-AM	1.00	0.18	0.18
DF129-AM	1.00	0.18	0.18

Environmental Class: B ▲ Refer to Appendix B for details.

DF100 Series Order Codes

Option	Order Code
DF124 desktop modem for U.S./Canada	DF124-CA
DF124 modem module for U.S./Canada	DF124-CM
DF126 desktop modem for U.S./Canada	DF126-AA
DF126 modem module for U.S./Canada	DF126-AM
DF127 desktop modem for U.S./Canada	DF127-AA
DF127 modem module for U.S./Canada	DF127-AM
DF129 desktop modem for U.S./Canada	DF129-AA
DF129 modem module for U.S./Canada	DF129-AM

DF200 Scholar Series

The DF224 Scholar is a low-profile desktop modem with external wall-mount power supply. It operates at 2400, 1200, and 300 b/s full duplex over dialup (PSTN) lines. The DF224 asynchronous integral autodialer stores up to 15 telephone numbers, which may also be identified by an ID name of six characters or less. Phone number linking capabilities are also provided. The DF224 is designed for supporting Digital and non-Digital, asynchronous or synchronous terminals, personal computers and workstation applications in the U.S. and Canada. The DF224-AA is compatible in operation to CCITT V.22 bis, CCITT V.22, and Bell 103/212A modems.

Scholar Plus

The DF242 and DF212 are enhanced versions of the desktop DF224 Scholar modem. As full-duplex, dialup (PSTN), desktop modems, these Scholar Plus modems offer the industry-standard Microcom Networking Protocol (MNP) error correction and X.PC error correction (used when accessing the TYMNET value-added network). Compatibility with the industry-standard Hayes "AT" command language acclimates the experienced modem user in minimal time. In addition, the Scholar Plus modems offer the simplified Digital Modem Command Language (DMCL) with VMS-like commands to set parameters.

DMCL features a unique security system to prevent unauthorized access to proprietary databases. One of four levels of security can be set:

- Passthrough via password
- Callback to predefined phone number with password
- Callback to predefined number with password and phone number validation
- Callback to predefined or user-defined phone number with password for those who call in from different sites, local or long distance

Modems

For complete security, an audit trail records dial attempts. Parameter settings are also secured by password to avoid unattended modem modifications.

The autodialer includes mixed dialing of up to 30 linked phone numbers, local or long distance. In the event of a busy or no-answer signal, the next linked number is dialed. The embedded speaker allows audible monitoring of call progress.

Cables may be ordered separately from the DECdirect catalog.

Call the Computer Special Systems Sales Support Team at 800-832-6277 for more information.

Specifications

Physical Size for DF224-AA, DF242-CA, DF212-CA:

- Height: 30.3 mm (1.19 in)
- Width: 152.4 mm (6.00 in)
- Depth: 219.0 mm (8.62 in)
- Weight: .539 kg (1.19 lbs) including power supply

Power Requirements:

- dc amps drawn at +5 V: 0.80
- dc amps drawn at +12 V: 0.10
- dc amps drawn at -12 V: 0.10

Environmental Class: B ▲ Refer to Appendix B for details.

DF200 Series Order Codes

Option	Order Code
2400/1200/300 FDX desktop modem Scholar for U.S./Canada	DF224-AA
2400/1200/300 FDX desktop modem Scholar Plus for U.S./Canada	DF242-CA
1200/600/300 FDX desktop modem Scholar Plus for U.S./Canada	DF212-CA

Multiple Modem (Rackmount) Enclosure



The multiple modem (rackmount) enclosure provides online computer services to distributed remote terminal users. The enclosure can house up to 12 combination DF100 modem modules. Modules can be added or changed from the front of the enclosure without disconnecting ac power or disrupting other online users. The enclosure connects to either dialup or leased telephone lines. For dialup communications, RJ21X telephone service is required, and for leased line communications, either two- or four-wire telephone service is required. All enclosures have a self-contained power supply that provides power to all modem modules within the enclosure. The enclosure is available with a 6-amp integral power supply.

Multiple Modem Enclosure Order Code

Option	Order Code
6-amp multiple modem enclosure for U.S./Canada	DF100-RM

DFM Series



The DFM Series of Intelligent Communication Processors (ICP) are free-standing units that utilize statistical time-division multiplexing techniques for concentrating four to sixteen EIA-232-C data channels over a single high-speed communication link. These data channels interface to terminals, personal computers, printers, modems, and computer ports.

The DFM Series has been designed with multi-microprocessor architecture utilizing internal DMA data transfer for high efficiency. The DFM uses a total modular design concept. This allows users to easily expand and upgrade the units from 4 to 16 channels with and without integral 4.8- and 9.6-Kb/s modems.

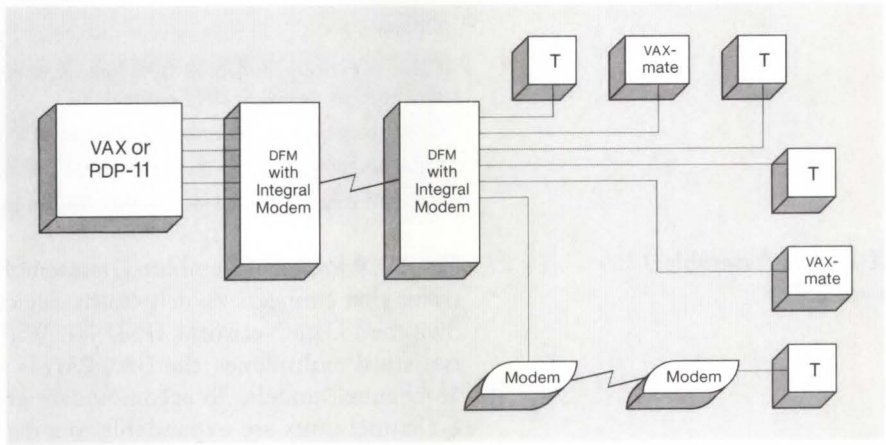
Channel switching and contention features provide the flexibility required in the rapidly changing data communication environments. Any switched channel end can be connected to any other authorized switched channel in the network. The contention feature allows a DFM at one end of the network to be connected to a DFM with fewer channels at the host end of the network. Users at one end may contend for connections on a first come/first served basis.

DFM-concentrated link configurations include telephone lines or satellite links. Digital's DDCMP protocol is supported on synchronous channels. The DFM handles synchronous data traffic on up to one-half of its channels. Each of these channels can be configured to support various data speeds and block sizes. Call the CSS Sales Support Team at 800-832-6277 for further information. Cables may be purchased separately from the DECdirect Catalog.

Features

- Asynchronous and synchronous data channels
- Network control and management
- Channel switching
- Port contention with queuing
- Modem control, all channels
- Network diagnostics
- Optional 4.8/9.6-Kb/s integral modems
- Automatic speed detection
- Speed conversion
- Flow control conversion
- Local and remote echo
- Easy expansion from 4 lines to 16 lines

DFM Statistical Multiplexer Configuration



NBG-187-00

Specifications

Physical Size:

- Height: 32 cm (12.5 in)
- Width: 32 cm (12.5 in)
- Length: 23 cm (9.0 in)

Power Requirements:

- 120 V, 60 Hz: 92 W
- 240 V, 50 Hz: 92 W

Environmental Class: B ▲ Refer to Appendix B for details.

DFM Series Order Codes

Option	Order Code
4-channel DFM with no modem	DFM04-AA
4-channel DFM with 4.8 Kb/s integral modem	DFM04-AB
4-channel DFM with 9.6 Kb/s integral modem	DFM04-AC
8-channel DFM with no modem	DFM08-AA
8-channel DFM with 4.8 Kb/s integral modem	DFM08-AB
8-channel DFM with 9.6 Kb/s integral modem	DFM08-AC
12-channel DFM with no modem	DFM12-AA
12-channel DFM with 4.8 Kb/s integral modem	DFM12-AB
12-channel DFM with 9.6 Kb/s integral modem	DFM12-AC
16-channel DFM with no modem	DFM16-AA
16-channel DFM with 4.8 Kb/s integral modem	DFM16-AB
16-channel DFM with 9.6 Kb/s integral modem	DFM16-AC
4-channel expansion line card for DFM08 option	DFMXX-4E
8-channel expansion line card for DFM08 option	DFMXX-8E
2.4 Kb/s integral modem for all DFM models	DF126-AM
4.8 Kb/s integral modem for all DFM models	DF127-AM
9.6 Kb/s integral modem for all DFM models	DF129-AM

Cables for the DFM must be ordered separately. When ordering cables, supply the length of the cable. ▲ Refer to “Communications Cables” in this section for available cable lengths.

Statistical Multiplexers

DFM Cable Order Codes

Option	Order Code
Cable to connect modem to DFM link, or to connect synchronous device to DFM channel	BC22F-xx
Cable to connect asynchronous device to DFM channel	BC22E-xx
Cable to connect dialup modem to DFM channel	BC22M-xx
Cable to connect two DFMs together for pre-installation test	BC22L-xx

DFX Packet Assembler/ Disassembler

The DFX Packet Assembler/Disassembler (PAD) is a freestanding concentrator that connects asynchronous devices to X.25 Public and Private Packet Switched Data Networks (PSDNs). With the same enclosure as the DFM statistical multiplexer, the DFX PAD is available in basic units of 4-, 8- and 16-channel models. To accommodate growing networks, the basic 4- and 8-channel units are expandable to a maximum of 16 channels. When the number of terminals or computer ports to be networked increases, the DFX PAD channel expansion cards (DFMXX-xE) are available for field-upgrade expansion in increments of 4 and 8 channels.

The DFX PAD concentrates the asynchronous data from 4, 8, 12, or 16 terminals or host computer ports onto a single high-speed synchronous X.25 leased access line. The DFX PAD is compatible with 1980 X.25 industry standards recommended by the international standards committee (CCITT). Video terminals and personal computers connected to the local DFX PAD can use it as a data switch to access and share local computer ports, printers, or modems. This combines comprehensive local communication with access to remote hosts, such as Digital systems running Packetnet products, via the PSDN. **▲ Refer to Section 4 for more information on Packetnet products.**

The DFX PAD supports a single synchronous access line to the PSDN at speeds ranging from 2.4 Kb/s to 64 Kb/s. Most public applications will provide, as part of the basic service, the pair of leased line modems and the leased telephone line to access the X.25 network. However, in private applications, or where permitted by a public PSDN, Digital's two optional integral modems may be used to access the X.25 network: the DF127-AM operates at 4.8 Kb/s and the DF129-AM operates at 9.6 Kb/s.

The DFX PAD may also be used, given suitable modems or modem eliminators, to connect directly to VAX P.S.I. over a local or long-distance leased or private synchronous line. In such a configuration, VAX P.S.I. is configured as a DCE to the ISO 8208 specification, and the DFX PAD acts as the DTE. **▲ For more information on VAX P.S.I., refer to Section 4.**

The DFX PAD is certified for connection to TYMNET and TELENET networks in the United States and the DATAPAC networks in Canada.

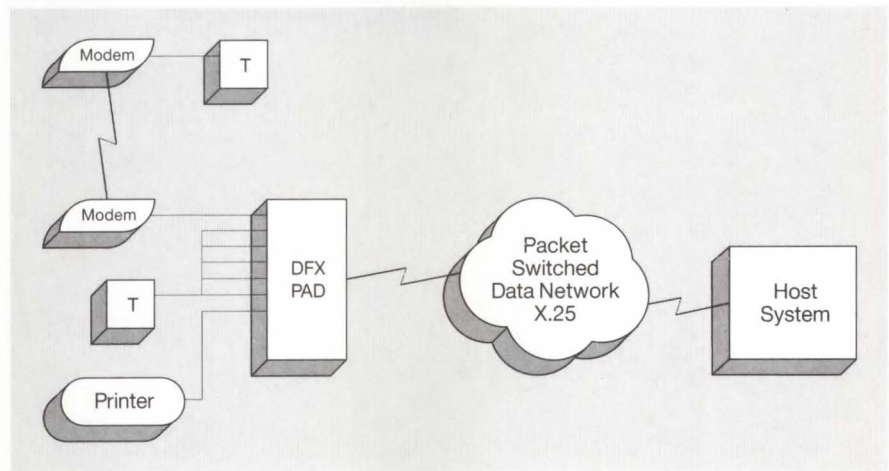
Features

- Fully compatible with 1980 CCITT recommendation X.3, X.28, X.29 and X.25.
- Certified for use on TYMNET and TELENET in the U.S. and Canada's (1980) DATAPAC X.25 Public Networks.
- Enhanced terminal interface parameters in addition to standard X.3 settings provide customized support for a wide variety of applications.

Statistical Multiplexers

- Local port switching and contention combines local resource sharing with access to remote hosts on the X.25 networks.
- Easy field-upgrade channel expansion up to 16 channels with 4- and 8-channel expansion modules.
- Easy-to-use calling features such as AUTOCALL and ABBREVIATED-CALL allow users to save time and eliminate the occurrence of wrong numbers when connecting to the remote X.25 destination.
- Composite link supports speeds of up to 64K b/s.
- Dedicated supervisory channel and user-friendly self-prompting software commands allow independent configuring of system, channel and link parameters in nonvolatile memory.

DFX PAD Terminal-to-host Application



NBG-188-00

Specifications

Physical Characteristics:

- Height: 32 cm (12.5 in)
- Width: 32 cm (12.5 in)
- Length: 23 cm (9.0 in)

Power Requirements:

- 120 V, 60 Hz: 92 W
- 240 V, 50 Hz: 92 W

Environmental Class: B ▲ Refer to Appendix B for details.

Statistical Multiplexers

DFX PAD Order Codes

Option	Order Code
4-channel X.25 PAD	DFX04-AA
8-channel X.25 PAD	DFX08-AA
16-channel X.25 PAD	DFX16-AA
Optional X.25 control module to upgrade existing DFM Statistical Multiplexer to an X.25 PAD	DFX25-CM
Channel Expansion Modules:	
4-channel expansion module for DFX04 and DFX08	DFMXX-4E
8-channel expansion module for DFX04 and DFX08	DFMXX-8E
Integral Modems:	
4800 b/s synchronous modem	DF127-AM
9600 b/s synchronous modem	DF129-AM

The following table lists the order codes and available lengths for cables required by the networking and communications products described in this catalog. For information about custom cables and longer-length cables, contact Digital's Accessories & Supplies Group.

<i>Communications Cable Order Codes</i>			
Order Code	Description	Where Used	Length
BC16C-10	36 position, straight-to-right angle, male-to-male, shielded, 18 assembly	DECconnect, DEC423 Q-bus products	3.05 m (10 ft)
BC16C-25			7.62 m (25 ft)
BC16D-10	36 position, right-angle, male to male, shielded, 18 twisted-pair extension cable	DECconnect, DEC423 Q-bus products	3.05 m (10 ft)
BC16D-25			7.62 m (25 ft)
BC16D-50			15.24 m (50 ft)
BC16D-A5			45.7 m (150 ft)
BC16E-02	Terminated six-conductor cable for terminal connection (Digital office cable)	DECconnect standard terminal connection cable	0.6 m (2 ft)
BC16E-10			3.1 m (10 ft)
BC16E-25			7.6 m (25 ft)
BC16E-50			15.2 m (50 ft)
BC16K-10	ThinWire patch cord	Patches ThinWire patch panel to DEMPR	3.05 m (10 ft)
BC16M-06	ThinWire 802.3/Ethernet PVC cable with connectors and boots	ThinWire 802.3/Ethernet Products	1.8 m (6 ft)
BC16M-15			4.6 m (15 ft)
BC16M-30			9.2 m (30 ft)
BC17C-10	Full EIA-232-C/CCITT V.28 modem cable, round, 25-wire, fully shielded, male-to-female molded connectors	802.3/Ethernet Communications Servers (DCSAX-LA line cards)	3.1 m (10 ft)
BC17C-25			7.6 m (25 ft)
BC17C-35			10.7 m (35 ft)
BC17C-50			15.2 m (50 ft)
BC17C-75			22.9 m (75 ft)
BC17C-A0			30.5 m (100 ft)
BC17C-B0			61.0 m (200 ft)
BC17C-B5			76.2 m (250 ft)
BC17D-02	EIA-232-C/CCITT V.28, fully shielded, null modem, 10-wire, female-to-female molded connectors	802.3/Ethernet Communications Servers (DCSAX-LB line cards)	0.6 m (2 ft)
BC17D-10			3.1 m (10 ft)
BC17D-25			7.6 m (25 ft)
BC17D-50			15.2 m (50 ft)
BC17D-A0			30.5 m (100 ft)
BC17E-25	CCITT V.35, fully shielded, modem cable (Note: This cable has a EIA-449 connector on the CPU end, and a V.35 connector on the modem end.)	802.3/Ethernet Communications Servers (DCSAX-LB line cards), DMR	7.6 m (25 ft)
BC17E-50			15.2 m (50 ft)
BC17E-A0			30.5 m (100 ft)
BC17E-A5			45.7 m (150 ft)
BC17E-B0			61.0 m (200 ft)
BC17E-B5			76.2 m (250 ft)
BC17L-04	EIA-232-C/CCITT V.28, 25-wire, fully shielded, male-to-female connectors adapter cable	802.3/Ethernet Communications Servers (DCSAX-LA or DCSAX-LC line cards)	1.22 m (4 ft)

Communications Cables

Communications Cable Order Codes (Continued)

Order Code	Description	Where Used	Length
BC22D-10	Null modem cable, round, 6-wire, fully shielded, EIA-232-C/CCITT V.28, female-to-female molded connectors	Local connection of asynchronous terminals	3.1 m (10 ft)
BC22D-25			7.6 m (25 ft)
BC22D-35			10.7 m (35 ft)
BC22D-50			15.2 m (50 ft)
BC22D-75			22.9 m (75 ft)
BC22D-A0			30.5 m (100 ft)
BC22D-A5			45.7 m (150 ft)
BC22D-B0			61.0 M (200 ft)
BC22D-B5	76.2 m (250 ft)		
BC22E-10	Modem cable, round, 16-wire, fully shielded, EIA-232-C/CCITT V.28, male-to-female molded connectors	Connection of asynchronous modems	3.1 m (10 ft)
BC22E-25			7.6 m (25 ft)
BC22E-35			10.7 m (35 ft)
BC22E-50			15.2 m (50 ft)
BC22E-75			22.9 m (75 ft)
BC22E-A0			30.5 m (100 ft)
BC22E-A5			45.7 m (150 ft)
BC22E-B0			61.0 m (200 ft)
BC22E-B5	76.2 m (250 ft)		
BC22F-10	Full, EIA-232-C/CCITT V.28 modem cable, round, 25-wire, fully shielded, male-to-female molded connectors	Connections of synchronous modems	3.1 m (10 ft)
BC22F-25			7.6 m (25 ft)
BC22F-35			10.7 m (35 ft)
BC22F-50			15.2 m (50 ft)
BC22F-75			22.9 m (75 ft)
BC22F-A0			30.5 m (100 ft)
BC22F-A5			45.7 m (150 ft)
BC22F-B0			61.0 m (200 ft)
BC22F-B5	76.2 m (250 ft)		
BC22U-10	Full, EIA-232-C/CCITT V.28 modem cable, D-subminiature connector, fully shielded, male-to-female molded connectors	KMV1A configuration in BA200 enclosure	3.1 m (10 ft)
BC22U-25			7.6 m (25 ft)
BC22U-50			15.2 m (50 ft)
BC22W-10	EIA-422/423 communications cable, 37-conductor, D-subminiature connector, fully shielded, molded connectors	KMV1A configuration in BA200 enclosure	3.1 m (10 ft)
BC22W-25			7.6 m (25 ft)
BC22W-50			15.2 m (50 ft)
BC55D-10	EIA-423-A/EIA-449 interface connectors	Connection of DMR, DMP, DMV options	3.1 m (10 ft)
BC55D-25			7.6 m (25 ft)
BC55D-50			15.2 m (50 ft)
BC55S-25	Integral modem, triaxial with BNC connectors	Connects fully shielded DMR, DMP, DMV options	7.6 m (25 ft)
BC55S-50			15.2 m (50 ft)
BC55S-75			22.9 m (75 ft)
BC55S-A0			30.5 m (100 ft)
BC55S-B5			76.2 m (250 ft)
BC55S-E0			152.4 m (500 ft)
BC55S-L0			304.9 M (1000 ft)
BC55S-YA			1,067 m (3500 ft)

Communications Cables

Communications Cable Order Codes (Continued)

Order Code	Description	Where Used	Length
BC55T-25	Integral modem, twinaxial cable with BNC connectors	Connects fully shielded DMR, DMP, DMV options	7.6 m (25 ft)
BC55T-50			15.2 m (50 ft)
BC55T-75			22.9 m (75 ft)
BC55T-A0			30.5 m (100 ft)
BC55T-B5			76.2 m (250 ft)
BC55T-E0			152.4 m (500 ft)
BC55T-L0			304.9 m (1000 ft)
BC55T-YA	1,067 m (3500 ft)		
BC56A-02	Male-to-male BC55S-to-BC55M adapter cable	Connects fully shielded DMR, DMP, DMV options to old options using CPC plastic connectors	0.6 m (2 ft)
BC56B-02	Male-to-female BC55S-to-BC55M adapter cable	Connects fully shielded DMR, DMP, DMV options to old options using CPC plastic connectors	0.6 m (2 ft)
BC56D-02	Male-to-male BC55T-to-BC55N adapter cable	Connects fully shielded, DMR, DMP, DMV options to old options using CPC plastic connectors	0.6 m (2 ft)
BC56E-02	Male-to-female BC55T-to-BC55N adapter cable	Connects current, fully shielded DMR, DMP, DMV options to old options using CPC plastic connectors	0.6 m (2 ft)
BN25J-10	VCS FOSHA-AC/AD fiber optic cable	Connects DHF11 remote terminal concentrator to DHF11 controller	10 m (32.8 ft)
BN25J-20			20 m (65.6 ft)
BN25J-50			50 m (164.0 ft)
BN25J-A0			100 m (328.1 ft)
BN25J-B5			250 m (820.1 ft)
BN25J-E0			500 m (1,640.2 ft)
BNE2A-MA	Plenum-rated coaxial cable	Standard 802.3/Ethernet cable (backbone)	23.4 m (76.8 ft)
BNE2A-MB			70.2 m (230.3 ft)
BNE2A-MC			117 m (383.9 ft)
BNE2A-ME			500 m (1640.4 ft)

Communications Cables

Communications Cable Order Codes (Continued)

Order Code	Description	Where Used	Length
BNE2B-MA BNE2B-MB BNE2B-MC BNE2B-ME	PVC-insulated coaxial cable	Ethernet	23.4 m (76.8 ft) 70.2 m (230.3 ft) 117 m (383.9 ft) 500 m (1640.4 ft)
H8243-A	PVC-insulated ThinWire cable spool	ThinWire 802.3/Ethernet Products	300 m (1000 ft)
H8244-A	Plenum-rated ThinWire cable spool	ThinWire 802.3/Ethernet Products	300 m (1000 ft)
BNE3A-05 BNE3A-10 BNE3A-20 BNE3A-40	PVC-insulated transceiver cable with straight connector	Ethernet	5 m (16.4 ft) 10 m (32.8 ft) 20 m (65.6 ft) 40 m (131.2 ft)
BNE3B-05 BNE3B-10 BNE3B-20 BNE3B-40	PVC-insulated transceiver cable with right-angle connector	Ethernet	5 m (16.4 ft) 10 m (32.8 ft) 20 m (65.6 ft) 40 m (131.2 ft)
BNE3H-05 BNE3H-10 BNE3H-20 BNE3H-40	PVC-insulated transceiver cable with straight connector	IEEE 802.3	5 m (16.4 ft) 10 m (32.8 ft) 20 m (65.6 ft) 40 m (131.2 ft)
BNE3K-05 BNE3K-10 BNE3K-20 BNE3K-40	PVC-insulated transceiver cable with right-angle connector	IEEE 802.3	5 m (16.4 ft) 10 m (32.8 ft) 20 m (65.6 ft) 40 m (131.2 ft)
BNE3L-05 BNE3L-10 BNE3L-20 BNE3L-40	Plenum-rated transceiver cable with straight connector	IEEE 802.3	5 m (16.4 ft) 10 m (32.8 ft) 20 m (65.6 ft) 40 m (131.2 ft)
BNE3M-05 BNE3M-10 BNE3M-20 BNE3M-40	Plenum-rated transceiver cable with right-angle connector	IEEE 802.3	5 m (16.4 ft) 10 m (32.8 ft) 20 m (65.6 ft) 40 m (131.2 ft)
BNE4C-02 BNE4C-05	Office transceiver cable with PVC insulation, straight connector	IEEE 802.3	2 m (6.6 ft) 5 m (16.4 ft)
BNE4D-02 BNE4D-05	Office transceiver cable with PVC insulation, right-angle connector	IEEE 802.3	2 m (6.6 ft) 5 m (16.4 ft)

Section 4

Interoperability: Communications Software

This section contains the following topics...

Ordering Information

DECnet Communications Software

Digital/IBM Communications Software

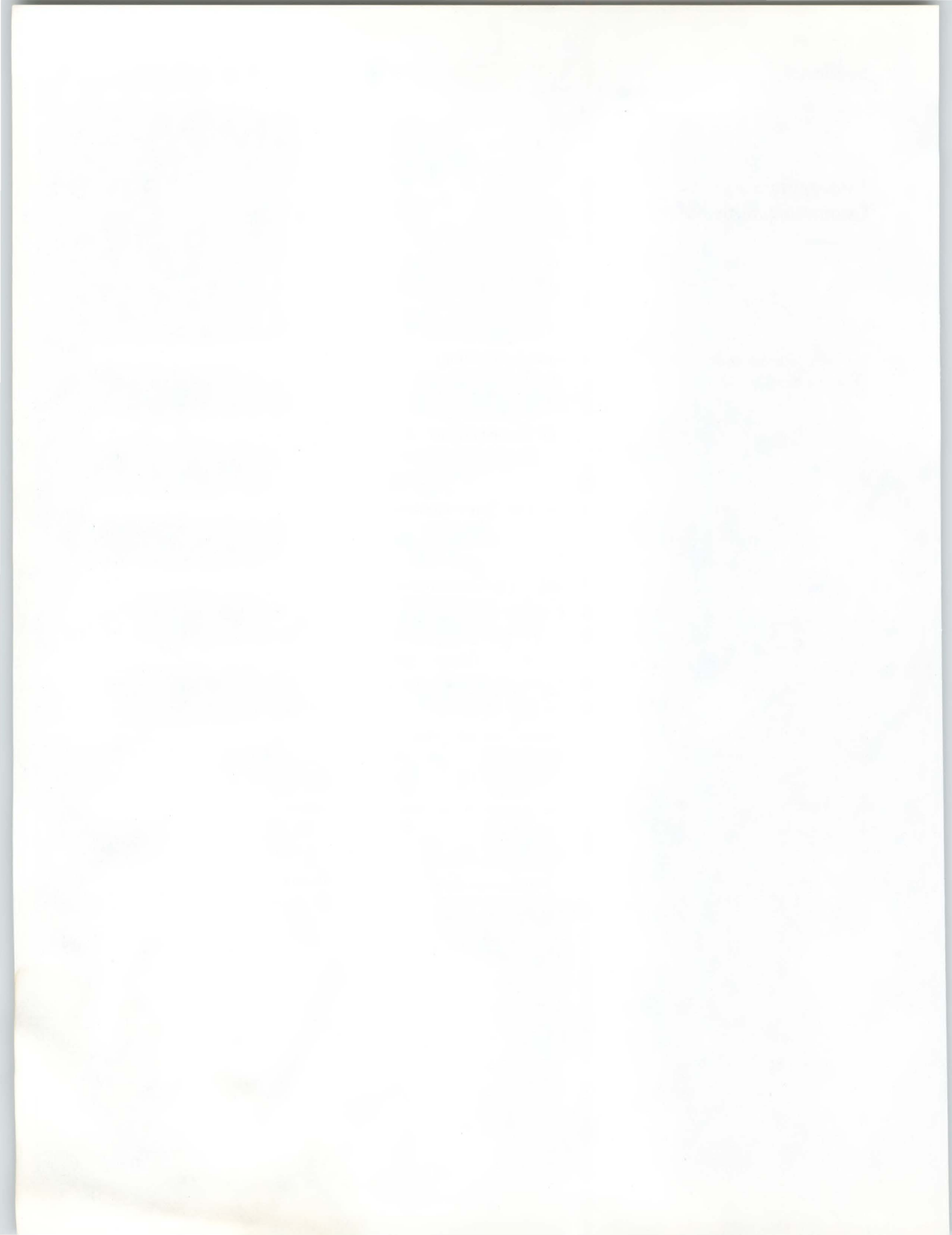
Digital/UNIX Communications Software

Digital/WANG Communications Software

Packetnet Communications Software

Opens Systems Interconnect (OSI) Products

File Transfer and Terminal Emulation Products



Interoperability: Communications Software

Interoperability is the ability to exchange information between systems from the same vendor or from a collection of vendors.

Digital allows customers to choose DECnet, OSI, and Packetnet products to satisfy requirements of bidirectional exchange of information and files, support of multivendor equipment, and compliance with industry standards. Also, Digital provides bidirectional communication with IBM databases and equipment.

The following Digital communications products, described in this section, facilitate interoperability.

- **DECnet communications software**
- Internet communications software including
 - **Digital/IBM**
 - **Digital/UNIX**
 - **Digital/Wang**
- **Packetnet communications software**
- **Open Systems Interconnection (OSI) products**
- **File-transfer and terminal emulation products**

Introduction

Software Ordering Information

The software order code tables in this guide provide all the information needed to order the major components of a software product: the licenses, distribution and documentation, and installation service.

The following example illustrates the typical software order code table listed in this guide.

Typical Software Order Code Table

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-VERA*-AA
Cluster member ²	QL-VERA*-AB
Initial license, primary and cluster ³	QL-VERA*-CA
Monthly rental, single-use ³	QL-VERA*-DA
Monthly rental, cluster ³	QL-VERA*-DB
Software revision right-to-copy	QL-VERA*-HZ
Materials and Installation	
Distribution and documentation	QA-VERAA-H#
Documentation only	QA-VERAA-GZ
Installation service	QT-VERA*-I#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RL02 (H), RX01 (Y), RX33 (7), TK50 (5), TU58 (G)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

Codes listed in the table that contain an * or # are incomplete: The footnotes after the table provide the information needed to complete the codes.

To complete the order code, replace the * with the processor on which the software will run, and the # with the medium on which the software will be delivered. For example, to order the VAXcluster license from the above table for the VAX 8350, replace the * in the QL-VERA*-AA code with a "H". The order code is therefore QL-VERAH-AA. To order installation service for a VAX 8700 with magtape, specify order code QT-VERAE-HM, where "E" designates the VAX 8700 and "M" designates magtape.

Note that a software product may not support all processors or all distribution media. Also note that certain limitations might accompany each option; for example, VAXcluster licenses might not be available for certain processors.

Introduction

The list of media codes follows.

Media Codes for Software Order Code Tables

Description	Code	Description	Code
RX18 floppy diskette	2	RL02 disk cartridge	H
RX50 floppy diskette	3	RX31 floppy diskette	I
RC25 disk cartridge	4	RA60 disk cartridge	J
TK50 streaming tape cartridge	5	RP04 disk pack	K
TK25 cartridge	6	9-track 1600 b/in magtape (PE)	M
RX33 floppy diskette	7	TU60 cassette	N
RD50/optical disk	8	RL01 disk cartridge	Q
6250 b/in 9-track magtape	A	RK06 disk cartridge	T
RX24 3.5 inch floppy diskette	B	RK07 disk cartridge	V
9-track 800 b/in magtape (NRZI)	D	RX02 double-density diskette	X
TU58 DECTape II cartridge	G	RX01 floppy diskette	Y
RL02 disk cartridge	H		

Introduction

Digital Network Architecture (DNA) is implemented in phases. The current phases are III and IV.

Four network capabilities were introduced in DNA Phase III:

- Adaptive routing (255 nodes)
- Network management
- Network command terminal software
- Multipoint line support

The maximum number of nodes in a Phase III network is 255. Network management was enhanced to provide the software tools for identifying and isolating problems for remotely testing network integrity.

Phase IV DECnet products give network owners significantly more flexibility in developing larger and more cost-effective computer networks and extending their current networks as their needs evolve. Phase IV capabilities include

- Routing—Area routing with 63 areas, 1,023 nodes per area.
- Communications server support.
- Network virtual terminals.
- 802.3/Ethernet support.

Digital offers two packages, full-function and end-node, for Phase IV DECnet products. The full-function package includes routing capability. The end-node package offers full DECnet capability with the exception of the routing function; that is, this DECnet package offers only single-line access to a network.

Using an end-node package, data can originate and terminate at this node, but data destined for other nodes cannot transit this node. End nodes access DECnet routers, X.25 gateways, or full-function nodes to send messages beyond the local area network. An end node reduces overhead needed for routing, thus increasing application performance.

Customers who have never used DECnet are strongly advised to purchase DECnet with the full service offerings including installation service.

The following table shows which DECnet products support full-function and end-node Phase IV packages and which continue to support Phase III.

<i>DECnet Packaging Support</i>			
	Phase IV Packaging Support		Phase III Packaging Support
	Full-function Package	End-node Package	
DECnet-VAX	•	•	
DECnet-ULTRIX		•	
DECnet-DOS		•	
DECnet-VAXmate		•	
DECnet-11M	•	•	
DECnet-11M-PLUS	•	•	
DECnet-Micro/ RSX		•	
DECnet-11S	•	•	
DECnet-RT (end-node only)			•
DECnet/E	•		

DECnet Product Capabilities

Each DECnet software product offers a particular set of capabilities that are summarized in the following table. These capabilities are divided into two categories:

- *DECnet Functions*—those capabilities inherent in the DECnet product
- *DECnet Services*—those capabilities provided by software beyond DECnet.

Definitions of DECnet Functions

- *Program-to-program communication* means that cooperating programs, including those running under different operating systems and written in different languages, can exchange data.
- *Network command terminal* capability allows users on a host system to log onto like (homogeneous) systems in the network as though their terminals were directly connected to the other system.
- *File transfer* is the ability to exchange files among systems in a network.
- *Command/batch file submission and execution* means that a user at a source node can request a destination node to execute a command file. The command file can already be at the destination node, or the source node can send it along with the request.
- *Remote resource access* allows the sharing of such resources as expensive peripheral devices and massive database files for reasons of economy and convenience. This capability is sometimes referred to as “remote file access,” when programs access file-structured devices remotely. DECnet offers both remote file and remote record access.
- *Downline system loading* is the ability to store initial memory images for a DECnet-11S system on a host. These images can then be loaded on request into adjacent DECnet-11S systems on the network.

DECnet Communications Software

- *Downline task loading* is the ability of a host to store programs that are to be executed on another system or server. These programs are then loaded on request into adjacent systems or servers on the network, under the joint control at both ends of the logical link.
- *Upline dumping* is the capability of a system or server to automatically send a system-image dump to an adjacent node if the system or server fails.

Definitions of DECnet Services

- *SNA Access* is the ability to access an IBM SNA network.
- *CCITT X.25 Access* is the ability to access an X.25 service.
- *Bisync Access* is the ability to support the IBM binary synchronous communications protocol between Digital and IBM systems.

DECnet Product Capabilities

Capability	DECnet Products							
	-RT	Micro/R SX, -11S -11M, -11M-PLUS	/E	-VAX	-ULTRIX	-VAXmate	-DOS	
DECnet Functions								
Program-to-program Communications	•	•	•	•	•	•	•	•
Network Command Terminal	• ³	• ⁴	• ¹	• ³	• ⁴	• ⁴	•	• ^{4,5}
File Transfer	•	•	•	•	•	•	•	•
Command/Batch File Submission and Execution	• ¹	•	•	•	• ²	•	• ¹	• ¹
Remote Resource Access	•	•	• ^{1,6}	•	•	•	•	•
Downline System Loading		•			•	• ²		
Downline Task Loading		•			•			
Upline Dumping		•	•		•	• ²		
DECnet Services⁸								
SNA Access					•	•	•	•
CCITT X.25 Access		• ⁷			•			
Bisync Access		•			•			

¹Requester-only function. DECnet-11S does not support connection from remote command terminals.

²Command file must reside on remote node.

³Supports homogeneous network virtual terminal.

⁴Supports CTERM, heterogeneous network virtual terminal.

⁵Supports outgoing requests only.

⁶Local system supports unit-record equipment only.

⁷Support for RSX-11M and RSX-11M-PLUS.

⁸Requires additional software beyond DECnet.

DECnet Communications Software

DECnet Product Support

CPU	DECnet -RT	/E	-RSX	-Micro/ RSX	-VAX	-ULTRIX	-DOS	-VAXmate
VAX CPUs					•	•		
PDP-11 CPUs	•	•	•	•				
IBM PCs ⁴							•	
VAXmate								• ⁵
Ethernet Controllers²								
DEBNA					•	•		
DELUA		•	•		•	•		
DEPCA							• ³	
DELQA		•	•	•	•	•		
DESQA		•	•	•	•	•		
DESVA					•	•		
Communications Controllers²								
CXA16			•	•				
CXB16			•	•				
CXY08			•	•	•			
DHB32					•			
DHF11			•	•				
DHQ11			•	•	•			
DHT32						•		
DHU11			•		•			
DLVJ1	•							
DMB32					• ¹			
DMF32					•			
DMR11	•	•	•		•	•		
DMV11	•	•	•	•	•	•		
DMZ32					•			
DPV11	•		•	•				
DSV11					•			
DUP11	•		•					
DZQ11			•	•	•			

¹Requires additional software beyond DECnet.

²Refer to the appropriate Software Product Description for support of retired products.

³Also supports some third-party products.

⁴Refer to the DECnet-DOS product description for supported processors and controllers.

⁵Uses an integral 802.3/Ethernet controller for connection to a local area network.

DECnet-VAX

DECnet-VAX allows a suitably configured VMS system to participate as a full-function (routing) or end node in DECnet computer networks. With proper network planning, DECnet-VAX Version 5.0 networks can contain up to 1,023 nodes per network area, and up to 63 areas per network. DECnet-VAX interfaces are standard components of the VMS operating system for use on a local, standalone system.

The DECnet-VAX end-node and full-function products are licensed separately for VMS. The DECnet-VAX License Product Authorization Key (PAK), when registered on a VMS system, enables communication between different networked systems that use the same protocols.

DECnet-VAX is a Phase IV network product that is warranted for use only with Phase III and Phase IV products supplied by Digital.

DECnet-VAX offers task-to-task communications, file management, downline system and task loading, network command terminals, and network resource-sharing capabilities using the Digital Network Architecture (DNA) protocols. DECnet-VAX communicates with adjacent and non-adjacent Phase III and Phase IV nodes. (Adjacent nodes are connected by a single communications line.)

VMS programs written in VAX MACRO and native-mode high-level languages can use DECnet-VAX capabilities; programs executing in PDP-11 compatibility mode cannot use DECnet-VAX.

Network functions available to DECnet-VAX users depend in part on the network configuration. Networks consisting entirely of DECnet-VAX Phase IV nodes provide all the functions described in the DECnet-VAX Software Product Description. Networks that combine different DECnet implementations may limit the functions available to the DECnet-VAX user on non-DECnet-VAX nodes (because other DECnet implementations may not implement the functions). Conversely, a user of another DECnet implementation may not be able to access all DECnet-VAX functions. Functions available on mixed networks can be determined by comparing the Software Product Descriptions for the appropriate DECnet products.

DECnet-VAX allows multiple 802.3/Ethernet controllers per host within the limitations listed in the Load Unit Table in Software Product Description 25.03. When two or more 802.3/Ethernet controllers are used on a single CPU, each controller must be connected to a different 802.3/Ethernet cable. These cables must not be joined by a bridge or repeater, though they may be joined by a DECnet router.

DECnet-VAX licenses include a license to run VAX/VMS Services for MS-DOS, allowing the DECnet-VAX host to act as a file, disk, and print server to VAXmate and other PC clients. Software media and services must be purchased separately. **▲ Refer to "VAX/VMS Services for MS-DOS" in Section 5 for more information.**

▲ For prerequisite hardware and software, consult Software Product Description 25.03.

Ordering Information

Order the license for either the end-node or full-function version. A license is also available to upgrade an end node to a full-function node.

As of DECnet-VAX Version 5.0, no media kit is required. DECnet-VAX is fully integrated into VMS V5.0 and is included in the VMS V5.0 Media and Documentation kit. A DECnet-VAX license PAK must be installed on each node.

As of Version 5.0 of DECnet-VAX, the VAX-11/782 is no longer supported.

DECnet-VAX End Node Order Codes	
Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license	QL-D04A*-AA
Cluster license ¹	QL-D04A*-AB
Initial license, primary and cluster ²	QL-D04A*-CA
Monthly rental, single-use ²	QL-D04A*-DA
Monthly rental, cluster ²	QL-D04A*-DB
Software revision right-to-copy	QL-D04A*-HZ
Installation	
Installation service	QT-D04A*-I#
U.S. Software Services³	
DECsupport service	QT-D04A*-9#
Basic service	QT-D04A*-8#
Self-maintenance service	QT-D04A*-3#
Supported processors (): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation I/II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/725/730 (M), VAX-11/750 (L), VAX-11/780/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)	
#Supported media (#): RX50 (3), TK50 (5), TU58 (G), 1,600 bpi magtape (M), RX01 (Y)	
¹ Available on VAX-11/750, VAX-11/78x, VAX 8600/8650 only.	
² Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600 series.	
³ For service agreements in other countries, consult a local Digital sales representative.	

DECnet Communications Software

DECnet-VAX Full-function Order Codes

Option	Order Code
Upgrade from End Node to Full Function¹ (A license is required for each CPU.)	
Single-use license	QL-D09A*-AA
Monthly rental, single-use ³	QL-D09A*-DA
Full-Function Licenses (A license is required for each CPU.)	
Single-use license	QL-D05A*-AA
Cluster license ²	QL-D05A*-AB
Initial license, primary and cluster ³	QL-D05A*-CA
Monthly rental, single-use ³	QL-D05A*-DA
Monthly rental, cluster ³	QL-D05A*-DB
Software revision right-to-copy	QL-D05A*-HZ
Installation	
Installation service	QT-D05A*-I#
U.S. Software Services⁴	
DECsupport service	QT-D05A*-9#
Basic service	QT-D05A*-8#
Self-maintenance service	QT-D05A*-3#

Supported processors (): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation I/II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/725/730 (M), VAX-11/750 (L), VAX-11/780/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): RX50 (3), TK50 (5), TU58 (G), 1,600 bpi magtape (M), RX01 (Y)

¹Not available on VAXstation I.

²Available on VAX-11/750, VAX-11/78x, VAX 8600/8650 only.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

DECnet-ULTRIX

DECnet-ULTRIX is a Phase IV end-node implementation of the Digital Network Architecture (DNA) for the ULTRIX-32 operating system. It allows Digital ULTRIX systems to communicate with other Digital operating systems that use the DNA Phase III or Phase IV protocols, as well as with non-Digital operating systems that support the Internet (TCP/IP-based) protocols.

DECnet-ULTRIX functions include a semi-transparent, bidirectional gateway that acts as a bridge between DECnet networks and Internet (TCP/IP-based) networks. This function allows DECnet and Internet users to communicate through file transfers, remote logins, and mail correspondence. The gateway function does not require special software on systems that use its service, nor does it require accounts for remote users on the gateway system.

▲ Refer to Software Product Description 26.83 for further information.

DECnet Communications Software

Features

DECnet-ULTRIX offers these networking capabilities:

- Semi-transparent, bidirectional software gateway between DECnet networks and Internet (TCP/IP-based) networks
- Task-to-task communications
- Network virtual terminal
- Remote file transfer
- Electronic mail
- Network management

Prerequisite Hardware

One of the following:

- Any valid VAX system configuration running ULTRIX-32 with the following communications devices: DEUNA or DELUA Ethernet controller, or VAXBI 802.3/Ethernet controller, or DMR11 synchronous controller interface. ▲ **Refer to the order code table for a list of supported VAX processors.**
- Any valid MicroVAX or VAXstation system configuration running ULTRIX-32 with the following communication devices: DELQA, DESQA or DESVA 802.3/Ethernet controller, or DSV11 synchronous controller. ▲ **Refer to the order code table for a list of supported VAX processors.**

Prerequisite Software

ULTRIX-32 operating system

DECnet Communications Software

DECnet-ULTRIX Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster	QL-716A*-AA
Cluster member ¹	QL-716A*-AB
Initial license, primary and cluster ¹	QL-716A*-CA
Monthly rental, single-use ¹	QL-716A*-DA
Monthly rental, cluster ¹	QL-716A*-DB
Software revision right-to-copy	QL-716A*-HZ
Materials and Installation	
Distribution and documentation	QA-716AA-H#
Documentation only	QA-716AA-GZ
Installation service	QT-716A*-I#
U.S. Software Services²	
DECsupport service	QT-716A*-9#
Basic service	QT-716A*-8#
Self-maintenance service	QT-716A*-3#

Supported processors (): MicroVAX II/VAXserver 100 (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II/GPX (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/750 (L), VAX-11/780/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800/8820 (D), VAX 8810 (E)

#Supported media (#): Magtape, 1600 bpi (M), RA60 (J), TK50 (5)

¹Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/700 series, or VAX 8600/8650.

²For service agreements in other countries, consult a local Digital sales representative.

DECnet-RSX

DECnet-RSX allows a suitably configured PDP-11 computer system to participate as a node in a DECnet network. DECnet-RSX Phase IV supports all Phase IV capabilities. The functions available to a user partially depend upon the configuration of the rest of the network. DECnet-Micro/RSX functions as an end node only.

▲ For prerequisite hardware and software, consult the following Software Product Descriptions: DECnet-11M 10.75, DECnet-11S 10.74, DECnet-11M-PLUS 10.66, and DECnet-Micro/RSX 18.27.

DECnet-11M Order Codes

Option	Order Code	
License (A license is required for each CPU.)		
Single-use license	QJ765-UZ	QJ764-UZ
Materials		
Distribution and documentation	QJ765-H#	QJ764-H#
Software revision right-to-copy	QJ765-HZ	QJ764-HZ
Documentation only	QJ765-GZ	QJ764-GZ
#Supported media: D, H, M, 5		

DECnet Communications Software

DECnet-11S Order Codes

Option	Order Code	
Licenses (A license is required for each CPU.)	End Node	Full Function
Single-use license	QJ763-UZ	QJ762-UZ
Materials		
Distribution and documentation	QJ763-H#	QJ762-H#
Software revision right-to-copy	QJ763-HZ	QJ762-HZ
Documentation only	QJ763-GZ	QJ762-GZ
#Supported media: D, H, M, 5		

DECnet-11M-PLUS Order Codes

Option	Order Code	
Licenses (A license is required for each CPU.)	End Node	Full Function
Single-use license	QJ767-UZ	QJ766-UZ
Materials		
Distribution and documentation	QJ767-H#	QJ766-H#
Software revision right-to-copy	QJ767-HZ	QJ766-HZ
Documentation only	QJ767-GZ	QJ766-GZ
#Supported media: D, H, M, 5		

DECnet-Micro/RSX Order Codes (End Node Only)

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license	QY766-UZ
Materials	
Distribution and documentation	QY766-H#
Software revision right-to-copy	QY766-HZ
Documentation only	QY766-GZ
#Supported media: 3, 5	

DECnet-DOS

DECnet-DOS allows IBM PCs, PC/XTs, Personal Computer ATs, and PS/2 models to participate as nonrouting (end) nodes in DECnet local area and wide area networks. In addition, some IBM compatibles are supported. **▲ Refer to Software Product Description (SPD) 50.15 for specifics on supported systems and configurations.**

DECnet-DOS supports the following 802.3/Ethernet communications controllers:

- Digital: DEPCA multibuffered 802.3/Ethernet controller
- MICOM/INTERLAN: NI5010-1 and NI5010-2 IBM PC Ethernet/IEEE 802.3 controllers
- 3Com: Etherlink/IBM PC, Etherlink II, and Etherlink/MC Ethernet Network Interfaces

DECnet Communications Software

DECnet-DOS nodes that use the DEPCA 802.3/Ethernet controller are supported in a broadband environment using the Chipcom Ethermodems. ▲ Refer to SPD 50.15 for a list of supported systems and configurations.

Features

- Supports task-to-task communications, remote file access, utilities for network file operations, and network resource sharing using DNA protocols.
- Supports virtual command terminals (VT220 emulation) and a scripting language.
- Allows access to full DECnet-DOS functions for MS-DOS user programs written in Macro Assembler or the C language.
- Provides SETHOST 132-column support for Digital national character sets and Digital multinational character sets.
- Supports IBM enhanced keyboards for IBM PC/XT and IBM Personal Computer AT, and Digital LK250.
- Allows for remote network monitoring of DECnet-DOS nodes.

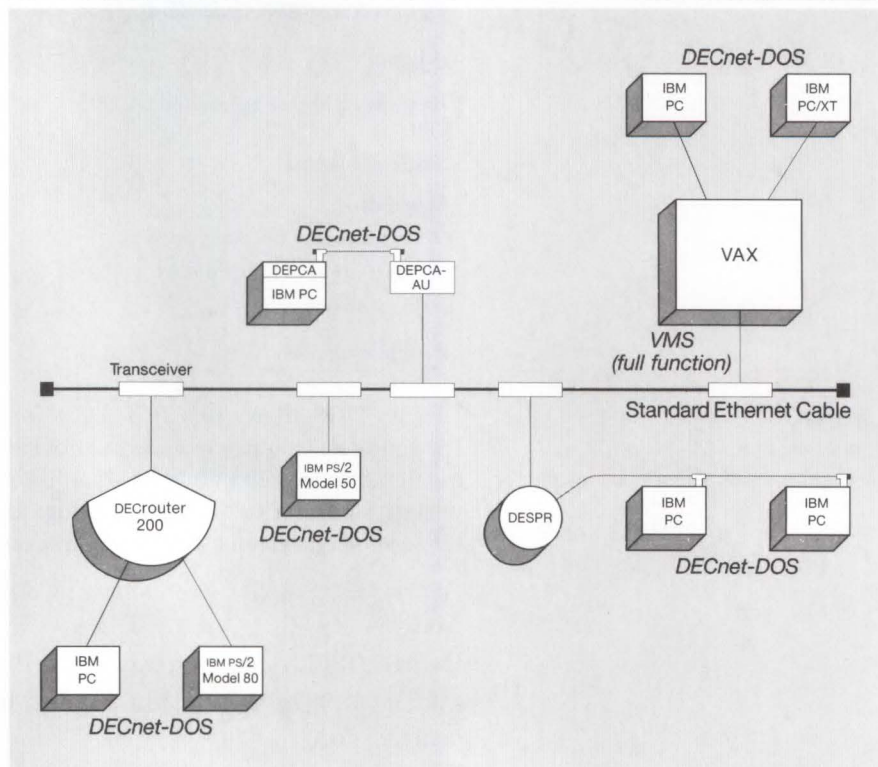
Prerequisite Hardware

▲ Refer to SPD 50.15 for configuration details.

Prerequisite Software

IBM PC Disk Operating System or vendor's variant of MS-DOS. ▲ Refer to SPD 50.15 for more information.

DECnet-DOS Configuration



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DECnet Communications Software

DECnet-DOS Order Code

Option	Order Code
Licenses (A license is required for each CPU.)	
License, binaries, warranty and documentation	QVA05-AB QVA05-AI
Single-use license ¹	QVA05-UZ
8-pack license	QVA05-U3
16-pack license	QVA05-U4
64-pack license	QVA05-U6
128-pack license	QVA05-U8
500-pack license	QVA05-UB
1000-pack license	QVA05-UC
Software revision right-to-copy	QVA05-HZ
Distribution and documentation	QVA05-H#
Documentation only	QVA05-GZ

#Supported media (#): RX24 (B), RX31 (I)

¹A DECnet-DOS license is included in the DEPCA Network Integration Packages.

▲ For more information, refer to "Network Integration Packages" in Section 5.

DECnet-VAXmate

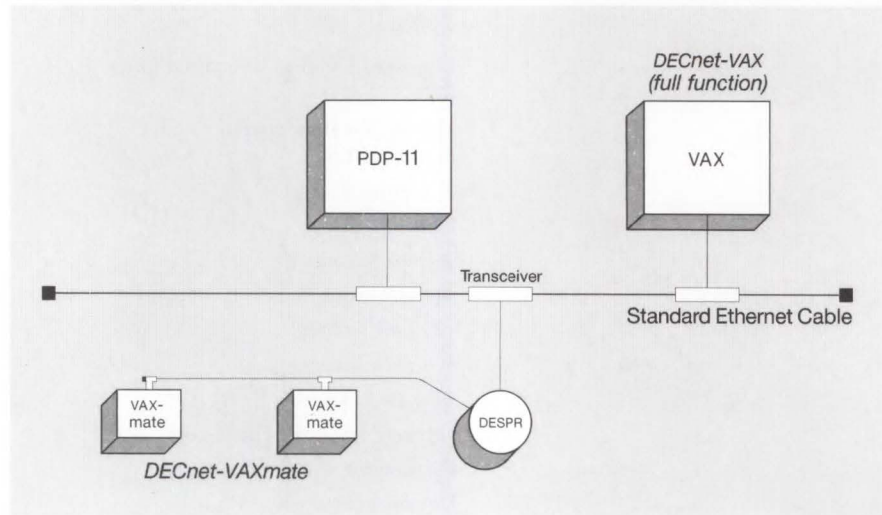
DECnet-VAXmate allows Digital's VAXmate personal computer/workstations to participate as nonrouting (end) nodes in both local and wide area DECnet networks. This software is one of the DECnet-DOS family of products for personal computer systems running Microsoft Corporation's MS-DOS operating system, and specific variants of that product. DECnet-VAXmate is a DECnet Phase IV network product and is warranted for use only with supported Phase IV products supplied by Digital.

Features

- Supports task-to-task communications, remote file access, utilities for network file operations, network command terminals, and network resource sharing using DNA protocols.
- Provides NETBIOS session-level interface, which allows NETBIOS applications to be layered on DECnet-DOS. These applications can communicate with other DECnet applications or with other PCs running DECnet and the NETBIOS application.
- Allows access to full DECnet-DOS functions for MS-DOS user programs written in Macro Assembler or the C language.
- Provides SETHOST 132-column support for Digital national character sets and Digital multinational character sets.
- Allows multiple CTERM and LAT terminal emulation sessions.
- Allows for remote network monitoring of DECnet-VAXmate nodes.

▲ Refer to Software Product Description 50.05 for more information about DECnet-VAXmate.

DECnet-VAXmate Configuration



NBG-102-00

Minimum Hardware Required

▲ Refer to Software Product Description 50.05 for supported configurations.

Note: Operation of the 802.3/Ethernet interface with broadband modems is not supported.

Prerequisite Software

VAXmate Standalone Software V1.1 or V2.0

DECnet-VAXmate Order Code

License and Materials	Order Code
License, binaries, warranty, and documentation	Q6000-A7
Single-use license	Q6000-UZ
Distribution and documentation	Q6000-H7

DECnet/E

DECnet/E software allows a suitably configured RSTS/E system to participate as a routing or nonrouting node in DECnet computer networks. DECnet/E can connect to an Ethernet and supports all Phase IV capabilities except area routing.

DECnet/E is a Phase IV network product and is warranted for use with supported Phase III and Phase IV DECnet products.

▲ For prerequisite hardware and software, consult Software Product Description 10.73.

DECnet Communications Software

DECnet/E Order Codes

Option	Order Code	
License (A license is required for each CPU.)	PDP-11	MicroPDP-11
Single-use license	QP692-UZ	QY692-UZ
Materials		
Distribution and documentation	QP692-H#	QY692-H#
Software revision right-to-copy	QP692-HZ	QY692-HZ
Documentation only	QP692-GZ	QY692-GZ

*Supported media: D, H, S, M, V

DECnet-RT

DECnet-RT software allows a suitably configured RT-11 Foreground/Background (FB) system to participate as an end node in DECnet computer networks. The backward compatibility of Phase IV allows DECnet-RT to connect to Ethernet through any Phase IV routing node.

DECnet-RT is a Phase III network product and is warranted for use with supported Phase III and Phase IV DECnet products supplied by Digital.

▲ For prerequisite hardware and software, consult **Software Product Description 10.72**.

DECnet-RT Order Codes

Option	Order Code
License (A license is required for each CPU.)	
Single-use license	QJ687-UZ
Materials	
Distribution and documentation	QJ687-H#
Software revision right-to-copy	QJ687-HZ
Documentation only	QJ687-GZ

*Supported media: 3, H, M, X

Digital's Internet family of products supports the connection of Digital's computers and Digital's networks to systems built by other manufacturers. Internet products are tools for distributed data processing in a multivendor environment. As parts of the powerful DNA, the Internet products allow transparent, bidirectional communication with the equipment of other vendors and, at the same time, provide the flexibility required by local networks and office systems. They support many programming languages and the wide range of computing power provided by Digital.

Internet Communications Software includes

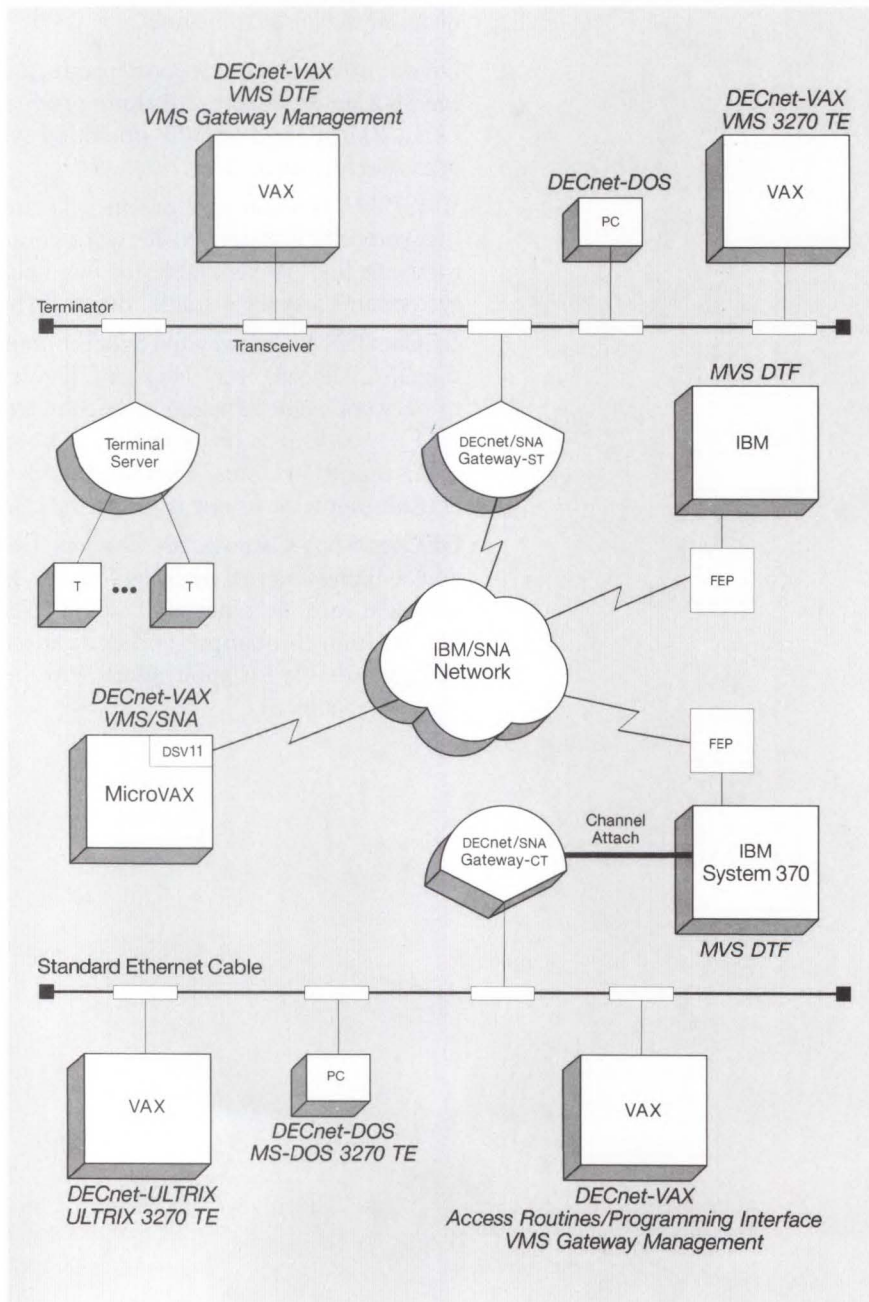
- **Digital/IBM.**
- **Digital/UNIX.**
- **Digital/WANG.**
- **Packetnet.**
- **Open Systems Interconnection (OSI).**

Digital/IBM communications products range from single-function, point-to-point protocol emulation to multi-function network-to-network communication via an IBM channel.

Digital offers three transport products that provide DECnet connection to the SNA environment. All three products support MVS (both /SP and /XA), VM/SP, and VSE/SP operating systems. The products fit into three price/performance tiers.

- **VMS/SNA** is a software product, layered on the VMS operating system, that provides a system-to-network connection over a synchronous communications line. It is suitable for low-volume applications that run on a single system and require a single, direct link to the SNA environment.
- **DECnet/SNA Gateway for Synchronous Transport** is software that runs on the DEC MicroServer, dedicated server hardware that provides network-to-network communications. It connects a DECnet 802.3/Ethernet local area network to as many as four remote SNA networks over synchronous communications lines. This product is suitable for medium traffic over a DECnet network to one or more IBM SNA systems.
- **DECnet/SNA Gateway for Channel Transport** is software that runs on the DEC ChannelServer, dedicated server hardware that connects 802.3/Ethernet local area networks to an SNA network via an IBM S/370 channel. Its high throughput and dedication to one high-speed IBM channel make it suitable for applications with heavy traffic between the DECnet and SNA environment.

DECnet/SNA Environment



NBG-127-00

The DECnet/SNA Gateway products and VMS/SNA software require installation of the appropriate **DECnet/SNA Access Routines and Programming Interfaces**. These products provide such functions as terminal and printer emulation, bidirectional data transfer, mail exchange, and remote job entry. ▲ Refer to “DECnet/SNA Access Routines and Programming Interfaces” in this section for more information.

Digital's **Binary Synchronous Communications (BSC Protocol Emulator)** products provide point-to-point emulation between Digital and IBM systems and are designed to satisfy single-function Digital/IBM communication requirements. If the amount of communication between Digital systems and IBM mainframes is relatively low, BSC may be the appropriate connection method. Digital offers two types of IBM Internet products using the BSC technology—**3271** and **2780/3780** protocol emulation software.

DECnet-DOS and **DECnet/PCSA Client** software products allow the IBM PC, PC/XT, Personal Computer AT systems (from PS/2 models), and selected compatibles to participate as nonrouting (end) nodes in DECnet and 802.3/Ethernet computer networks. **▲ Refer to "DECnet Communications Software" in this section for more information.**

Other products are available for Digital/IBM communications:

- **VIDA** allows integration of data from IDMS on IBM mainframes with VAX databases
- **WPS-PLUS/PC** provides Digital-style word processing for IBM PC users

The three DECnet/SNA transport products---**VMS/SNA**, **DECnet/SNA Gateway for Synchronous Transport (-ST)**, and **DECnet/SNA Gateway for Channel Transport (-CT)**—allow systems in a DECnet network to access resources, programs, and information in an SNA network. In cooperation with the appropriate DECnet/SNA Access Routines, they allow 3270 display users within the SNA network to access DECnet-based system resources within the DNA environment.

VMS/SNA, a software product that runs on a VAX/VMS system, provides system-to-network connection with the same functions as the DECnet/SNA Gateway products (except for the Distributed Host Command Facility, discussed later in this section). The DECnet/SNA Gateway products provide dedicated service between the DECnet network and the SNA network, alleviating the VMS systems from managing this task.

In deciding which product is suitable for a customer site, it is helpful to consider both the application and the operating environment.

Suitable Applications for VMS/SNA

- Remote offices requiring both independent computing resources for office applications and access to the corporate database on the IBM mainframe.
- Government command and control systems requiring a link to the IBM mainframe for transfer of military information from mobile units.

Suitable Applications for the DECnet/SNA Gateway Products

- Installations with Digital department-level systems and IBM corporate systems. The department-level systems are linked via DECnet to the corporate SNA network with a DECnet/SNA Gateway.
- Remote sites with more than one Digital computer that require access to the SNA network.
- IBM 3270 users requiring access to a corporate mail system implemented on VAX systems. The DECnet/SNA VMS Distributed Host Command Facility access routine provides this capability.

Comparison of VMS/SNA and DECnet/SNA Gateway Products

Suitable Environments for VMS/SNA

- A large SNA network with a small number of VAX systems
- A large SNA network and geographically dispersed single VAX systems, each requiring a separate link to the SNA network

Suitable Environments for the DECnet/SNA Gateway Products

- A large DECnet network and medium-to-heavy interface to SNA network
- Multiple DECnet networks and medium interface to SNA network
- Need for multiple lines to SNA network
- Heavy VAX usage that requires offloading network capabilities to a communications server

Comparison of VMS/SNA and DECnet/SNA Gateway Capabilities

VMS/SNA	DECnet/SNA Gateway-ST	DECnet/SNA Gateway-CT
System-to-network connection	Network-to-network connection	Network-to-IBM-channel connection
Single line at speeds up to 64 Kb/s	One line at speeds up to 256 Kb/s; Two lines at speeds up to 128 Kb/s; Four lines at speeds up to 64 Kb/s.	Direct channel speed (typically 3 to 4 Mb/s)
Supports 16 concurrent sessions	Supports 128 concurrent sessions	Supports 255 concurrent sessions
Supports all VAX processors except VAX UNIBUS processors	802.3/Ethernet-based, supports all VAX systems	802.3/Ethernet-based, supports all VAX systems
No Distributed Host Command Facility	Supports Distributed Host Command Facility	Supports Distributed Host Command Facility
Node management internal	Gateway management uses DECnet tools	Gateway management uses DECnet tools

DEC ChannelServer

The DEC ChannelServer represents the high-end of the DECnet/SNA Gateway product family and provides the hardware base for the DECnet/SNA Gateway for Channel Transport (DECnet/SNA Gateway-CT). The DEC ChannelServer attaches directly to both the Ethernet Local Area Network and an IBM S/370 Byte Multiplexer, Block Multiplexer, or Selector Channel.

The DEC ChannelServer is defined to the I/O subsystem as either a 3174-1L or 3790 communications controller and is also defined to VTAM as a Physical Unit Type 2.0. It supports a single pair of Bus and Tag connectors and is capable of accessing information on any mainframe defined to the SNA network regardless of its location. By using the SNA network, a single DEC ChannelServer can access applications, files, and documents simultaneously on multiple mainframes in either central or distributed locations.

The DEC ChannelServer consists of a MicroVAX II CPU with 4 MBytes of additional memory enclosed in an H9642 OEM cabinet. It connects to the Ethernet LAN through a DELQA controller and connects to the S/370 through a three-card Q-BUS option with driver/receiver panel. An RX33 diskette controller and a video port are also included for diagnostic use.

▲ For more information, refer to “DECnet/SNA Gateway-CT” in this section.

Specifications

Physical Characteristics

Height	41.7 inches	105.918 cm
Width	23.0 inches	58.42 cm
Depth	36.0 inches	91.44 cm
Weight	200 pounds	90.72 kg

Power Requirements

	120 Vac	240 Vac
Low-range line voltage	88 to 128 Vac	176 to 256 Vac
High-range line voltage	Single	Single
Frequency tolerance	47 to 63 Hz	47 to 63 Hz
Frequency	60 Hz	50 Hz
Steady state current (typ)	4.4 A	2.2 A
Steady state current (max)	6.0 A	3.0 A
Power consumption (max)	345 W	345 W

Environmental Class

A ▲ Refer to Appendix B for details.

Prerequisite Hardware

- Any VAX, MicroVAX, or VAXstation configuration as specified in the order code table can act as the load host.
- S/370 Bus and Tag cables (terminators if appropriate) for connection into the X/370 system.
- VT1xx, VT2xx, or VT3xx series terminal for diagnostic use.

Note: The DEC ChannelServer has a built-in Ethernet communications controller. It needs a suitable connection to the user's Ethernet LAN, together with any transceiver cables.

Prerequisite Software

- VMS V4.6 to V5.0 or MicroVMS V4.6 to V4.7
- DECnet-VAX V4.6 to V5.0

Ordering Information

The DEC ChannelServer is packaged and ordered as a complete DECnet/SNA Gateway-CT system. ▲ Refer to the DECnet/SNA Gateway-CT product description to order the package.

Refer to the order codes below only when ordering spare hardware. Note that the options listed below do not include cables, licenses, or documentation.

DEC ChannelServer Spare Hardware Order Codes

DEC ChannelServer configured for 120 Vac	DESNA-AA
DEC ChannelServer configured for 240 Vac	DESNA-A3

DECnet/SNA Gateway for Channel Transport



DECnet/SNA Gateway for Channel Transport (DECnet/SNA Gateway-CT), the high-end member of the DECnet/SNA Transport family, is software that runs on the DEC ChannelServer dedicated server hardware. The DECnet/SNA Gateway-CT operates as part of both the DECnet and SNA networks, allowing users anywhere in either the SNA or DECnet network to share systems, applications, and network resources.

DECnet/SNA Gateway-CT is defined to VTAM as a physical unit type 2.0 and can be configured to the physical unit type 2 maximum of 255 logical units. Also, it supports a maximum of 255 simultaneous sessions. Compatible with IBM MVS, VSE/SP, and VMS operating systems, DECnet/SNA Gateway-CT also supports all existing DECnet/SNA Access Routines for VMS, ULTRIX, and MS-DOS systems.

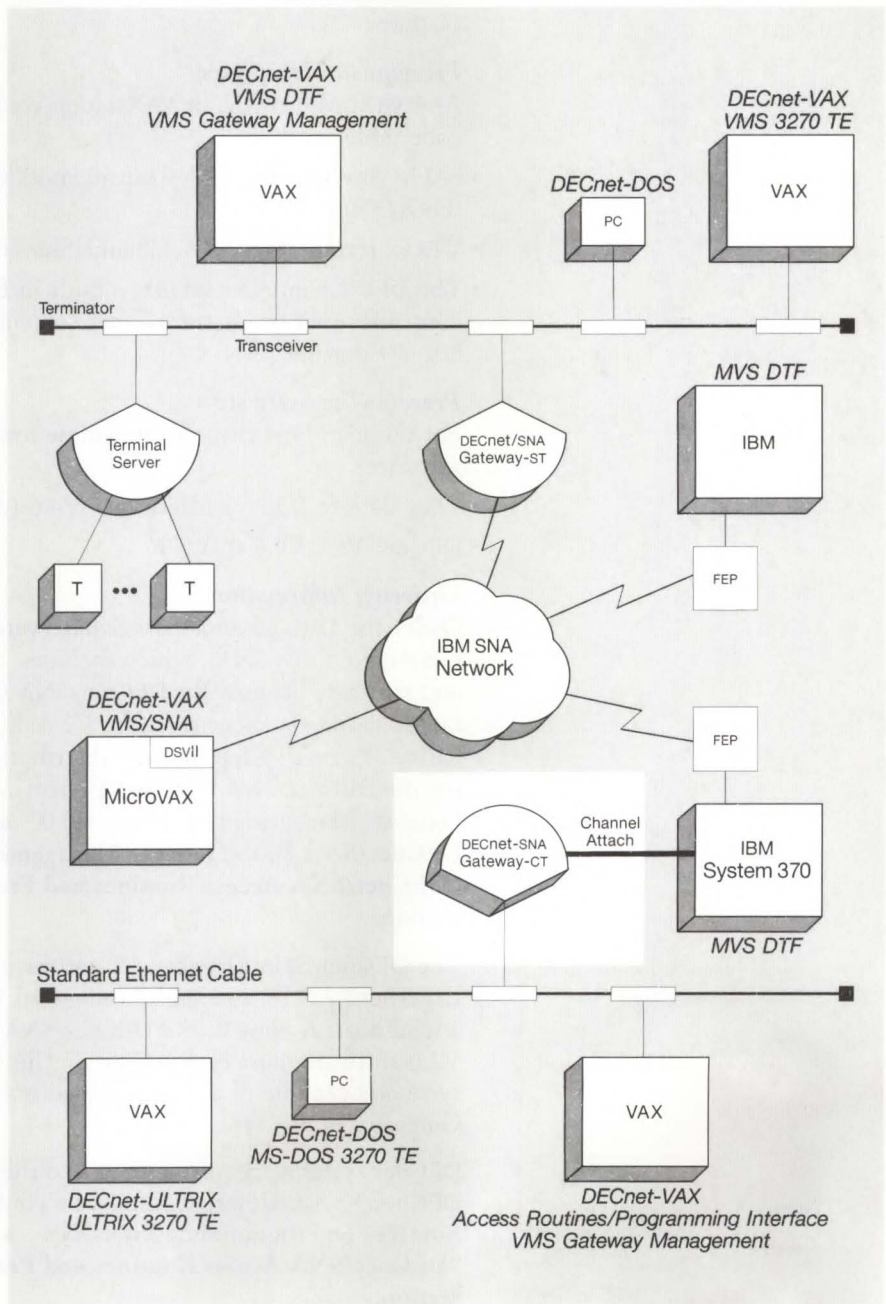
DECnet/SNA Gateway-CT software is downline loaded across an Ethernet network into the DEC ChannelServer from a suitably configured VAX/VMS load-host system. The DECnet/SNA Gateway-CT product is configured and managed by the load host using DECnet/SNA VMS Gateway Management V2.0 (required for each load host). DECnet/SNA VMS Gateway Management software can be used to manage both DECnet/SNA Gateway-CT and DECnet/SNA Gateway-ST products. **▲ For more information on the DECnet/SNA VMS Gateway Management software, refer to "DECnet/SNA Access Routines and Programming Interfaces" in this section.**

DEC ChannelServer

The DEC ChannelServer provides the hardware base for the DECnet/SNA Gateway-CT, and attaches directly to both the Ethernet Local Area Network and an IBM S/3270 Byte Multiplexer, Block Multiplexer, or Selector Channel.

▲ Refer to the DEC ChannelServer product description in this section and to Software Product Description 29.76 for further information.

DECnet/SNA Gateway-CT Configuration



NBG-147-00

Features

- Up to 255 concurrent sessions allow many users and applications to be supported through a single DECnet/SNA Gateway-CT.
- High performance DECnet/SNA Gateway-CT supports greater concurrent sessions and provides higher throughput than any other DECnet/SNA Transport product.
- Direct S/370 channel attachment bypasses front-end processors and wide-area networks.

Digital/IBM Communications Software

- Compatibility with DECnet/SNA Access Routines and Programming Interfaces eases migration from other transport products to DECnet/SNA Gateway-CT.

Prerequisite Hardware

- Any VAX, MicroVAX, or VAXstation configuration as specified in the order code table
- S/370 Bus and Tag cables (terminators if appropriate for connection into the X/370 system)
- VTxxx terminal for DEC ChannelServer diagnostic use
- The DEC ChannelServer has a built-in Ethernet communications controller that needs transceiver cable and a suitable connection to the 802.3/Ethernet LAN.

Prerequisite Software

For the load host that will downline load the DECnet/SNA Gateway-CT software:

- VMS V4.6 to V5.0 or MicroVMS V4.6 to V4.7
- DECnet-VAX V4.6 to V5.0

Ordering Information

Order the DEC ChannelServer hardware base for the DECnet/SNA Gateway-CT (DESNA), which includes a power cord, diagnostic package, and software licenses for DECnet/SNA Gateway-CT and DECnet/SNA VMS Gateway Management software V2.0. First time purchasers of a DEC ChannelServer system require distribution media and documentation kits for the DECnet/SNA Gateway-CT software and the DECnet/SNA VMS Gateway Management software V2.0. **▲ For information on ordering the DECnet/SNA VMS Gateway Management V2.0 software, refer to “DECnet/SNA Access Routines and Programming Interfaces” in this section.**

The DECnet/SNA Gateway-CT software is downline loaded across the Ethernet LAN by a suitably configured VAX/VMS system which acts as a load host. A copy of the DECnet/SNA VMS Gateway Management V2.0 software must be installed on this load host. A single VAX/VMS system is capable of acting as a load host for multiple DECnet/SNA Gateways of any type.

DECnet systems, requiring access to the SNA environment through the DECnet/SNA Gateway-CT, must be configured with the appropriate Access Routines or Programming Interfaces. **▲ For more information, refer to “DECnet/SNA Access Routines and Programming Interfaces” in this section.**

Bus and Tag cables are the responsibility of the customer and are not available from Digital.

Digital/IBM Communications Software

DECnet/SNA Gateway-CT Hardware Order Codes

Option	Order Code
DECnet/SNA Gateway-CT package includes DEC ChannelServer hardware, power cord, diagnostics, DECnet/SNA Gateway-CT License, DECnet/SNA VMS Gateway V2.0 license.	DESNA-S*
DECnet/SNA Gateway-CT package for Ireland. Includes components listed above.	DESNA-TE

*Fill in one of the following codes for the appropriate country: A (United States, Mexico), D (Denmark), E (United Kingdom), G (West Germany), I (Italy), K (Switzerland), P (France), T (Israel), X (Austria, Belgium, Finland, Netherlands, Norway, Sweden, Portugal, Spain)

DECnet/SNA Gateway-CT Order Codes

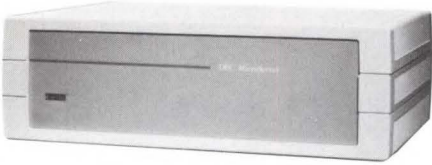
Option	Order Code
Materials and Installation*	
Distribution and documentation	QA-VC9AA-H#
Software revision right-to-copy	QL-VC9AA-HZ
Documentation only	QA-VC9AA-GZ
U.S. Software Services¹	
Installation service—first time	QSF01-SZ
Installation service—subsequent	QSF02-SZ
DECsupport service	QT-VC9AA-9#
Basic service	QT-VC9AA-8#
Self-maintenance service	QT-VC9AA-3#

*Supported processors: MicroVAX I/II, MicroVAX 2000, MicroVAX 3500/3600, VAXstation I/II, VAXstation 2000, VAXstation 3200/3500, VAXserver 3500/3600/3602, VAX-11/730/750/780/785, VAX 6210/6220/6230/6240, VAX 8200/8250, VAX 8300/8350, VAX 8500/8530/8550, VAX 8600/8650, VAX 8700, VAX 8800/8810/8820/8840/8842, VAX 8974/8978

#Supported media (#): RX33 (7), TK50 (5), 9-track 1,600 bpi magtape (M)

¹For service agreements in other countries, consult a local Digital sales representative.

**DECnet/SNA Gateway for
Synchronous Transport**



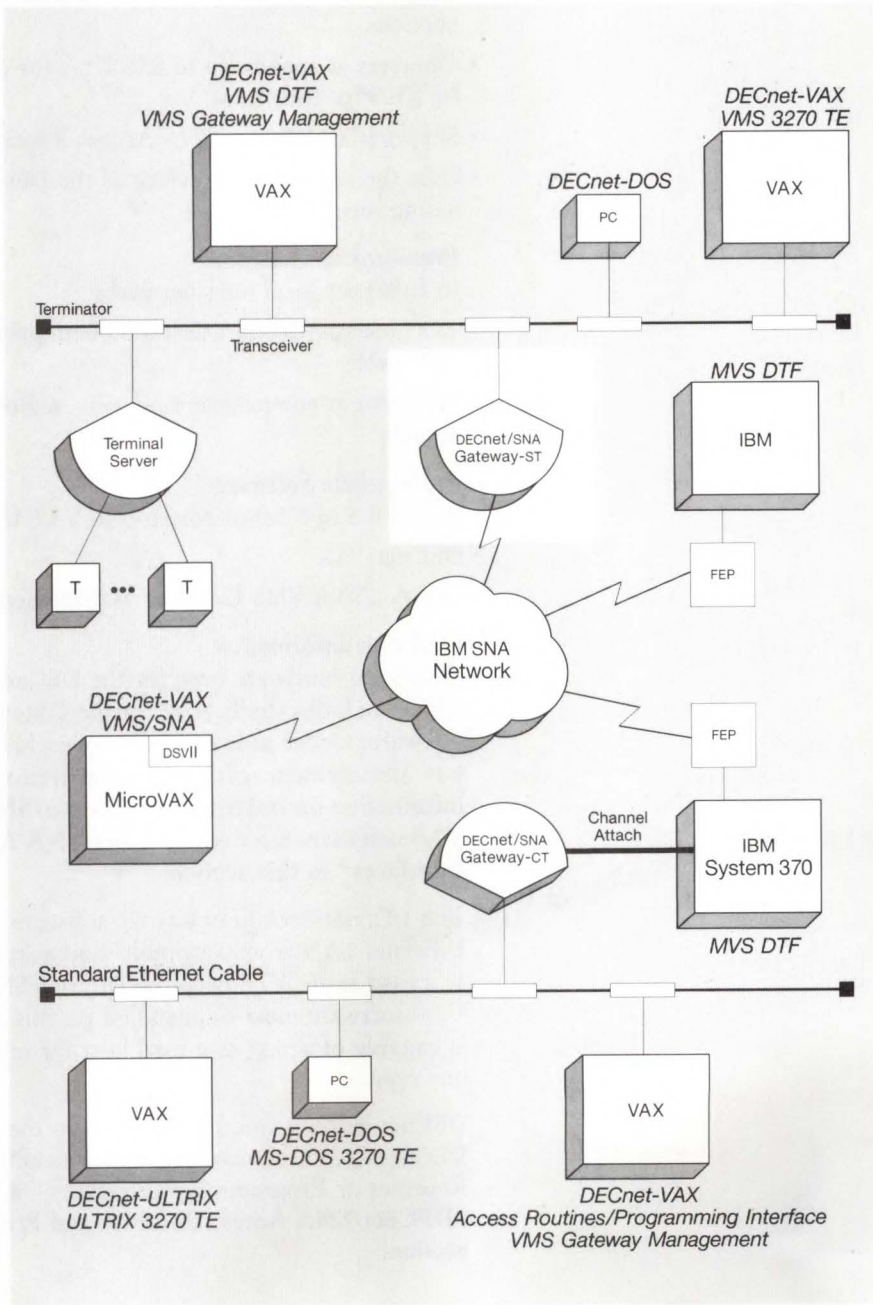
DECnet/SNA Gateway for Synchronous Transport (DECnet/SNA Gateway-ST), is software that runs on the DEC MicroServer, dedicated server hardware that provides network-to-network communications. It connects a DECnet 802.3/Ethernet local area network to as many as four remote SNA networks over synchronous communications lines. This product is suitable for medium traffic over a DECnet network to one or more IBM SNA systems.

The DECnet/SNA Gateway-ST, the midrange member of the DECnet/SNA Transport family, connects Digital and IBM networks using a wide variety of Digital Access Routines running under VMS, MS-DOS, and ULTRIX operating environments. DECnet/SNA Gateway-ST is defined to Virtual Telecommunications Access Method (VTAM) as a physical unit type 2.0 and can be configured with up to four physical unit type 2 definitions supporting up to 128 concurrent sessions.

DECnet/SNA Gateway-ST software is downline loaded across an Ethernet network into the DEC MicroServer from a suitably configured VMS load host system. The DECnet/SNA Gateway-ST is configured and managed by the DECnet/SNA VMS Gateway Management V2.0 (required for each load host), which can be used to manage both DECnet/SNA Gateway-ST and DECnet/SNA Gateway-CT systems.

▲ For more information on the DEC MicroServer, refer to “802.3/Ethernet Communications Servers” in Section 2. For more information on the DECnet/SNA Gateway-ST, refer to Software Product Description 25.C6.

DECnet/SNA Gateway-ST Configuration



NBG-103-01

Features

- Supports up to 128 concurrent sessions and up to four synchronous connections.
- Operates at speeds up to 256 Kb/s for one line, 128 Kb/s for two lines, or 64 Kb/s for four lines.
- Supports all DECnet/SNA Access Routines and Programming Interfaces.
- Uses the same user interface as the DECSA DECnet/SNA Gateway, eliminating retraining.

Prerequisite Hardware

In Ethernet local area networks:

- VAX, MicroVAX, or VAXstation configuration as specified in the order code table
- Bell System-compatible modems. ▲ **Refer to SPD 25.C6 for approved models.**

Prerequisite Software

- VMS V4.6 to V5.0 or MicroVMS V4.6 to V4.7
- DECnet-VAX
- DECnet/SNA VMS Gateway Management V2.0 for each VAX/VMS load host

Ordering Information

Order the hardware base for the DECnet/SNA Gateway-ST (DEMSA), which includes the license for the Gateway and Gateway Management software. Order at least one copy each of the Gateway software and Gateway Management software on the appropriate distribution medium. ▲ **For information on ordering the DECnet/SNA VMS Gateway Management V2.0 software, refer to “DECnet/SNA Access Routines and Programming Interfaces” in this section.**

The DECnet/SNA Gateway-ST software is downline loaded across the Ethernet LAN from a suitably configured VAX/VMS system which acts as a load host. A copy of the DECnet/SNA VMS Gateway Management V2.0 software must be installed on this system. A single VAX/VMS system is capable of acting as a load host for multiple DECnet/SNA Gateways of any type.

DECnet systems, requiring access to the SNA environment through the DECnet/SNA Gateway-ST, must be configured with the appropriate Access Routines or Programming Interfaces. ▲ **For more information, refer to “DECnet/SNA Access Routines and Programming Interfaces” in this section.**

Digital/IBM Communications Software

DECnet/SNA Gateway-ST Hardware Order Codes

Option	Order Code
DECnet/SNA Gateway-ST package. Includes DEC MicroServer hardware, two V.35 and two EIA-232 adapter cables, power cord, DECnet/SNA Gateway-ST license with warranty, and DECnet/SNA VMS Gateway Management license with warranty. (Packages for West Germany have two X.21 and two EIA-232 cables.)	DEMSA-S*
DECnet/SNA Gateway-ST package for Ireland. Includes components listed above.	DEMSA-TE

*Fill in one of the following codes for the appropriate country: A (United States, Mexico), D (Denmark), E (United Kingdom), G (West Germany), I (Italy), K (Switzerland), P (France), T (Israel), X (Austria, Belgium, Finland, Netherlands, Norway, Sweden, Portugal, Spain)

DECnet/SNA Gateway-ST Software Order Codes

Option	Order Code
Materials and Installation*	
Distribution and documentation	QA-S01AA-H#
Software revision right-to-copy	QL-S01AA-HZ
Documentation only	QA-S01AA-GZ
Installation service	QT-S01AA-I#
U.S. Software Services¹	
DECsupport service	QT-S01AA-9#
Basic service	QT-S01AA-8#
Self-maintenance service	QT-S01AA-3#

*Supported processors: MicroVAX I/II, MicroVAX 2000, MicroVAX 3500/3600, VAXstation I/II, VAXstation 2000, VAXstation 3200/3500, VAXserver 3500/3600/3602, VAX-11/730/750/780/785, VAX 6210/6220/6230/6240, VAX 8200/8250, VAX 8300/8350, VAX 8500/8530/8550, VAX 8600/8650, VAX 8700, VAX 8800/8810/8820/8840/8842, VAX 8974/8978

#Supported media (#): RX33 (7), TK50 (5), 9-Track 1,600 bpi magtape (M)

¹For service agreements in other countries, consult a local Digital sales representative.

VMS/SNA

VMS/SNA is a software product, layered on the VMS operating system, that provides a system-to-network connection over a synchronous communications line. It is suitable for low-volume applications that run on a single VAX/VMS system and require a single, direct link to the SNA environment.

Architecturally, a VAX system running VMS/SNA appears to the SNA network as a remote Physical Unit Type 2 node, and is attached to the SNA network through a synchronous communications controller to an IBM 37x5 Communications Controller.

VMS/SNA allows a VMS system to connect to SNA at lower entry cost than the DECnet/SNA Gateway products. VMS/SNA provides the high-level capabilities of a system-to-network link, allowing users to perform such functions as

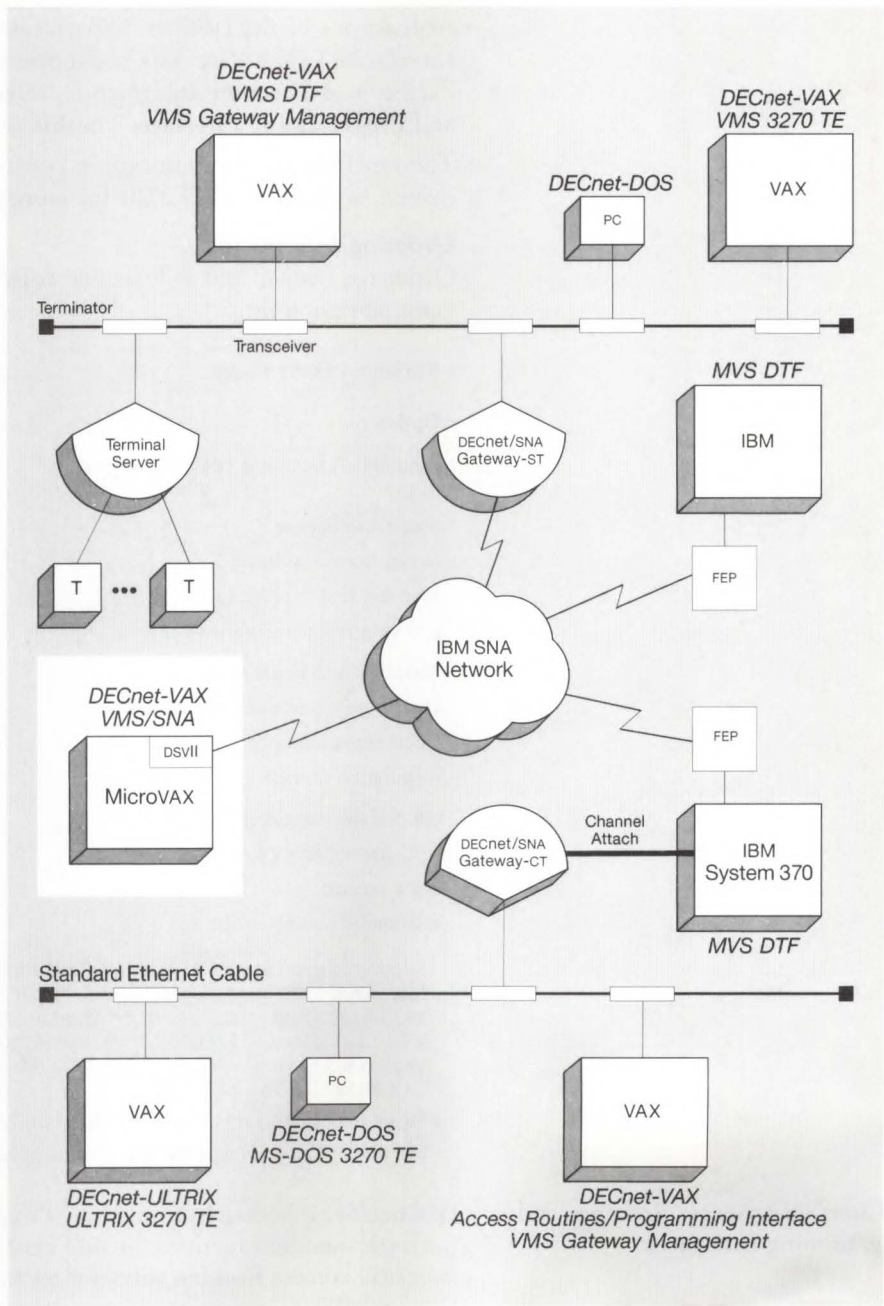
- Accessing IBM application programs or other system resources.
- Acting as a 3270 display station.
- Transferring files between Digital and IBM environments.
- Exchanging documents and electronic mail messages between the VMS operating system and IBM's DISOSS or PROFS.
- Implementing distributed application programs that run between the VMS and IBM systems.

▲ Refer to Software Product Description 27.01 for more information.

Features

- VMS/SNA supports DECnet/SNA VMS Access Routines that provide SNA functions such as terminal and printer emulation, bidirectional data transfer, mail exchange, and remote job entry. **▲ Refer to "DECnet/SNA Access Routines and Programming Interfaces" in this section for more information.**
- SNA Node Management (SNANM) provides a node management facility to control, monitor, and troubleshoot VMS/SNA and the IBM/SNA environment. SNANM commands display information about the circuit status, circuit counters, line status, and access names.
- The SNA Protocol Trace Utility (SNATRACE) is a problem-determination tool that provides frame-level tracing of a circuit to help in debugging application programs, as well as identifying system problems.

VMS/SNA Configuration



Prerequisite Hardware

VMS/SNA supports various synchronous communications controllers for supported processors. ▲ Refer to SPD 27.01 for a list of devices and their maximum line speeds.

▲ Refer to the VMS/SNA order code table for a list of supported processors.

Prerequisite Software

- VMS V4.7 or later.
- At least one of the DECnet/SNA Access Routines or Programming Interfaces. (VMS/SNA does not support the Distributed Host Command Facility.) **▲ For more information, refer to “DECnet/SNA Access Routines and Programming Interfaces” in this section.**
- The synchronous communications controller may require a software device driver. **▲ Refer to SPD 27.01 for more information.**

Ordering Information

Order the license and at least one copy of the distribution-media and documentation kit.

VMS/SNA Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license	QL-362A*-AA
Initial license, primary	QL-362A*-CA
Monthly rental, single-use	QL-362A*-DA
Software revision right-to-copy	QL-362A*-HZ
Materials and Installation	
Distribution and documentation	QA-362AA-H#
Documentation only	QA-362AA-GZ
Installation service	QT-362A*-I#
U.S. Software Services¹	
DECsupport service	QT-362A*-9#
Basic service	QT-362A*-8#
Self-maintenance service	QT-362A*-3#

Supported processors (): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8830 (U), VAX 8840 (V)

#Supported media (#): Magtape, 1,600 bpi (M), TK50 (5), RX33 (7)

¹For non-U.S. service agreements, consult a local Digital sales representative.

DECnet/SNA Access Routines and Programming Interfaces

DECnet/SNA Access Routines and Programming Interfaces allow users to perform specific functions on IBM host systems connected to the SNA network. Access Routine software packages are required for either the DECnet/SNA Gateway products or VMS/SNA software.

The following products, which are ordered separately, are available:

- Message Router/S Gateway (for IBM SNADS)
- Message Router/P Gateway (for IBM PROFS)
- DECnet/SNA VMS Gateway Management
- DECnet/SNA VMS 3270 Terminal Emulator (VMS 3270 TE)
- DECnet/SNA ULTRIX 3270 Terminal Emulator (ULTRIX 3270 TE)
- DECnet/SNA MS-DOS 3270 Terminal Emulator (MS-DOS 3270 TE)

Digital/IBM Communications Software

- Remote Job Entry (RJE)
- DECnet/SNA Data Transfer Facility (DTF)
- DISOSS Document Exchange Facility (DDXF)
- EDE with IBM DISOSS
- Distributed Host Command Facility (DHCF)
- Printer Emulator (PrE)
- Advanced Program-to-Program Communication/LU6.2 Programming Interface (APPC)
- DECnet/SNA VMS 3270 Data Stream Programming Interface (3270 DS)
- DECnet/SNA VMS Application Programming Interface (API)

The following table lists the IBM operating systems supported by each of the access routines.

IBM Software Supported by Access Routines

DECnet/SNA Access Routine	IBM Software Supported		
	MVS	VM/SP	VSE/SP
DECnet/SNA VMS 3270 Terminal Emulator V1.4	CICS, ISPF, Netview, PS/370, TSO	CMS, PROFS, Netview	CICS, ISPF, NCCF, PS/370
DECnet/SNA ULTRIX 3270 Terminal Emulator, V1.0	CICS, ISPF, Netview, PS/370, TSO	CMS, PROFS, Netview	CICS, ISPF, NCCF, PS/370
DECnet/SNA MS-DOS 3270 Terminal Emulator, V1.0	CICS, ISPF, Netview, PS/370, TSO	CMS, PROFS, Netview	CICS, ISPF, NCCF, PS/370
DECnet/SNA VMS RJE V1.3	JES2, JES3	N/A	VSE/Power
DECnet/SNA VMS API V2.2	CICS, VTAM, IMS, TSO	VTAM, CMS, RSCS	CICS, VTAM
DECnet/SNA VMS 3270 Data Stream Programming Interface V1.3	CICS, IMS, TSO, VTAM	CMS	CICS, VTAM
DECnet/SNA VMS APPC/LU6.2 Programming Interface V2.0	CICS	N/A	CICS
DECnet/SNA VMS PrE V1.1	DSPRINT, CICS, JES 328X	RSCS	CICS, VSE/Power
DECnet/SNA VMS DHCF V1.1	HCF	N/A	N/S
DECnet/SNA VMS DDXF V1.3	DISOSS	N/A	N/S
EDE with IBM DISOSS V2.1	DISOSS	N/A	N/S
DECnet/SNA DTF V2.0	MVS/DTF	N/A	N/A
VAX Message Router/S Gateway V1.0	DISOSS	N/A	N/S
VAX Message Router/P Gateway V1.0	N/A	PROFS, CMS Notes	N/A

N/A means not applicable

N/S means the product has not been certified and is not supported

Digital/IBM Communications Software

Message Router/S Gateway (for IBM SNADS)

Message Router/S Gateway is a layered VMS application that allows transparent exchange of messages between Digital and IBM Office Networks. **▲ For more information, refer to “MAILbus Electronic Mail Interchange” in Section 5.**

Message Router/P Gateway (for IBM PROFS)

Message Router/P Gateway is a layered VMS application that allows transparent exchange of messages between Digital and IBM PROFS and CMS systems. **▲ For more information, refer to “MAILbus Electronic Mail Interchange” in Section 5.**

DECnet/SNA VMS Gateway Management

DECnet/SNA VMS Gateway Management provides configuration and management functions for the DECnet/SNA Gateway for Synchronous Transport (DECnet/SNA Gateway-ST and DECnet/SNA Gateway for Channel Transport (DECnet/SNA Gateway-CT). **▲ Refer to the appropriate descriptions in this section for information on both products.**

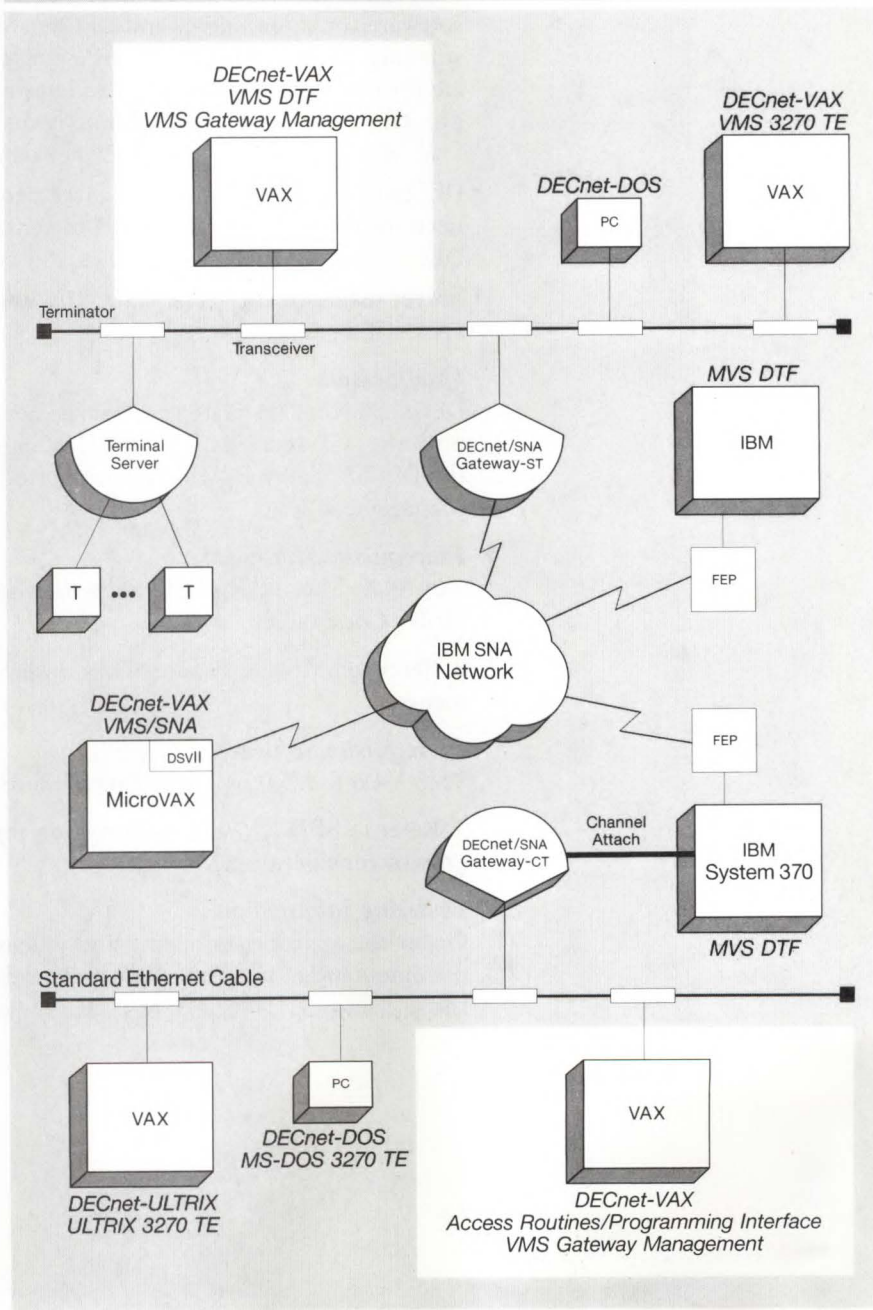
DECnet/SNA VMS Gateway Management allows the gateway administrator to configure the software executing in the DECnet/SNA Gateway-ST or DECnet/SNA Gateway-CT system. Also, it allows the administrator to establish parameters relating to lines, circuits, physical units, logical units, and other variables necessary for network-to-network communications between the DECnet and SNA networks. Additionally, DECnet/SNA VMS Gateway Management allows the administrator to manage and to diagnose problems related to the DECnet/SNA Gateway.

DECnet/SNA VMS Gateway Management includes the following fault isolation tools:

- A trace capability for use with the DECnet/SNA Gateway(s) helps debug application programs and assists in identifying system problems. An operator can run a trace at the line/circuit, physical unit (PU), or session level, then format the data on a specified Digital system. This trace feature helps determine an error for remedial action.
- A “snapshot” monitoring utility displays on a Digital host-controlled terminal the status of the Gateway’s buffer availability, the number of SNA session currently in progress, and other information pertinent to both the DECnet and the SNA network.
- If an irrecoverable error occurs during operation of the DECnet/SNA Gateway system, a memory image may be dumped to a designated Ethernet-attached VAX host.

▲ For further information, refer to Software Product Description 29.70.

DECnet/SNA VMS Gateway Management Configuration



NBG-105-01

Qualifications

Note that only DECnet/SNA VMS Gateway Management V1.x supports DECnet/SNA V1.x (DECSA-FA/DX24).

Digital/IBM Communications Software

Features

- Simple configuration procedure—After installing DECnet/SNA Gateway software (on a load host) and DECnet/SNA VMS Gateway Management software, the administrator runs a single configuration procedure appropriate for the type of DECnet/SNA Gateway to be used. This configuration procedure creates files that define items for the DECnet database on the load host, and the SNA and DECnet databases on the Gateway.
- DECnet/SNA VMS Gateway Management utility—The Gateway supports network control program (NCP) commands to manage the Gateway-to-DECnet components such as lines and circuits.
- Server management—The GAS, RJE, and DHCF servers are managed with SNANCP commands.

Qualification

DECnet/SNA VMS Gateway Management V2.0 can configure and monitor both the -CT and -ST DECnet/SNA Gateway products. It does not support the DECSA Gateway, which is supported by DECnet/SNA VMS Gateway Management V1.0.

Prerequisite Hardware

Any VAX, MicroVAX, VAXstation, or VAXserver system specified in the Order Code table.

▲ Refer to Software Product Description (SPD) 29.70 for other requirements.

Prerequisite Software

VMS V4.6 to V5.0 or MicroVMS V4.6 to V4.7

▲ Refer to SPD 29.70 for information regarding optional software and growth considerations.

Ordering Information

Order the appropriate license and at least one copy of the distribution and documentation kit for the VAX system that will downline load and monitor the -CT and -ST DECnet/SNA Gateway products.

DECnet/SNA VMS Gateway Management V2.0 Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster	QL-VCKA*-AA
Cluster member ¹	QL-VCKA*-AB
Initial license, primary and cluster	QL-VCKA*-CA
Monthly rental, single-use	QL-VCKA*-DA
Monthly rental, cluster	QL-VCKA*-DB
Software revision right-to-copy	QL-VCKA*-HZ
Materials and Installation	
Distribution and documentation	QA-VCKAA-H#
Documentation only	QA-VCKAA-GZ
Installation service	QT-VCKA*-I#
U.S. Software Services²	
DECsupport service	QT-VCKA*-9#
Basic service	QT-VCKA*-8#
Self-maintenance service	QT-VCKA*-3#

Supported processors (): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation I/II (Q), VAXstation 2000 (R), VAXstation 8000 (), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): RX33 (7), TK50 (5), 9-track 1,600 bpi magtape (M)

¹Not available on MicroVAX I, VAXstation I, or VAX-11/725/730/782.

²For service agreements in other countries, consult a local Digital sales representative.

DECnet/SNA VMS 3270 Terminal Emulator (VMS 3270 TE)

The DECnet/SNA VMS 3270 Terminal Emulator (VMS 3270 TE) is software layered on DECnet-VAX that allows VT users (or users of other Digital terminals, workstations, or personal computers in VT emulation mode) on suitably configured VAX, MicroVAX, or VAXstation systems to interactively access IBM mainframe-based applications. The applications for use by the VMS 3270 TE are those originally developed for IBM 3270 display stations in a Systems Network Architecture (SNA) networking environment.

The VMS 3270 Terminal Emulator gains access to the SNA environment via a DECnet/SNA Gateway product or VMS/SNA software.

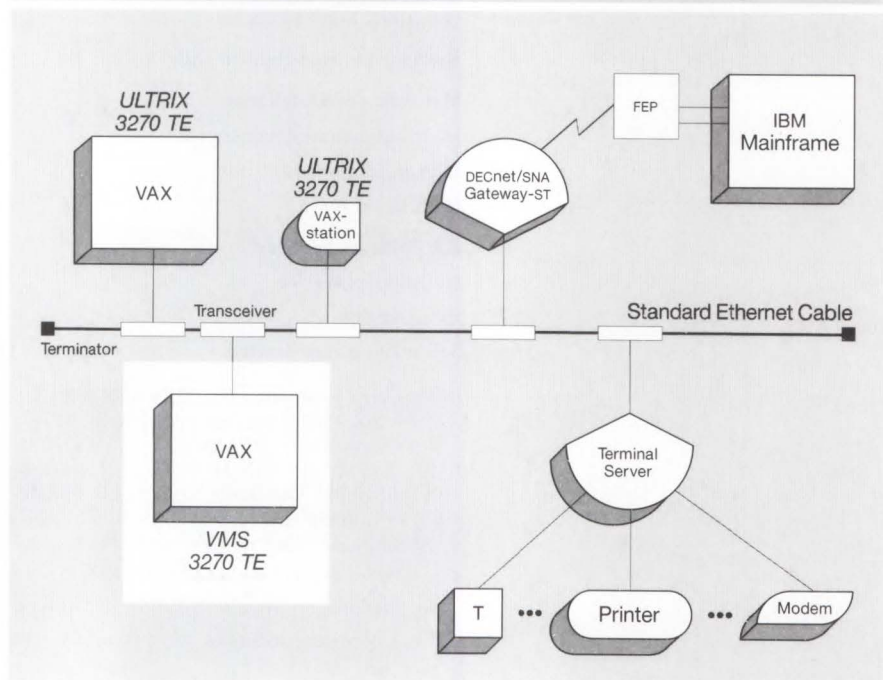
Features

- IBM 3x78 Models 2, 3, 4, or 5 Terminal Emulation.
- Support for multiple IBM Operating System environments (MVS, VM, VSE/SP).
- Support for SSCP-LU sessions—Supports USS screen (also called Message 10) and by use of the SYS REQ key allows users to switch easily between SSCP-LU and LU-LU sessions.
- Support for SPAWN/ATTACH commands—Allows users to create subprocesses and easily switch between VMS processes using SPAWN/ATTACH commands.

Digital/IBM Communications Software

- Support for RECORD/PLAYBACK—Allows users to save frequently used key sequences and associate them with particular PF keys. The key sequences saved (recorded) can then be executed by pressing the desired PF key. Up to 127 keystrokes can be saved on each PF key.
- Support for Numeric Lock Override—Allows users to enter non-numeric characters in numeric fields. The numeric lock override feature is enabled/disabled by the NUM OVR key.

VMS 3270 Terminal Emulator Configuration



NBG-148-00

Prerequisite Hardware

The VMS 3270 TE is supported on any valid VAX, MicroVAX, or VAXstation running VMS and DECnet-VAX. (The order code table lists the supported processors.) ▲ **For more specific communications configuration information, refer to Software Product Description 26.84.**

Access via a DECnet/SNA Gateway requires a VMS-based Load Host. ▲ **Refer to the appropriate DECnet/SNA Gateway product in this section for more information.**

Prerequisite Software

- VMS Operating System
- DECnet-VAX
- DECnet/SNA Gateway and Gateway Management Software (for DECnet/SNA Gateway configurations), or VMS/SNA

VMS 3270 Terminal Emulator Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-454A*-AA
Cluster member ²	QL-454A*-AB
Initial license, primary and cluster ³	QL-454A*-CA
Monthly rental, single-use ³	QL-454A*-DA
Monthly rental, cluster ³	QL-454A*-DB
Software revision right-to-copy	QL-454A*-HZ
Materials and Installation	
Distribution and documentation	QA-454AA-H#
Documentation only	QA-454AA-GZ
Installation service	QT-454A*-I#
U.S. Software Services⁴	
DECsupport service	QT-454A*-9#
Basic service	QT-454A*-8#
Self-maintenance service	QT-454A*-3#

Supported processors (): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/725/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RX01 (Y), RX50 (3), TK50 (5)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX I, VAXstation I, or VAX-11/725/730/782.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

DECnet/SNA ULTRIX 3270 Terminal Emulator (ULTRIX 3270 TE)

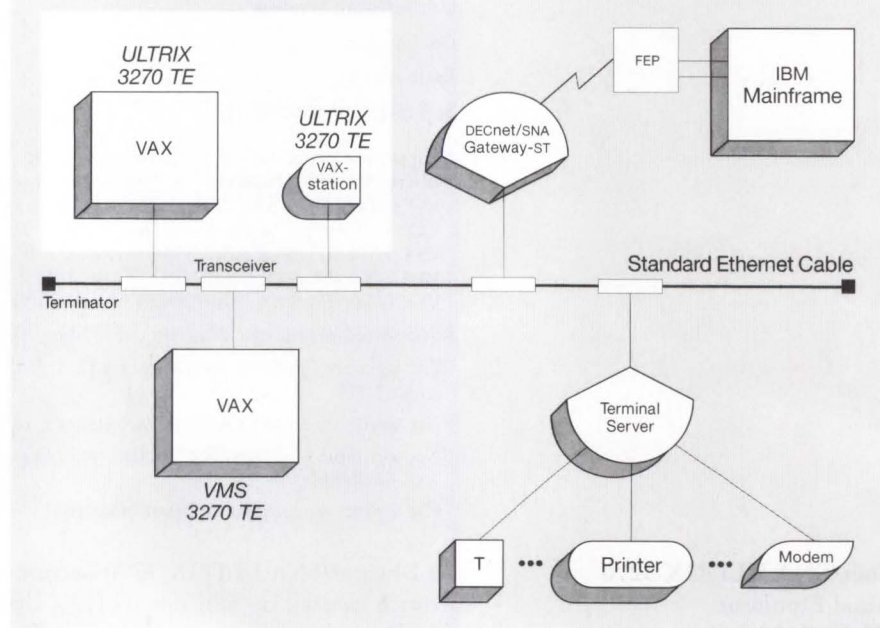
The DECnet/SNA ULTRIX 3270 Terminal Emulator (ULTRIX 3270 TE) is software layered on DECnet-ULTRIX that allows VT users (or users of other Digital terminals, workstations, or personal computers in VT emulation mode) to interactively access IBM mainframe-based applications.

The ULTRIX 3270 TE Terminal Emulator gains access to the SNA environment via a DECnet/SNA Gateway product only.

Features

- IBM 3x78 Model 2, 3180 (24x80 mode) Terminal Emulation
- Access to multiple IBM Operating System environments (MVS, VM, VSE/SP)
- Access to IBM mainframe-based applications (via the DECnet/SNA Gateway) designed for interaction with a screen size of 1920 (24x80) characters
- Record/playback function for associating frequently used key sequences with particular PF (Program Function) keys
- Online keyboard customization
- Online help facility
- Numeric lock override
- Local/logical print functions

ULTRIX 3270 Terminal Emulator Configuration



NBG-191-01

Prerequisite Hardware

The ULTRIX 3270 TE is supported on any valid VAX, MicroVAX, or VAXstation running ULTRIX-32 and DECnet-ULTRIX. (The order code lists the supported processors.) ▲ **For more specific communications configuration information, refer to Software Product Description 26.40.**

IBM Access is via a DECnet/SNA Gateway, which requires a VMS-based load host. ▲ **For more information, refer to the appropriate DECnet/SNA Gateway product description in this section.**

Prerequisite Software

- ULTRIX-32 Operating System V2.2 or later, or ULTRIX Worksystem Software V1.1 (for VAXstation 3200/3500 systems or later)
- DECnet-ULTRIX V2.2 or later

Digital/IBM Communications Software

ULTRIX 3270 Terminal Emulator Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license ¹	QL-VCWA*-AA
Cluster license ²	QL-VCWA*-AB
Initial license, primary and cluster ³	QL-VCWA*-CA
Monthly rental, single-use ³	QL-VCWA*-DA
Monthly rental, cluster ³	QL-VCWA*-DB
Software revision right-to-copy	QL-VCWA*-HZ
Materials and Installation	
Distribution and documentation	QA-VCWAA-H#
Documentation only	QA-VCWAA-GZ
Installation service	QT-VCWA*-I#
U.S. Software Services⁴	
DECsupport service	QT-VCWA*-9#
Basic service	QT-VCWA*-8#
Self-maintenance service	QT-VCWA*-3#
<p>*Supported processors (*): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/725/730 (M), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)</p> <p>#Supported media (#): TK50 (5), 1,600 bpi magtape (M), TU58 (G), RA60 (J)</p> <p>¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.</p> <p>²Not available on MicroVAX I, VAXstation I, or VAX-11/725/730/782.</p> <p>³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.</p> <p>⁴For service agreements in other countries, consult a local Digital sales representative.</p>	

DECnet/SNA MS-DOS 3270 Terminal Emulator (MS-DOS 3270 TE)

The DECnet/SNA MS-DOS 3270 Terminal Emulator (MS-DOS 3270 TE) is software layered on DECnet-DOS or DECnet-VAXmate, which allows an MS-DOS-based personal computer (PC), connected as an end node in a DECnet environment, to interactively access IBM mainframe-based applications. The PC connection to the DECnet environment can be via either a serial port driver with asynchronous DDCMP, or an 802.3/Ethernet communications controller.

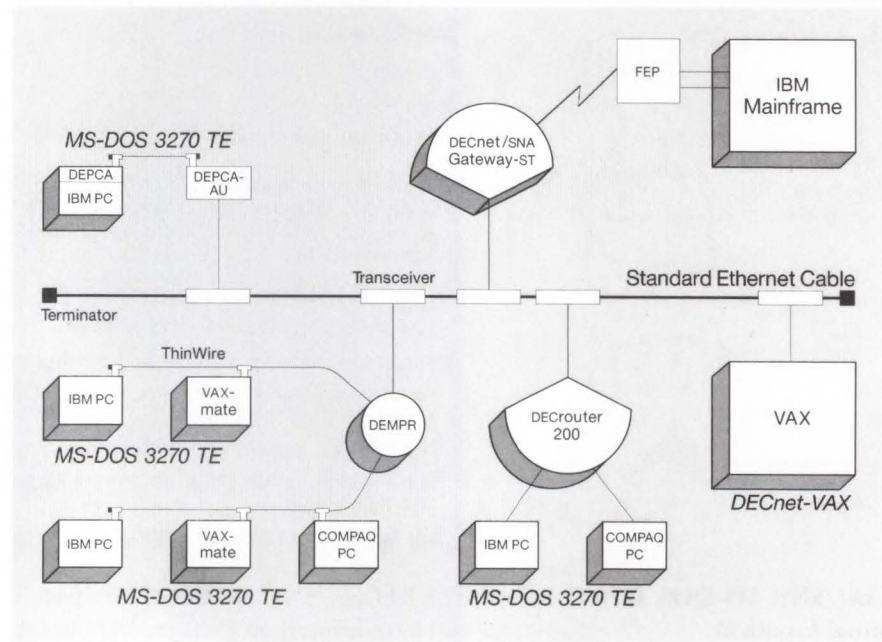
The MS-DOS 3270 TE is available for use with the DECnet/SNA Gateway products only.

Digital/IBM Communications Software

Features

- IBM 3x78 Model 2, 3180 (24x80 mode) Terminal Emulation
- IBM 3279 2A Base Color support (4 colors)
- Access to IBM mainframe-based applications (via the DECnet/SNA Gateway designed for interaction with a screen size of 1920 (24x80) characters)
- Record/playback function for associating frequently used key sequences with particular Program Function keys
- Online keyboard customization
- SPAWN capability for accessing the DOS command environment from the TE session
- Numeric lock override
- Local/logical print functions

MS-DOS 3270 Terminal Emulator Configuration



NBG-192-01

Prerequisite Hardware

The following systems are supported:

- Digital VAXmate personal computer
- IBM 5150 Personal Computer
- IBM 5160 Personal Computer XT
- IBM 5162 Personal Computer XT Model 286
- IBM 5170 Personal Computer AT
- IBM 8525 Personal System/2 Model 30
- IBM 8525 Personal System/2 Model 50
- IBM 8525 Personal System/2 Model 60
- IBM 8525 Personal System/2 Model 80
- COMPAQ DESKPRO 286 Personal Computer Model 40
- COMPAQ DESKPRO Model 2

Digital/IBM Communications Software

Standard keyboards supplied with the above PCs are supported. The DIGITAL LK250 is also supported on the IBM PC, IBM PC/XT and IBM PC/AT.

The following video adapters are supported:

- MDA (IBM Monochrome Display Adapter)
- CGA (IBM Color Graphics Adapter)
- EGA (IBM Enhanced Graphics Adapter)
- MCGA (IBM PS/2 Model 30 video hardware)
- VGA (IBM PS/2 Model 50, 60, 80 video hardware)

IBM Access requires a DECnet/SNA Gateway, which requires a VMS-based load host. ▲ **Refer to Software Product Description 30.15 for DECnet/SNA Gateway configuration details.**

Prerequisite Software

Operating system—one of the following depending on PC model:

- VAXmate Standalone Software
- IBM PC Disk Operating System
- COMPAQ MS-DOS

Digital layered products—one of the following:

- DECnet-DOS or DECnet/PCSA Client
- DECnet-VAXmate

MS-DOS 3270 Terminal Emulator Order Code

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license	QVVFA-UZ
8-pack license	QVVFA-U3
16-pack license	QVVFA-U4
32-pack license	QVVFA-U5
64-pack license	QVVFA-U6
128-pack license	QVVFA-U7
500-pack license	QVVFA-UB
Materials and Installation	
Distribution and documentation	QVVFA-H#
Software revision right-to-copy	QVVFA-HZ
U.S. Software Product Services	
Basic Service	QVVFA-8#
Self-Maintenance Service	QVVFA-3#
#Supported media (#): RX33 floppy diskette (7), RX31 floppy diskette (I), RX24 3.5-inch floppy diskette (B)	

DECnet/SNA VMS Remote Job Entry (RJE)

The DECnet/SNA VMS Remote Job Entry (RJE) access routine allows suitably configured VAX or MicroVAX systems to function as SNA/RJE workstations that can submit batch jobs to an IBM host and receive job output. The RJE access routine must reside on each VAX or MicroVAX system supporting RJE transmission. Note that access routines are not required for DECnet nodes that transmit files to a DECnet system for subsequent RJE processing, nor are they required for any routing nodes between the requesting VAX or MicroVAX system and the DECnet/SNA Gateway. The RJE access routine is available for use with both VMS/SNA and the DECnet/SNA Gateway products.

▲ Refer to Software Product Description 26.85 for further information.

DECnet/SNA VMS Remote Job Entry Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-453A*-AA
Cluster member ²	QL-453A*-AB
Initial license, primary and cluster ³	QL-453A*-CA
Monthly rental, single-use ³	QL-453A*-DA
Monthly rental, cluster ³	QL-453A*-DB
Software revision right-to-copy	QL-453A*-HZ
Materials and Installation	
Distribution and documentation	QA-453AA-H#
Documentation only	QA-453AA-GZ
Installation service	QT-453A*-I#
U.S. Software Services⁴	
DECsupport service	QT-453A*-9#
Basic service	QT-453A*-8#
Self-maintenance service	QT-453A*-3#

Supported processors (): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RX01 (Y), RX50 (3), TK50 (5), TU58 (G)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX I, VAXstation I, or VAX-11/725/730/782.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

DECnet/SNA Data Transfer Facility (DTF)

DECnet/SNA Data Transfer Facility (DTF) is a software product that provides bidirectional data transfer capabilities, initiated by either environment, between an IBM MVS system in a Systems Network Architecture (SNA) environment and one or more Digital nodes in a DECnet network. Digital nodes include VMS systems running DECnet-VAX, ULTRIX-32 systems running DECnet-ULTRIX, and MS-DOS systems running DECnet-DOS. Access between the cooperating Digital and IBM environments is via a DECnet/SNA Gateway or VMS/SNA software.

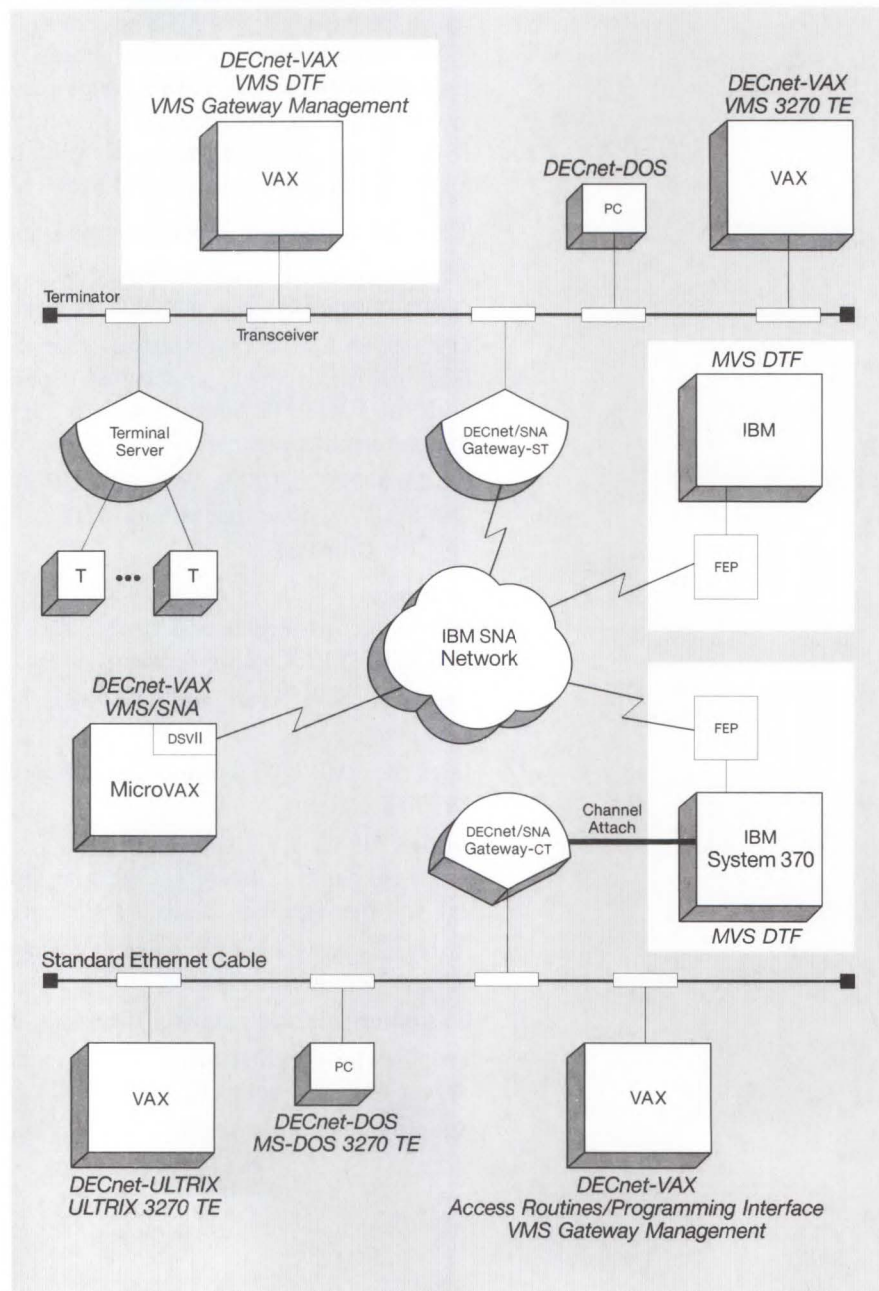
The DTF software comprises these components:

- DECnet/SNA DTF Server software that runs on a DECnet-VAX system to communicate between the DECnet nodes and the MVS/DTF system.
- DECnet/SNA MVS DTF software that runs on the IBM MVS system. MVS/DTF includes a VTAM application program to control the communications with the VMS/DTF Server nodes, a TSO command processor, and an ISPF dialog to initiate transfers from the IBM system.
- Optional DECnet/SNA VMS DTF Utilities software that runs on any DECnet-VAX node that is not a DTF server and needs to initiate recoverable file transfers.

Features

- Allows record-level access from VMS systems to MVS data sets via DATATRIEVE, RMS applications, or DCL commands.
- Provides create, read, and write facilities for IBM VSAM and non-VSAM data sets.
- Uses the VMS/DTF Server software via DECnet for all VMS, MS-DOS, and ULTRIX systems.
- Allows MS-DOS, ULTRIX, and VMS systems to initiate nonrecoverable, bidirectional file transfers. Optional VMS Utilities software provides recovery and management capabilities for other networked VMS systems.
- Provides recoverable file transfer for non-VSAM file types between the IBM MVS system and a VMS system.
- Customers maintain control over their corporate data.
- Provides password security through a proxy database on the VMS/DTF Server node for both Digital and IBM users.
- Supports standard user interfaces in Digital and IBM environments.

DTF Configuration



NBG-106-01

Prerequisite Hardware

A suitably configured VAX/VMS system that will act as the DTF server. ▲ Refer to the order code table for processors supported and to SPD 27.85 for Server and Utilities block-space requirements.

MVS/DTF is installed on an IBM System 370 class machine (including 43xx and 30xx). ▲ Refer to SPD 27.85 for more information.

Digital/IBM Communications Software

Prerequisite Software

For VMS/DTF Server and Utilities,

- VMS, V4.5–V4.7, or MicroVMS, V4.7 operating system. (For MicroVMS, both the Extended Base and Program Development components are required.)
- DECnet/VAX V4.7–V5.0

For ULTRIX and MS-DOS clients,

- ULTRIX V2.2 operating system
- DECnet-ULTRIX V2.2

For MS-DOS, DECnet-DOS V2.0–V2.1 operating system

Ordering Information

Order the following:

- A license for the VAX processor that will act as the server and a distribution and documentation kit (order codes Q*-VEBA*-.**))
- A license for the IBM MVS system and a software distribution kit delivered on 9-track 6250 bpi magtape (order codes QX101)
- As an option, a license for each VAX system that requires the VMS/DTF Utilities and at least one distribution and documentation kit (order codes Q*-VEKA*-.**)

DECnet/SNA VMS DTF Server and Utilities Order Codes

Option	Order Code	
	Server	Utilities
Licenses (A license is required for each CPU.)		
Single-use license ¹	QL-VEBA*-AA	QL-VEKA*-AA
VAXcluster license	QL-VEBA*-AB	QL-VEKA*-AB
Initial license, primary and cluster	QL-VEBA*-CA	QL-VEKA*-CA
Monthly rental, primary	QL-VEBA*-DA	QL-VEKA*-DA
Monthly rental, cluster	QL-VEBA*-DB	QL-VEKA*-DB
Software revision right-to-copy	QL-VEBA*-HZ	QL-VEKA*-HZ
Distribution and documentation	QA-VEBAA-H#	QL-VEKAA-H#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): RX33 (7), TK50 (5), 1,600 bpi magtape (M)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

DECnet/SNA MVS DTF Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license	QX101-UZ
Initial license	QX101-1P
Monthly rental	QX101-JP
Distribution and documentation	QX101-HA

**DECnet/SNA VMS DISOSS
Document Exchange Facility
(DDXF)**

The DECnet/SNA VMS DISOSS Document Exchange Facility (DDXF) access routine allows suitably configured VAX or MicroVAX systems to access both document distribution and library services provided by the IBM host supported Distributed Office Support System/370 (DISOSS/370). DDXF communicates with the DISOSS host system using the SNA Advanced Program-to-Program Communication (APPC/LU6.2) facility and the Document Interchange Architecture/Document Content Architecture (DIA/DCA) protocols.

DDXF accepts both final-form-text and revisable-form-text documents for transmission or reception. However, transform routines are provided for final-form-text documents only. Final-form-text documents are translated by DDXF to/from ASCII text after reception or prior to transmission of a document. This allows a VAX or MicroVAX user to perform minor revisions to a received document via a text editor such as EDT.

DDXF is available for use with both VMS/SNA and the DECnet/SNA Gateway products.

DECnet/SNA VMS DDXF Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license ¹	Q*042-UZ
VAXcluster license ²	Q*042-QZ
Initial license, primary and cluster ³	Q*042-1P
Periodic payment, primary ³	Q*042-JP
Periodic payment, cluster ³	Q*042-JZ
Materials and Installation	
Distribution and documentation	Q*042-H#
Software revision right-to-copy	Q*042-HZ
Documentation only	QL042-GZ
Installation service	Q*042-I#
U.S. Software Services⁴	
DECsupport service	Q*042-9#
Basic service	Q*042-8#
Self-maintenance service	Q*042-3#

Supported processors (): MicroVAX I (N); MicroVAX II (Z); VAXstation II (4); MicroVAX 2000 (3); VAXstation 2000 (8); MicroVAX 3500/3600 (0); VAXserver 3500/3600/3602 (1); VAXstation 3200/3500 (1); VAX-11/730 (C); VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8500/8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M)

#Supported media: 3, 5, G, M, Y

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For non-U.S. service agreements, consult a local Digital sales representative.

EDE with IBM DISOSS

The EDE with IBM DISOSS product provides VAX or MicroVAX users of ALL-IN-1 Office Menu software or DECdx/VMS access to the Document Library Services and Distribution Services of the IBM DISOSS/370 product running in an SNA environment. Both final-form-text and revisable-form-text are supported/transformed. Operation of EDE with IBM DISOSS is initiated through a simple menu interface, which can be added to the ALL-IN-1 Office Menu or invoked from the DCL system prompt when used with DECdx/VMS. Note: The DISOSS Document Exchange Facility (DDXF) access routine is a prerequisite product.

EDE with IBM DISOSS is available for use with both VMS/SNA and the DECnet/SNA Gateway products.

Digital/IBM Communications Software

EDE with IBM DISOSS Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license ¹	Q*761-UZ
VAXcluster license ²	Q*761-QZ
Initial license, primary and cluster ³	Q*761-1P
Periodic payment, primary ³	Q*761-JP
Periodic payment, cluster ³	Q*761-JZ
Materials and Installation	
Distribution and documentation	Q*761-H#
Software revision right-to-copy	Q*761-HZ
Documentation only	QL761-GZ
Installation service	Q*761-I#
U.S. Software Services⁴	
DECsupport service	Q*761-9#
Basic service	Q*761-8#
Self-maintenance service	Q*761-3#

Supported processors (): MicroVAX II (Z); MicroVAX 2000 (3); VAXstation 2000 (8); VAX-11/730 (C); VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8500/8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M)

#Supported media: 3, 5, G, M, Y

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For non-U.S. service agreements, consult a local Digital sales representative.

DECnet/SNA VMS Distributed Host Command Facility (DHCF)

The DECnet/SNA VMS Distributed Host Command Facility (DHCF) access routine allows IBM 3270-class displays connected to an IBM host running the HCF (Host Command Facility) program product in an SNA network to access VAX/VMS systems. The IBM system gains access to VAX/VMS systems through a DECnet/SNA Gateway product. This allows the IBM network manager to control both the IBM and Digital networks from an IBM display terminal. It allows IBM users to access Digital computers and perform VAX functions such as executing VMS commands, reading VAX mail, editing files, and monitoring and controlling VMS processors.

DHCF is available for use with the DECnet/SNA Gateway products only.

Digital/IBM Communications Software

DECnet/SNA VMS DHCf Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license ¹	Q*043-UZ
VAXcluster license ²	Q*043-QZ
Initial license, primary and cluster ³	Q*043-1P
Periodic payment, primary ³	Q*043-JP
Periodic payment, cluster ³	Q*043-JZ
Materials and Installation	
Distribution and documentation	Q*043-H#
Software revision right-to-copy	Q*043-HZ
Documentation only	QL043-GZ
Installation service	Q*043-I#
U.S. Software Services⁴	
DECsupport service	Q*043-9#
Basic service	Q*043-8#
Self-maintenance service	Q*043-3#

Supported processors (): MicroVAX II (Z); VAXstation II (4); MicroVAX 2000 (3); VAXstation 2000 (8); MicroVAX 3500/3600 (0); VAXserver 3500/3600/3602 (1); VAXstation 3200/3500 (1); VAX-11/730 (C); VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8500/8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M)

#Supported media: 3, 5, G, M, Y

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For non-U.S. service agreements, consult a local Digital sales representative.

DECnet/SNA VMS Printer Emulator (PrE)

The DECnet/SNA VMS Printer Emulator (PrE) access routine allows suitably configured VAX or MicroVAX systems to receive printable data from IBM host-based applications. These applications were originally developed to produce output for an IBM 3287 printer in system mode that is connected to an IBM 3274 cluster controller. Using PrE, either an IBM or Digital terminal user (in 3270 terminal emulation mode) can have a document printed at a Digital printer attached to a local VAX or MicroVAX system.

PrE is available for use with both VMS/SNA and the DECnet/SNA Gateway products. **▲ Refer to Software 26.70 for further information.**

Digital/IBM Communications Software

DECnet/SNA VMS PrE Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-044A*-AA
Cluster member ²	QL-044A*-AB
Initial license, primary and cluster ³	QL-044A*-CA
Monthly rental, single-use ³	QL-044A*-DA
Monthly rental, cluster ³	QL-044A*-DB
Software revision right-to-copy	QL-044A*-HZ
Materials and Installation	
Distribution and documentation	QA-044AA-H#
Documentation only	QA-044AA-GZ
Installation service	QT-044A*-I#
U.S. Software Services⁴	
DECsupport service	QT-044A*-9#
Basic service	QT-044A*-8#
Self-maintenance service	QT-044A*-3#

Supported processors (): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RX50 (3), TK50 (5), TU58 (G)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

DECnet/SNA VMS Application Programming Interface (API)

The DECnet/SNA VMS Application Programming Interface (API) supports many different types of sessions between VMS or MicroVMS applications and applications running in an IBM host through its support of Logical Unit Type 0 (LU0) sessions. This product can implement the path control, transmission control, and the data flow control layers of SNA for the VMS user. The API also provides extensive parameter checking, state machine management, and other high level services.

The DECnet/SNA VMS Application Programming Interface can be used in either basic or extended mode. Two sets of subroutines are provided with the product: the set for the basic mode supports VMS or MicroVMS application programs written with the V1.x product; the set for the extended mode provides users with an easier-to-use interface than earlier versions of the product.

API is available for use with both VMS/SNA and the DECnet/SNA Gateway products.

Digital/IBM Communications Software

DECnet/SNA VMS Application Programming Interface Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster	QL-455A*-AA
Cluster member	QL-455A*-AB
Initial license, primary and cluster	QL-455A*-CA
Monthly rental, single-use	QL-455A*-DA
Monthly rental, cluster	QL-455A*-DB
Software revision right-to-copy	QL-455A*-HZ
Materials and Installation	
Distribution and documentation	QA-455AA-H#
Documentation only	QA-455AA-GZ
Installation service	QT-455A*-I#
U.S. Software Services²	
DECsupport service	QT-455A*-9#
Basic service	QT-455A*-8#
Self-maintenance service	QT-455A*-3#
<p>*Supported processors (*): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/725/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)</p> <p>#Supported media (#): Magtape, 1,600 bpi (M), RX01 (Y), RX50 (3), TK50 (5), TU58 (G)</p> <p>¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.</p> <p>²For service agreements in other countries, consult a local Digital sales representative.</p>	

Digital/IBM Communications Software

DECnet/SNA VMS Advanced Program-to-Program Communication/LU6.2 Programming Interface (APPC)

The DECnet/SNA VMS Advanced Program-to-Program Communication/LU6.2 Programming Interface (APPC) allows program-to-program communications between transaction programs on an IBM host and those on a suitably configured VAX or MicroVAX system. The APPC product is a set of subroutines called by VMS programs acting as Logical Unit 6.2 (LU6.2) transaction application programs. Any of the VMS programming languages conforming to the VMS Calling Standard can be used to write VMS or MicroVMS programs that communicate with IBM applications running under IBM's CICS transaction subsystem. APPC implements both the basic and mapped conversation verb set of LU6.2, using additional parameters to implement the mapped verbs.

APPC is available for use with both VMS/SNA and the DECnet/SNA Gateway products. **▲ Refer to Software Product Description 26.88 for further information.**

DECnet/SNA VMS APPC/LU6.2 Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-022A*-AA
Cluster member ²	QL-022A*-AB
Initial license, primary and cluster ³	QL-022A*-CA
Monthly rental, single-use ³	QL-022A*-DA
Monthly rental, cluster ³	QL-022A*-DB
Software revision right-to-copy	QL-022A*-HZ
Materials and Installation	
Distribution and documentation	QA-022AA-H#
Documentation only	QA-022AA-GZ
Installation service	QT-022A*-I#
U.S. Software Services⁴	
DECsupport service	QT-022A*-9#
Basic service	QT-022A*-8#
Self-maintenance service	QT-022A*-3#

Supported processors (): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/725/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RX01 (Y), RX33 (7), RX50 (3), TK50 (5), TU58 (G)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

DECnet/SNA FLASH/IMS Programming Interface (FPI)

The DECnet/SNA FLASH/IMS Programming Interface (FPI) is a layered software package that enables high-level, task-to-task message exchange between cooperating VMS and IMS applications.

FPI facilitates creation of distributed applications where one component of the application runs on an IBM IMS system and another component runs on a VMS system. It is suitable for developing high-performance, realtime, and inquiry-response applications.

Layered on the DECnet/SNA VMS Application Programming Interface (API) software, the FPI software exists on the VMS system as a shareable subroutine library.

Features

- Provides mechanisms for applications to perform session level recovery in the event of communications failure, ensuring data integrity across sessions and prevents loss or duplication of messages.
- Supports asynchronous and synchronous calls as well as inbound/outbound session activation and multiple SNA sessions per user process.
- Has high-level callable interface conforms to VMS calling standard.
- Implements SLU-Type P protocol.
- Performs default translation between ASCII and EBCDIC.
- Allows user-definable translation tables.

Availability

This product is available in the United States only.

Prerequisite Hardware

- Any valid VAX or MicroVAX system configuration.
- Access between the cooperating Digital and IBM applications is via a DECnet/SNA Gateway or VMS/SNA software.

Prerequisite Software

- VMS or MicroVMS Operating System and DECnet/SNA VMS Application Programming Interface. ▲ Refer to Software Product Description 26.86.
- For IBM software, any valid IBM system which supports Digital's DECnet/SNA VMS Application Programming Interface. ▲ Refer to Software Product Description 26.86.

Ordering Information

For ordering information contact the local Digital sales office.

<i>FLASH/IMS Programming Interface Order Codes</i>	
Option	Order Code
FLASH/IMS Programming Interface includes single-use license, VAXcluster license, distribution and documentation, installation, orientation service, and support service.	QSTAM-SZ

Digital/IBM Communications Software

DECnet/SNA VMS 3270 Data Stream Programming Interface (3270 DS)

The DECnet/SNA VMS 3270 Data Stream Programming Interface (3270 DS) allows users to develop programs that use Logical Unit Type 2 (LU2) sessions to communicate with IBM application programs. This product can be used in either of two modes—Data Stream Mode or Field Mode. Data Stream Mode programs send and receive uninterpreted 3270 data streams, as defined by IBM. The VMS program interprets the incoming 3270 data stream and builds the data stream that returns to IBM applications. Field Mode programs interpret the incoming 3270 data stream to build a screen image, and produce the 3270 data screen to return to the IBM application from the updated image provided by the VMS application.

3270 DS is available for use with VMS/SNA and the DECnet/SNA Gateways. ▲ Refer to Software Product Description 26.87 for further information.

DECnet/SNA VMS 3270 DS Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-363A*-AA
Cluster member ²	QL-363A*-AB
Initial license, primary and cluster ³	QL-363A*-CA
Monthly rental, single-use ³	QL-363A*-DA
Monthly rental, cluster ³	QL-363A*-DB
Software revision right-to-copy	QL-363A*-HZ
Materials and Installation	
Distribution and documentation	QA-363AA-H#
Documentation only	QA-363AA-GZ
Installation service	QT-363A*-I#
U.S. Software Services⁴	
DECsupport service	QT-363A*-9#
Basic service	QT-363A*-8#
Self-maintenance service	QT-363A*-3#

Supported processors (): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/725/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media: magtape, 1,600 bpi (M), RX01 (Y), RX50 (3), TK50 (5)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/725/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

VAX/IBM Data Access (VIDA)

VAX/IBM Data Access (VIDA) is VMS-layered software that allows integration of data from IBM mainframe databases with VAX databases. VIDA conforms to a read-only subset of the Digital Standard Relational Interface (DSRI) architecture. VIDA users can access IBM data through products such as Datatrieve, the Rdb/VMS utilities and embedded Data Manipulation Language (DML), and other layered products which access data through DSRI.

VIDA uses Digital's VMS/SNA Gateway products to communicate with software from Cullinet Software, Inc., running on the IBM mainframe. The Cullinet software accesses the data from the IBM mainframe database, and sends it across an VMS/SNA Gateway to the VAX user's application software. The accessed data can also be stored in a VAX database or file. **▲ Refer to Software Product Description (SPD) 27.25 for detailed information about VIDA.**

Required Hardware

Digital hardware: Any valid VAX or MicroVAX system configuration and 802.3/Ethernet-based VMS/SNA Gateway. **▲ Refer to Software Product Description (SPD) 27.25 for individual system requirements.**

IBM hardware: Any valid IBM system which supports the required Cullinet Software and Digital's DECnet/SNA VMS 3270 Data Stream Programming Interface. **▲ Refer to SPD 26.87.**

Prerequisite Software

Digital software: VMS or MicroVMS Operating Systems and DECnet/SNA VMS 3270 Data Stream Programming Interface V1.1 or later.

IBM software: Any valid IBM system which supports the required Cullinet software and Digital's DECnet/SNA VMS 3270 Data Stream Programming Interface. **▲ Refer to SPD 26.87.**

Cullinet software: IDMS-DC/UCF, ICMS Version 10.0 and IDMS/R Version 10.0 with Information Database (IDB).

Digital/IBM Communications Software

VIDA Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-B12A*-AA
Cluster member ²	QL-B12A*-AB
Initial license, primary and cluster ³	QL-B12A*-CA
Monthly rental, single-use ³	QL-B12A*-DA
Monthly rental, cluster ³	QL-B12A*-DB
Software revision right-to-copy	QL-B12A*-HZ
Materials and Installation	
Distribution and documentation	QA-B12AA-H#
Documentation only	QA-B12AA-GZ
Installation service	QT-B12A*-I#
U.S. Software Services⁴	
DECsupport service	QT-B12A*-9#
Basic service	QT-B12A*-8#
Self-maintenance service	QT-B12A*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RX33 (7), TK50 (5)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/725/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

Binary Synchronous Communications Protocol Emulators

The communications used in this group of products is a subset of IBM's Binary Synchronous Communications (BSC) protocol. Access to an IBM host system can be either via batch or interactive methods. Horizontal format control records can be received and processed. A subset of vertical format control escape sequences is supported, specifically single, double, and triple space, form feed, and space suppress. In most cases, any block-addressable storage device supported by the Digital system can be used as a source of transmission files with fixed length (80-character card image), variable length transmitted as either EBCDIC (automatically translated from ASCII), or binary data (no translation). BSC control characters are automatically added to the data before transmission and stripped upon reception.

▲ Refer to Software Product Description 25.07 for more information.

VAX 2780/3780 Protocol Emulator

The VAX 2780/3780 Protocol Emulator supports the synchronous line protocol used by an IBM 2780 or 3780 Remote Batch Terminal. The emulator provides the VMS user with a mechanism for transferring data between the VMS operation system and another system equipped to handle 2780 or 3780 communications protocols.

The following IBM remote batch terminal features are supported:

- 2780 Extended and Multiple Record Option
- Variable Horizontal Forms Control
- BSC Transparency
- 3780 Space Compression

The VAX 2780/3780 Protocol Emulator can run up to four physical lines concurrently, each with a different set of attributes. For example, some lines may connect to 2780 terminals, others to 3780 terminals, at speeds up to 9.6 Kb/s per line (4.8 Kb/s for MicroVAX II).

Features

- Can be invoked interactively or by a VMS command procedure.
- Command set designed to facilitate sharing a communication line among several users to reduce network costs.
- With the appropriate modem options, the emulator can automatically answer incoming calls.
- Using a combination of command procedures, the emulator can operate unattended and is capable of
 - detecting an incoming call.
 - establishing the connection.
 - transmitting and receiving files.
 - recovering from transmission failures.

Prerequisite Hardware

One of the following:

- A MicroVAX or VAXstation system with DPV11 communications interface. ▲ **Refer to the order code table for a list of supported processors.**
- A VAX-11/700 system (except VAX-11/725 with a DUP11 or DMF32 communications interface; or a VAX-11/725 with a DMF32 communications interface. The VAX-11/730 requires an R80/RL02 configuration.
- A VAX 8000 series system with a DUP11, DMF32, or DMB32 communications interface. ▲ **Refer to the order code table for a list of supported processors.**

Optional Hardware

- For MicroVAX or VAXstation, up to two additional DPV11 communications interfaces
- For VAX-11/780, VAX-11/782, VAX-11/785, VAX 8600, or VAX 8650, up to three additional DUP11 or DMF32 communications interfaces
- For VAX-11/750, one additional DUP11 or DMF32 communications interface
- For VAX 8200 or VAX 8300, one additional DMF32 or DMB32 communications interface
- For VAX 8530, VAX 8550, VAX 8700, or VAX 8800, up to three additional DUP11, DMF32, or DMB32 communications interfaces

Prerequisite Software

- For MicroVAX and VAXstation systems, MicroVMS with Extended Base component and Program Development component
- For VAX systems, VMS and, if using the DMB32, the DMB32 Synchronous Device Driver

VAX 2780/3780 Protocol Emulator Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license ¹	Q*111-UZ
VAXcluster license ²	Q*111-QZ
Initial license, primary & cluster ³	Q*111-1P
Periodic payment, primary ³	Q*111-JP
Periodic payment, cluster ³	Q*111-JZ
Materials and Installation	
Distribution and documentation	Q*111-H#
Software revision right-to-copy	Q*111-HZ
Documentation only	QL111-GZ
Installation service	Q*111-I#
U.S. Software Services⁴	
DECsupport service	Q*111-9#
Basic service	Q*111-8#
Self-maintenance service	Q*111-3#

Supported processors (): MicroVAX I (N); MicroVAX II (Z); VAXstation II (4); MicroVAX 3500/3600 (0); VAXserver 3500/3600/3602 (1); VAXstation 3200/3500 (1); VAX-11/725/730 (C); VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M)

#Supported media: 3, 5, G, M, Y

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For non-U.S. service agreements, consult a local Digital sales representative.

VAX 3271 Protocol Emulator

VAX 3271 Protocol Emulator enables VT100 users (or users with Digital terminals or personal computers that emulate the VT100) on a VMS system to communicate interactively with application programs running on an IBM System 370 class host. The 3271 Protocol Emulator can run with IMS/VS, CICS/VS, or TSO, and allows users to implement applications performing remote, online access to IBM databases for data entry, retrieval and update. This capability is an especially efficient migration tool in the transition phase for users who are implementing distributed processing by moving applications from centralized mainframes to VAX distributed processors. The application program interface provides a base for distributed applications where one component of the application runs on an IBM system and the other on a VAX. This type of application is useful in situations such as on-line access and update of a mainframe database in response to an event in the VAX. ▲ **Refer to Software Product Description 25.21 for detailed information.**

Features

- Manages the modems and line protocols and provides an easy-to-use interface.
- The application program support interface provides on-line access to a mainframe database.
- Executes the WRITE, GENERAL POLL, and SPECIFIC POLL command sequences.
- Allows the system manager to control and monitor the activity of the emulator.
- The 3270 Terminal Emulation utility causes a screen display transmitted from the IBM system to be displayed on the Digital terminal in a fashion similar to the display on a 3270, and maps the Digital terminal keyboard to simulate the 3270 keyboard.

Prerequisite Hardware

One of the following:

- A MicroVAX or VAXstation system with DPV11 communications interface. ▲ **Refer to the order code table for a list of supported processors.**
- A VAX-11/700 system (except VAX-11/725) with a DUP11 or DMF32 communications interface, or a VAX-11/725 with a DMF32 communications interface. The VAX-11/730 requires an R80/RL02 configuration.
- A VAX 8000 series system with a DUP11 or DMF32 communications interface. ▲ **Refer to the order code table for a list of supported processors.**

Digital/IBM Communications Software

Optional Hardware

- For MicroVAX or VAXstation, up to two additional DPV11 communications interfaces
- For VAX-11/780, VAX-11/782, VAX-11/785, VAX 8600, or VAX 8650, up to three additional DUP11 or DMF32 communications interfaces
- For VAX-11/750, one additional DUP11 or DMF32 communications interface
- For VAX 82xx or VAX 83xx, one additional DMF32 communications interface
- For VAX 8530, VAX 8550, VAX 87xx, or VAX 88xx, up to three additional DUP11 or DMF32 communications interfaces

Prerequisite Software

- For MicroVAX I, MicroVAX II, and VAXstation II systems, MicroVMS with Extended Base component and Program Development component
- For VAX systems, VMS operating system

Digital/IBM Communications Software

VAX 3271 Protocol Emulator Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-112A*-AA
Cluster member ²	QL-112A*-AB
Initial license, primary and cluster ³	QL-112A*-CA
Monthly rental, single-use ³	QL-112A*-DA
Monthly rental, cluster ³	QL-112A*-DB
Software revision right-to-copy	QL-112A*-HZ
Materials and Installation	
Distribution and documentation	QA-112AA-H#
Documentation only	QA-112AA-GZ
Installation service	QT-112A*-I#
U.S. Software Services⁴	
DECsupport service	QT-112A*-9#
Basic service	QT-112A*-8#
Self-maintenance service	QT-112A*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAX-11/725/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8840/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RX01 (Y), RX50 (3), TU58 (G)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/725/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

RSX-11 2780/3780 Emulator

The RSX-11 2780/3780 software emulates the communications protocol of an IBM 2780 or 3780 data communications terminal while running as a user task on a suitably configured RSX-11M or RSX-11M-PLUS system. This product is not designed to run on RSX-11S systems.

The RSX-11 2780/3780 Emulator appears as an IBM 2780 or 3780 data transmission terminal on point-to-point switched or nonswitched communications line operating with standard 2780/3780 protocol.

This product can transmit and receive data and job control files with an IBM System/370 class host system running batch subsystems such as POWER, HASP, RES, JES2, or JES3. RSX-11 2780/3780 software will transmit files from or store received files on any file-structured device accessible through the RSX-11M or RSX-11M-PLUS File Control Services (FCS) except DECtape or TU58.

On a mapped system the RSX-11 2780/3780 Emulator also supports a spooling feature that allows users to queue one or more files for subsequent transmission or printing.

Digital/IBM Communications Software

Users running the RSX-11 2780/3780 Emulator on an unmapped system are limited to one-line support, 2780 emulation, and attended mode.

▲ Refer to Software Product Description 10.01 for further information.

Features

- Transmission from disk storage devices.
- Capable of queuing transmission request in unattended operation.
- Maximum transmit and receive block size of 400 characters in 2780 mode, 512 characters in 3780 mode.
- Maximum transmit and receive record size of 144 characters.
- Handles up to seven records per block in 2780 mode and up to 256 records per block in 3780 mode.
- Supports vertical and horizontal print format control.
- Supports binary or EBCDIC transmission.
- Selectable EBCDIC-to-ASCII conversion on Receive.
- Space Compression/Expansion in 3780 mode.
- Concurrent operation with application programs.
- Automatic retry of unattended mode transmissions.
- Error log recording and loopback facilities.
- Supports up to four lines concurrently.
- Supports line speeds up to 9,600 bits per second half duplex, although CPU utilization on small RSX-11M systems will make support of more than two lines running at 9,600 bits per second impractical.

Prerequisite Hardware

RSX-11M or RSX-11M-PLUS system configuration with

- At least an additional 16 Kwords of memory available for this product (10 Kwords for unmapped systems). Requirements vary with option and configuration; see product documentation for exact requirements.
- One DU11, DUP11, DUV11, or DPV11 synchronous line interface per line.

Prerequisite Software

One of the following operating systems:

- RSX-11M operating system
- RSX-11M-PLUS operating system

RSX-11 2780/3780 Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license	QJD82-UZ
Materials and Installation	
Distribution and documentation	QJD82-HD QJD82-HH QJD82-HM QJD82-HQ QJD82-HT QJD82-HV
Software revision right-to-copy	QJD82-HZ
Sources	
Source listings and source distribution	QJD82-ED QJD82-EM
Source license and source listings	QJD82-FR
Source distribution	QJD82-ND QJD82-NM

Micro/RSX 2780/3780 Emulator

The Micro/RSX 2780/3780 Emulator is a layered software product that extends the ability to communicate with IBM systems using Binary Synchronous Communications (BSC) protocols in both a batch and interactive manner.

Micro/RSX 2780/3780 emulates the communications protocol of an IBM 2780 or 3780 remote batch terminal. Data may be transferred between the Micro/RSX system and the IBM system that supports the IBM 2780 or 3780 protocol.

▲ Refer to Software Product Description 18.32 for further information.

Prerequisite Hardware

- Any system with 512 Kbytes of memory
- One DPV11 synchronous communications device (Note: Maximum line speed is between 2400 and 4800 b/s.)

Prerequisite Software

Micro/RSX V3.0

Follow the guidelines described in the Software Product Description regarding prerequisite support and customer responsibility for installing this product.

Micro/RSX 2780/3780 Emulator Order Code

Option	Order Code
Single-use license with limited warranty, documentation, binaries on RX50. (A license is required for each CPU.)	QYD82-UZ

RSX-11/3271 Protocol Emulator

RSX-11/3271 Protocol Emulator (PE) enables VT100 or VT200 users on an RSX-11M or RSX-11M-PLUS system to communicate interactively with application programs running on an IBM System 370 class host. The 3271 PE can run with IMS/VS, CICS/VS, or TSO. The protocol emulator makes it possible to implement applications performing remote, online access to IBM databases for data entry, retrieval and update.

This capability is an especially efficient migration tool in the transition phase for users who are implementing distributed processing by moving applications from centralized mainframes to PDP-11 distributed processors. The RSX-11/3271 PE allows users to access the applications that remain on mainframes through their local PDP-11 systems.

The application program interface provides a base for distributed applications where one component of the application runs an IBM system and the other a PDP-11. This type of application is useful in situations such as online access and update of a mainframe database in response to an event in the PDP-11, or where it is inappropriate to present a 3270-style formatted screen to a user who is accustomed to RSX-11 style screens.

▲ Refer to Software Product Description 10.88 for further information.

Prerequisite Hardware

RSX-11M or RSX-11M-PLUS system configuration with

- Synchronous interface: either a DV11, a DUP11, or a DUV11.
- Additional memory available for the RSX-11/3271 Protocol Emulator Application Interface:
 - 16 Kbytes for the first or only 3270 controller emulated by the application interface (i.e., for the first or only synchronous line).
 - 2 Kbytes for each synchronous line after the first.
 - 1.2 Kbytes of pool for the protocol emulator and approximately 60 bytes of pool for each application task supported.
- Installation requires approximately 4,800 blocks of disk space; approximately 2,800 are required for generation.

Prerequisite Software

RSX-11M or an RSX-11M-PLUS operating system

Features

- Manages the modems and line protocols and provides an easy-to-use interface so that the application programmer does not have to be knowledgeable about communications.
- The application program support interface provides online access to a mainframe database.
- Executes the WRITE, GENERAL POLL, and SPECIFIC POLL command sequences.
- Allows the system manager to control and monitor the activity of the emulator.
- The 3270 Terminal Emulation utility causes a screen display transmitted from the IBM system to be displayed on the VT100 in a fashion similar to the display on a 3270, and maps the VT100 keyboard to simulate the 3270 keyboard.

Digital/IBM Communications Software

- The hardware is microprocessor driven providing Direct Memory Access (DMA) for the DUP11 synchronous line adapter on PDP-11 UNIBUS configurations. The DMA ability reduces the CPU overhead associated with the transmission and reception of messages compared to a character interrupt method which interrupts the CPU for each character as it is received.

The terminal emulator portion of the RSX-11/3271 Protocol Emulator supports the following features of the 3277 Model 2 terminal:

- 1,920-character screen
- Upper/lowercase, numeric, and special symbol characters
- Field attribute characters, protected and unprotected fields
- Tab stop
- Overstrike and insert mode
- Reverse video and intensified display (both requiring the VT100 Advanced Video Option), display or nondisplay characters

RSX-11/3271 Protocol Emulator Order Codes

Option	Order Code	
Licenses (A license is required for each CPU.)	RSX-11M	RSX-11M-PLUS
Single-use license	QJD76-UZ	QJD84-UZ
Materials		
Distribution and documentation	QJD76-HD QJD76-HH QJD76-HM QJD76-HQ QJD76-HT QJD76-HV	QJD84-HD QJD84-HH QJD84-HM QJD84-HV
Software revision right-to-copy	QJD76-HZ	QJD84-HZ
Documentation only	QJD76-GZ	QJD84-GZ
Sources		
Source license and sources	QJD76-ED	QJD84-ED
Distribution	QJD76-EM	QJD84-EM
Source license and source listings	QJD76-FR	QJD84-FR
Source distribution	QJD76-ND QJD76-NM	QJD84-ND QJD84-NM

Micro/RSX 3271 Protocol Emulator

The Micro/RSX 3271 PE is a layered software product that enables supported Digital terminals and application programs to interact with IBM system application programs and system services that use the Binary Synchronous Communications (BSC) line discipline. Digital terminal users access the 3270 Terminal Emulator which is part of the Micro/RSX 3271 PE distribution; application programmers use an application program interface (API) provided as part of the Micro/RSX 3271 PE product.

▲ Refer to Software Product Description 18.33 for further information.

Prerequisite Hardware

- Any system with 512 Kbytes of memory
- One DPV11 synchronous communications device.

Note: Maximum line speed supported is between 2400 and 4800 b/s.

Prerequisite Software

Micro/RSX V3.0

Follow the guidelines described in the Software Product Description regarding prerequisite support and the customer's responsibility for installation of this product.

Micro/RSX 3271 Protocol Emulator Order Code

Option	Order Code
Single-use license with limited warranty, documentation, binaries on RX50. (A license is required for each CPU.)	QYD84-UZ

RSX-11M/RSX-11M-PLUS RJE/HASP Emulator

The RSX-11M/RSX-11M-PLUS RJE/HASP Emulator is a software package that performs the standard functions of an IBM HASP Remote Job Entry Workstation. It operates as a set of tasks under the RSX-11M-PLUS operating system.

The emulator provides multileaved (pseudosimultaneous, bidirectional) communication of up to seven input and seven output data streams. The number of input and output streams accommodated by the emulator is fixed at assembly time. The operator can assign operating supported devices to data streams on a per-file or temporarily dedicated basis.

Features

- Data compression of repeated sequential characters including blanks
- Full EBCDIC transparency
- Multileaving
- Printer vertical forms control skip to channel 1 (top of form) is supported (No other vertical forms control is supported.)

Digital/IBM Communications Software

Prerequisite Hardware

- PDP-11/44 or PDP-11/70 with at least 128 Kwords of memory configured to support RSX-11M-PLUS
- A KG11-A communications arithmetic unit
- A tape drive capable of reading the distribution media
- At least 14 Kwords of memory allocated for RSX-11M-PLUS RJE/HASP operation with one input and two output streams
- 600 words of memory required for each additional stream with File Control Services (FCS)
- One of the following synchronous communications line controllers: DP11, DU11, or DUP11 for line speeds up to 4,800 bits per second
- One of the following Bell System modems or a modem that is exactly equivalent:
 - 201A 2.0 Kb/s dialup
 - 201B 2.4 Kb/s private line
 - 201C 2.4 Kb/s dialup
 - 208A 4.8 Kb/s private line
 - 208B 4.8 Kb/s dialup
 - 209A 9.6 Kb/s private line
 - 19.2 Kb/s current Bell

▲ For host system compatibility, consult Software Product Description 10.48.

Prerequisite Software

RSX-11-PLUS operating system

RSX-11M/RSX-11M-PLUS RJE/HASP Order Codes

Option	Order Code
License Options (A license is required for each CPU.)	
Single-use license only	QJS62-DZ
Sources, services	QJS62-XD QJS62-XM
Sources, NINS services	QJS62-YD QJS62-YM
Sources, no services, update	QJS63-YD QJS63-YM
Documentation only	QJS62-GZ

VMS/ULTRIX Connection

The VMS/ULTRIX Connection, a VMS layered software product, provides a bridge between VMS servers and ULTRIX clients without modifying the syntax or semantics of either operating system. The VMS/ULTRIX Connection supports Internet networking protocols and a network file system (NFS) server on VMS. The protocols are

- Transmission Control Protocol (TCP).
- Internet Protocol (IP).
- User Datagram Protocol (UDP).
- Internet Control Message Protocol (ICMP).
- Address Resolution Protocol (ARP).
- File Transfer Protocol (FTP).

The VMS/ULTRIX Connection also provides a QIO (Queued Input/Output) programming interface so VMS users can write applications to access the lower-level protocols. Users can write networking applications in any VAX language using the standard ASSIGN, DASSGN, and QIO system services.

The Network File System (NFS) server provides UNIX-based clients with transparent access to remote file systems. The NFS server promotes data sharing between clients by providing a central data storage facility for VMS and UNIX file systems.

▲ Refer to Software Product Description (SPD) 25.A4 for further information.

Features

- Customers can connect VMS and ULTRIX systems with UNIX-based systems from other vendors using industry-standard protocols for communication.
- Users can write network applications that access the Internet Networking Protocols using standard VMS services.
- UNIX-based clients can access VMS and UNIX-compatible files stored on a remote VMS-based system or VAXcluster system.
- VMS system managers can manage Internet communications and the FS server without a detailed knowledge of UNIX networking.

Hardware Requirements

Refer to the order code table for processor support. At least one Ethernet controller is required. **▲ Refer to SPD 25.A4 for more information.**

Note: The VMS/ULTRIX Connection can share the same Ethernet interface with other Digital protocols such as DECnet-VAX.

Software Requirements

For the VMS server, VMS V4.7 or later, or MicroVMS V4.7

For UNIX-based clients, any UNIX-based system which supports NFS V2.0 protocol specifications and the networking protocols specified by the the Defense Data Network RFCs.

Digital/UNIX Communications Software

VMS/ULTRIX Connection Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-VHRA*-AA
Cluster member ²	QL-VHRA*-AB
Initial license, primary and cluster ³	QL-VHRA*-CA
Monthly rental, single-use ³	QL-VHRA*-DA
Monthly rental, cluster ³	QL-VHRA*-DB
Software revision right-to-copy	QL-VHRA*-HZ
Materials and Installation	
Distribution and documentation	QA-VHRAA-H#
Documentation only	QA-VHRAA-GZ
Installation service	QT-VHRA*-I#
U.S. Software Services⁴	
DECsupport service	QT-VHRA*-9#
Basic service	QT-VHRA*-8#
Self-maintenance service	QT-VHRA*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): RX33 (7), TK50 (5), TU58 (G), RL02 (H), 1,600 bpi magtape (M), RX01 (Y)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/725/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

FUSION TCP/IP

FUSION TCP/IP, developed by Network Research Corporation and distributed by Digital through the Digital Distributed Software (DDS) program, is a communications package that provides full VMS communications services to other vendors' systems that support the Transmission Control Protocol/Internet Protocol (TCP/IP) suite.

▲ Refer to Software Product Description 29.81 for further information.

Digital/UNIX Communications Software

Features

- Supports TCP/IP communications services over any Digital 802.3/Ethernet communications controllers. The shared version can share an 802.3/Ethernet communications controller simultaneously with DECnet.
- Provides three standard application-level utility services for VMS users:
 - File Transfer: The File Transfer Protocol (FTP) permits the transfer of both text and binary files between network hosts.
 - Electronic Mail: The Simple Mail Transfer Protocol (SMTP) allows users to send and receive mail over the network.
 - Virtual Terminal: The TELNET protocol allows a user to log into a remote system and utilize the resources of the remote host.
- Supports the following protocols: IP, TCP, UDP, ICMP, ARP, and TFTP.

Availability

This product is available worldwide.

Prerequisite Hardware

Any valid VAX system with a Digital 802.3/Ethernet communications controller

Prerequisite Software

VMS, V4.3 or later

Ordering Information

Special pricing is available for qualified educational institutions.

Option	Order Code
FUSION TCP/IP, includes license, media, and documentation	Q*ZDN-C#
FUSION TCP/IP Shared, includes license, media, and documentation	Q*ZDQ-C#
Supported processors (): MicroVAX I (N); VAXstation I (Q); MicroVAX II (Z); VAXstation II (4); MicroVAX 2000 (3); VAXstation 2000 (8); MicroVAX 3500/3600 (0); VAXserver 3500/3600/3602 (1); VAXstation 3200/3500 (1); VAX-11/725/730 (C); VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M)	
#Supported media: 5, M	

WIN/TCP and WIN/TCP-DDN

WIN/TCP and WIN/TCP-DDN, developed by the Wollongong Group and distributed by Digital through the Digital Distributed Software (DDS) program, allow VMS systems to fully communicate with systems that support the Transmission Control Protocol/Internet Protocol (TCP/IP).

Features

- WIN/TCP supports TCP/IP communications services over any Digital 802.3/Ethernet communications controller. WIN/TCP-DDN supports connection to the various Defense Data Networks, ARPANET, MILNET, or DISNET through X.25 communications interfaces supplied by Advanced Computer Communications.
- WIN/TCP is based on the most recent specifications for TCP/IP and is compatible with BSD 4.3 UNIX.

Digital/UNIX Communications Software

- Provides three standard application-level utility services for VMS users:
 - File Transfer: The File Transfer Protocol (FTP) permits the transfer of both text and binary files between network hosts
 - Electronic Mail: The Simple Mail Transfer Protocol (SMTP) allows users to send and receive mail over the network using standard VMS mail facilities.
 - Virtual Terminal: The TELNET protocol allows a user to log into a remote system and utilize the resources of the remote host.
- WIN/TCP and WIN/TCP-DDN support the following protocols: IP, TCP, UDP, ICMP, EGP, ARP.

Availability

This product is available in North America only.

Prerequisite Hardware

For WIN/TCP, any valid VAX system with a valid 802.3/Ethernet communications controller.

For WIN/TCP-DDN, any valid VAX system with a DDN X.25 interface from Advanced Computer Communications.

Prerequisite Software

VMS, V4.3 or later

Optional Software

WIN/TCP-DDN Ethernet option adds support for 802.3/Ethernet communications to WIN/TCP-DDN.

WIN/TCP DDN option adds support for DDN X.25 interfaces to WIN/TCP.

Ordering Information

Special pricing is available for qualified educational institutions.

Option	Order Code
WIN/TCP, includes license, media, and documentation	A*ZNJ-C#
WIN/TCP-DDN option, includes license, media, and documentation	Q*ZNM-C#
WIN/TCP-DDN, includes license, media, and documentation	Q*ZNH-C#
WIN/TCP-DDN Ethernet option, includes license, media, and documentation	Q*ZNL-C#

Supported processors (): MicroVAX II (Z); VAXstation II (4); MicroVAX 2000 (3); VAXstation 2000 (8); MicroVAX 3500/3600 (0); VAXserver 3500/3600/3602 (1); VAXstation 3200/3500 (1); VAX-11/730 (C); VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M)

#Supported media: 5, M

TCP/IP

TCP/IP is a software communications product developed by the Wollongong Group and available through Digital's Distributed Software (DDS) program. TCP/IP software under VMS or MicroVMS contains the network protocols required in exchanging messages between various systems connected to a TCP/IP network. The package supports various hardware interfaces to the following networks: Arpanet, 802.3/Ethernet, MILNET, Defense Data Network (DDN), Point-to-Point Networks, custom-designed networks. The DEUNA and DEQNA Ethernet controllers are supported and can be shared by the TCP/IP package, DECnet, and LAT (terminal server protocols). The DMC/DMR-11 is also supported. ▲ **Refer to Software Product Description 21.34 for further information.**

DECnet-ULTRIX as an Alternative Solution

TCP/IP is a suitable solution for a single VMS node in a large UNIX environment. However, DECnet-ULTRIX communicates between the VMS and ULTRIX environments using DECnet instead of the TCP/IP protocols. DECnet-ULTRIX bridges both environments by supporting the co-existence of the DECnet and TCP/IP protocols. Coexistence means that DECnet and TCP/IP can run together simultaneously (DECnet-ULTRIX systems use DECnet to communicate with other Phase III/IV systems in DECnet networks and TCP/IP is used to communicate with non-Digital systems in Internet networks. DECnet and TCP/IP can also share the same system resources such as the DEUNA and DEQNA Ethernet interfaces, and programs can be written in such a way that either of the lower-level protocols, NSP or TCP, can be used. In general, existing programs running over TCP/IP can be easily modified to run with DECnet. DECnet programs can run over TCP/IP, but only if they do not make use of operations that are specific to DECnet. This feature of co-existence allows a DECnet-ULTRIX system to act as a gateway between DECnet networks and Internet networks. ▲ **Refer to "DECnet Communications Software" in this section for a description of DECnet-ULTRIX.**

Digital/UNIX Communications Software

Features

The following application-level protocols are included in the TCP/IP package:

- SMTP—Simple Mail Transfer Protocol, which allows users to send and receive electronic mail
- FTP—File Transfer Protocol, which allows a user to transfer files between hosts
- TELNET—A protocol which allows a user to log on to a remote system over the network (virtual terminal)
- UDP—User Datagram Protocol, which allows an application program to send messages to other programs via the network (task-to-task communications)
- ICMP—Internet Control Message Protocol, which provides a method of sending messages concerning unusual network events

Availability

This product is currently not available in Europe.

TCP/IP Order Codes

Option	Order Code
TCP/IP (commercial)	QAX74-CM
TCP/IP (educational installations)	QAX75-CM
TCP/IP MicroVMS (commercial)	QAXX1-C3
TCP/IP MicroVMS (educational)	QAXX2-C3

EDE-W Document Exchange

EDE-W Document Exchange is a software application that utilizes the VAX 2780/3780 Protocol Emulator to give VAX users of ALL-IN-1 or DECdx/VMS the ability to send documents to a suitably equipped Wang OIS system. Wang OIS users can transfer documents to VAX system using Wang's telecommunications software, which includes Wang's equivalent 2780/3780 protocol emulator. Wang OIS systems can be connected to a VAX system either by dedicated lines or through dial-up connections.

Wang documents being transferred are first converted from Wang Word Processing System Code to EBCDIC code by the Wang software and then transferred to the VAX system. The VAX 2780/3780 Protocol Emulator receives the document from the Wang system and EDE-W transforms the document from the Wang format to DECdx format, then stores the converted documents in the user's DECdx or ALL-IN-1 filing cabinet. For transfers from the VAX system to the Wang OIS system, the process is reversed.

Operation of the EDE-W Document Exchange is initiated through an easy-to-use menu interface, which can be added to the ALL-IN-1 Office Menu, or, when used with DECdx/VMS, invoked from the DCL system prompt. The user interface for operating the document transfer functions are compatible with Digital standard user interface requirements for office products. Online help capability is included with the product.

▲ Refer to Software Product Description 26.37 for more information.

Prerequisite Hardware

Any valid VAX system. ▲ Refer to the order code table for a list of supported processors.

- UNIBUS VAX systems require a DUP11 or a DMF32. (The VAX-11/730 requires an RA80/RL02 configuration.)
- Q-bus MicroVAX systems require the DPV11.
- VAXBI systems require a DMB32 and V.24 adapter cable, or a VAXBI-to-UNIBUS adapter with DUP11 or DMF32.

Prerequisite Software

- ALL-IN-1 V2.1 or V2.2 DECdx V1.1
- VAX 2780/3780 Protocol Emulator V1.5 or V1.6 (DMB32 requires V1.6)
- VMS or MicroVMS, V4.4 to V4.6

Digital/Wang Communications Software

EDE-W Document Exchange Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license ¹	Q*760-UZ,-UA,-U3
VAXcluster license ²	Q*760-QZ
Initial license, primary & cluster ³	Q*760-1P,-1A,-13
Periodic payment, primary ³	Q*760-JP,-JA,-J3
Periodic payment, cluster ³	Q*760-JZ
Materials and Installation	
Distribution and documentation	Q*760-H#
Software revision right-to-copy	Q*760-HZ
Documentation only	QL760-GZ
Installation service	Q*760-I#
U.S. Software Services⁴	
DECsupport service	Q*760-9#
Basic service	Q*760-8#
Self-maintenance service	Q*760-3#

Supported processors (): MicroVAX II (Z); VAXstation II (4); VAX-11/730 (C); VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M); VAX 8974/8978 (2)

#Supported media: 3, 5, G, M, Y

¹License for VAX 8974 is -UA; for VAX 8978 is -U3. For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXstation, or VAX-11/730.

³Initial and periodic licenses for VAX 8974 are -1A and -JA; for VAX 8978 are -13 and -J3. Not available on MicroVAX, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For non-U.S. service agreements, consult a local Digital sales representative.

Overview

The fundamental technology used in data networks is called **packet switching**. With it, user data and the accompanying control information needed to ensure delivery are formed in discrete entities called **packets**. The network dynamically interweaves the packets of many users over shared transmission facilities and routes the packets to their destinations.

Packet-switched data networks (PSDNs) can be public or private. A **public PSDN** is the computer's analogy to the telephone: Once connected to the PSDN, calls can connect to any other number on that network, or to any number on another public PSDN that is cross-connected to it (for example, for international data communication). Calls can be normally or reverse-charged, and the customer pays a tariff related to time-of-day, number called, and duration and amount of data. The tariff structures vary considerably between public PSDNs, but the data charges are generally more significant than either time or distance factors.

Private PSDNs are owned and operated by one company or group of companies, for inter- rather than intra-company communications. Otherwise, they offer the same general features as their public counterparts.

Digital's Packetnet System Interface (P.S.I.) products extend the high-level DECnet functions of Digital's Network Architecture to computer systems communicating across PSDNs. The currently available products are

- **X25router 2000**
- **VAX P.S.I. and VAX P.S.I. Access**
- **RSX-11 P.S.I./M**
- **RSX-11 P.S.I./M-PLUS**

These interfaces allow suitably configured Digital systems to connect to packet-switched data networks that conform to the CCITT Recommendation X.25. (CCITT is the International Telephone and Telegraph Consultative Committee, an advisory committee established under the United Nations to recommend worldwide standards.) VAX P.S.I. also supports International Standards 7776 and 8208, which standardize the protocols described in the CCITT recommendations.

Features

Packet-switching networks offer a number of benefits to a customer looking for low-to-medium data communications rate to a reasonable number of remote locations, and in particular when the remote locations tend to be undefined. These benefits can include

- Reduced complexity of wiring—only one physical line can handle multiple calls simultaneously, to the same or different remote locations.
- The same network can handle computer-to-computer and terminal-to-computer traffic.
- The tariff is less than leased lines if the data rate to the remote site is relatively low.
- Because it is an internationally recognized protocol, X.25 can be used as a common carrier for multiple protocols, avoiding duplication of networks.
- A level of multivendor operation, especially when used to carry Open System Interconnection (OSI) protocols above the basic X.25 protocols.
- Simpler network management as a result of reduced proliferation of lines and protocols.

Applications

Applications where packet-switching communications technology is particularly suitable include

- Dial-in access to or from the general public.
- Any OSI applications such as electronic mail to customers or other third parties.

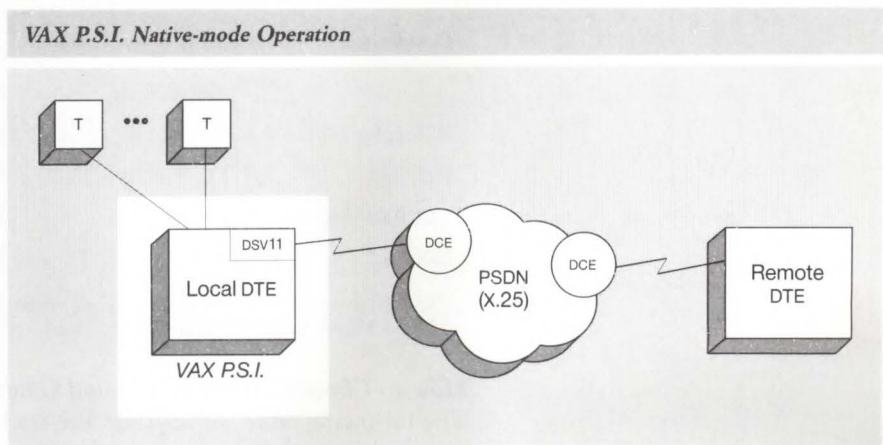
▲ For an introduction to packet switching networks and the user benefits associated with their use, refer to *Introduction to VAX P.S.I. (AA-LO67D-TE)* or *Introduction to RSX P.S.I. (AA-M369B-TC)* in the product documentation sets.

For connections to private networks other than those conforming to the ISO 7776/8208 standards, Digital requires that its P.S.I. software be specifically configured. Consult the local Digital sales representative for details.

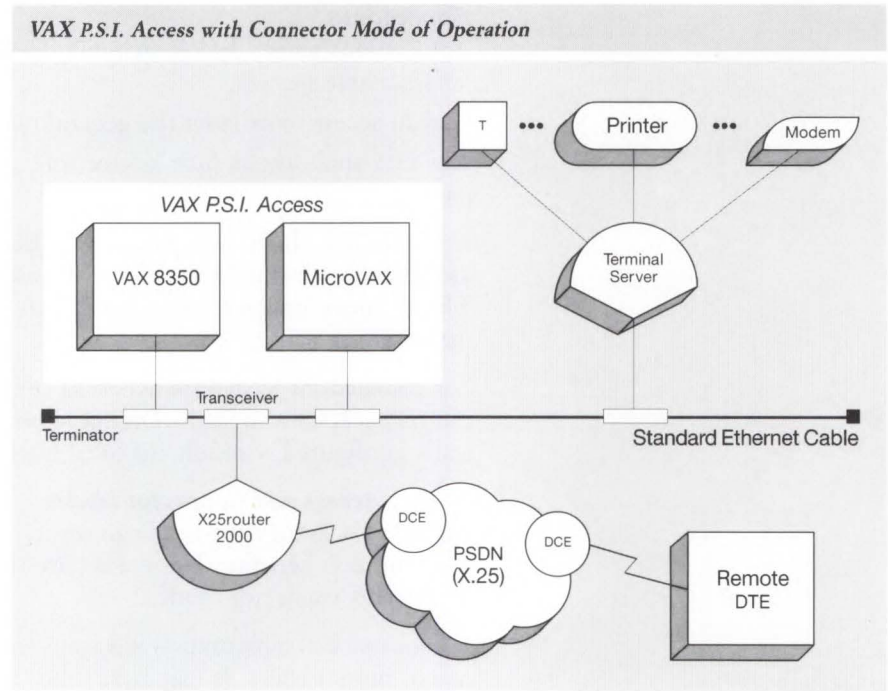
Native, Access and Connector Nodes

Digital's Packetnet products can act in three ways, each giving different configuration benefits. These ways are referred to as native mode, access mode, and connector mode.

A *native mode* configuration is a standalone CPU with direct connection to one or more PSDNs. It may have other DECnet connections, but the essential point is that all communications to or from any PSDN originate or terminate in that same CPU. The following figure shows VAX P.S.I. in native mode.



Access mode allows communications to take place to or from a PSDN that is not directly connected to that CPU. The PSDN is connected to another node, called a *connector node*, and the connector node communicates with the access node by DECnet (usually, but not necessarily, over an 802.3/Ethernet local area network). The following figure shows VAX P.S.I. Access in such a configuration.



NBG-149-00

The following table indicates the mode of the various Digital Packetnet products:

Comparison of Modes for Packetnet Products

	Native Mode	Access Mode	Connector Mode
X25router 2000	No	No	Yes
VAX P.S.I.	Yes	No ¹	Yes
VAX P.S.I. Access	No ¹	Yes	No ¹
RSX P.S.I.	Yes	No	No

¹VAX P.S.I. and VAX P.S.I. Access can be installed in the same system to provide combined Native, Connector, and Access facilities.

How to Choose between Host and Gateway X.25 Connections

The following table summarizes the trade-offs and benefits of the two approaches to X.25 communications in an 802.3/Ethernet environment: direct connection between a PSDN and the system that needs to access it; and indirect connection using access and connector modes.

<i>Comparison of Direct and Connector Packetnet Connection</i>		
	Direct Connection	Connector Connection
Cost of connections	One per system	One shared between all systems on 802.3/Ethernet LAN
Cost of devices	One set per system; may be limited in speed due to cost factors	Shared devices on the connector node(s); possible to use fewer, higher-speed lines
Technology Considerations	Specific to each system concerned; may need to change if processor types change	Specific to the connector node only; no change needed if other processors change
DECnet communication	Requires a DECnet full-function license per system	Handled entirely in one connector node; only end-node licenses needed elsewhere
X.25 or X.29 communication	Uses VAX or RSX P.S.I. on all connected nodes	Uses P.S.I. Access on all other nodes
	No user differences in X.25/X.29 application interfaces/code; applications are portable between (VAX) P.S.I. and P.S.I Access nodes	
CPU overhead: routing DECnet (DLM) data traffic	Can be significant on the directly-connected nodes	Handled entirely in the connector node
CPU overhead: X.25 task-to-task and X.29 terminal traffic	Optimal when using direct memory access (DMA) devices	Sometimes higher on access nodes due to DECnet overhead

The benefits of using the gateway or connector increase when a high portion of the PSDN traffic is DECnet; the benefits of using direct connection increase when a high proportion of the PSDN traffic is task-to-task X.25 or X.29 terminal traffic. A combination of direct connections and connector nodes may sometimes be best.

If an access/connector solution is indicated, the following table shows the benefits of choosing between different connector nodes, that is, VAX P.S.I. in multihost mode and the X25router 2000.

Comparison of Host and X.25 Gateway Connections

	VAX P.S.I. Multihost	X25router 2000
Type of solution	Existing VMS system may be used	Dedicated server on the 802.3/Ethernet
Technology	General-purpose system	Specific hardware
Public PSDNs supported	Many	Many
Number of lines and line speeds	Not limited, but depends on system used	Four lines @ 64 Kb/s or two lines @ 256 Kb/s
DECnet communication	Requires DECnet full-function license	Handled entirely in the Gateway node
	Supports Level 1 (local) or Level 2 (area) routing	Supports Level 1 (local) or Level 2 (area) routing
	DDCMP lines require extra devices	Supports up to 4 DDCMP lines
CPU overhead in the access nodes	No difference between the two solutions.	
CPU overhead in the gateway node	Can be significant, depending on the VAX system	Puts the CPU load on the gateway rather than on a VAX
Load host	Not required	Must be a VAX/VMS system

Multivendor Aspects

Because many networks contain non-Digital systems, Digital fully supports the concept of cooperative computing via the Packetnet family of products. These products provide extended X.25 capabilities including communications with non-Digital hosts and asynchronous terminals connected to the X.25 network. Note that when X.25 is used as the data link protocol between Digital systems and non-Digital systems, all upper-level software (such as file transfer protocols) must be written by the user, or purchased separately (for example, the VOTS product from Digital for OSI multivendor communications).

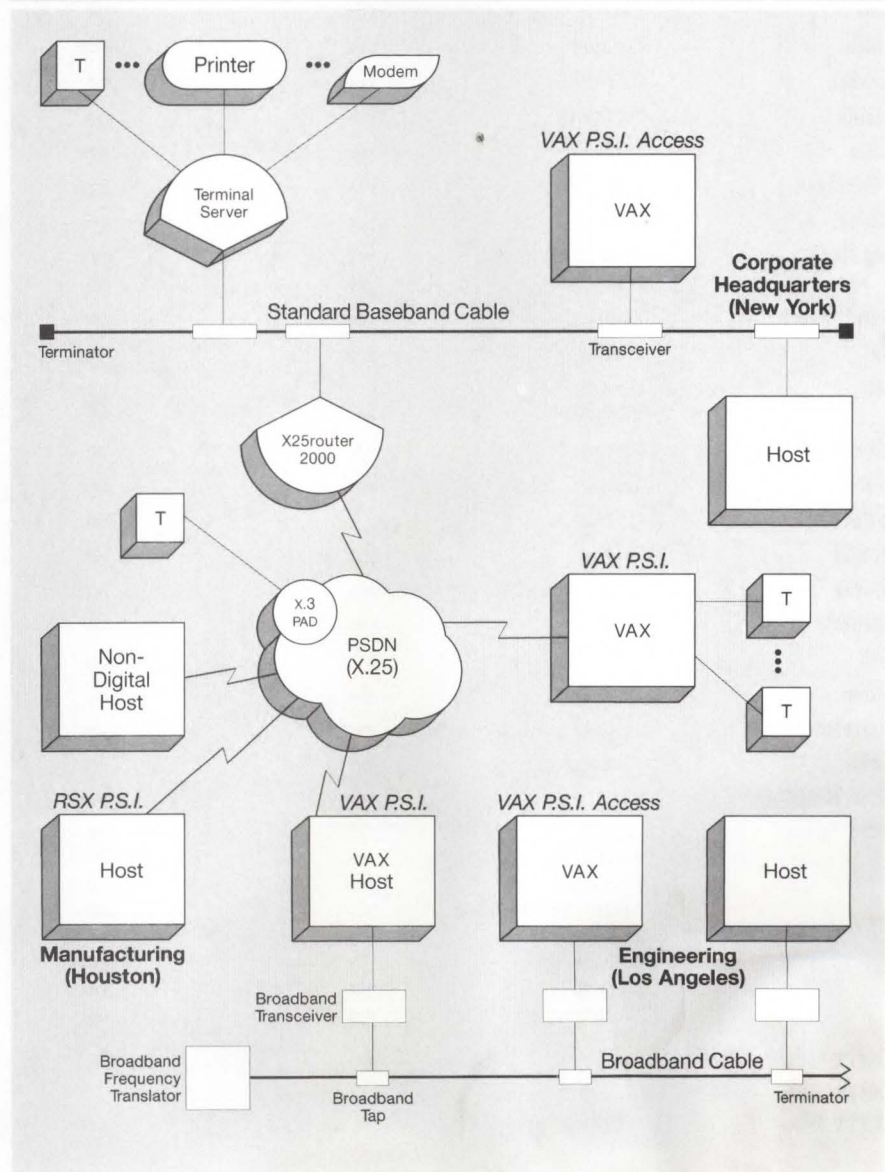
The configuration shown in the following figure enables the following communications:

- Digital-to-Digital communications using DECnet between the X25router 2000 at New York, the Houston PDP-11 running RSX P.S.I. and DECnet-RSX, and the Los Angeles VAX P.S.I. node. DECnet routing on the two 802.3/Ethernet local area networks means that the use of the X.25 PSDN is transparent to users on other 802.3/Ethernet nodes at New York and Los Angeles.
- Customers can write applications to communicate between a VAX P.S.I. Access node on the two local area networks and any Digital or non-Digital node connected to the PSDN. The same is true for OSI applications, subject to support of such in all nodes concerned.
- Terminals connected to VAX hosts on the 802.3/Ethernet local area networks, or the RSX P.S.I. node at Houston, can make outgoing calls to log into any Digital or non-Digital node on the PSDN, or any VAX P.S.I. Access node on the local area network.

Packetnet Communications Software

- Remote terminals on the PSDN can use Packet Assemblers/Disassemblers (PADs) to place calls into any Digital or non-Digital node connected to the PSDN, including the RSX P.S.I. node at Houston. These calls can access any VAX P.S.I. Access node on either of the two 802.3/Ethernet local area networks. The PADs may be "public" PADs provided as a part of the PSDN service, accessible through dedicated or dialup telephone connections or, depending on PSDN policies, a customer-owned "private" PAD such as the DFX product (described in Section 3), connected to the PSDN by a synchronous leased line.

Packetnet Communications Including Non-Digital Computers



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Packetnet Communications Software

Currently Supported PSDNs

The following table lists the currently supported public PSDNs by country and product. Consult the local Digital sales office for the latest additions to this table.

Supported Public PSDNs

Country	Public PSDN	VAX P.S.I.	RSX P.S.I.	X25router 2000
Australia	Austpac	yes	no	yes
Austria	Datex-P	yes	yes	yes
Belgium	DCS	yes	no	yes
Brazil	Renpac	yes	no	yes
Canada	Datapac	yes ^{1,3}	yes ¹	yes ¹
Denmark	DATAPAK	yes	no	yes
Finland	DATAPAK	yes	no	yes
France	Transpac	yes	yes	yes
W. Germany	Datex-P	yes	yes	yes
Holland	Datanet-1	yes	yes	yes
Hong Kong	INTELPAC	yes	yes	yes
	DATAPAK	yes	no	yes
Ireland (Eire)	Eirpac	yes	yes	yes
Italy	ITAPAC	yes	no	yes
Japan	DDX-P	yes ^{1,3}	no	yes
	VENUS-P	yes ³	no	yes
Malaysia	Maypac	yes	no	yes
Mexico	Telepac	yes	no	yes
Norway	DATAPAK	yes	no	yes
Portugal	Telepac	yes	no	yes
S. Korea	DATAKOM-NET	yes	no	yes
Singapore	Telepac	yes	no	yes
Spain	IBERPAK	yes	no	yes
Sweden	DATAPAK	yes	no	yes
Switzerland	Telepac	yes ^{2,3}	yes ²	yes ²
Taiwan	Pacnet	yes	yes	yes
United Kingdom	PSS	yes	yes	yes
United States	ACCUNET	yes	no	yes
	AUTONET	yes	no	yes
	INFONET	yes	no	yes
	Mark*net Extended	yes	no	yes
	PTN-1	yes	no	yes
	Telenet	yes	yes	yes
	TYMNET	yes	yes	yes
	Worldnet	yes	no	yes

¹CCITT 1976

²CCITT 1978

³CCITT 1980

X25router 2000

The X25router 2000 is a combination hardware/software product that provides access to one or more PSDNs for any system on the LAN that runs a supported VAX P.S.I. Access product. It also provides access to any DECnet system that uses the PSDN to carry DECnet traffic to remote Digital systems.

The X25router is the preferred method for accessing a PSDN. **▲ For more information on the X25router 2000 refer to “802.3/Ethernet Communications Servers” in Section 2.**

VAX P.S.I. and VAX P.S.I. Access

The VAX P.S.I. products allow suitably configured VMS systems to connect to, and/or access, Packet Switching Data Networks (PSDNs). The product set consists of two options: full-function VAX P.S.I. and a subset of that product, VAX P.S.I. Access. VAX P.S.I. allows connection to PSDNs conforming to CCITT recommendations X.25 (1978, 1980 or 1984) or to Full or Draft International Standards (ISO or DIS) 7776 and 8208.

Both options enable process-to-process and terminal communications between a VAX and remote Data Terminal Equipment (DTE) in a PSDN supporting the X.25 interface protocol. VAX P.S.I. also enables direct connection to equipment acting as either Data Circuit Terminating Equipment (DCE) or DTE using the ISO 7776/8208 protocols.

VAX P.S.I.

VAX P.S.I. allows a standard VMS system to use X.25 connections to any number or combination of the following:

- One or more DTEs (lines) connecting to X.25 PSDN(s) conforming to the CCITT X.25 recommendations (1978, 1980 or 1984)
- Point-to-point connections to one other DTE or DCE conforming to the ISO 7776/8208 protocols

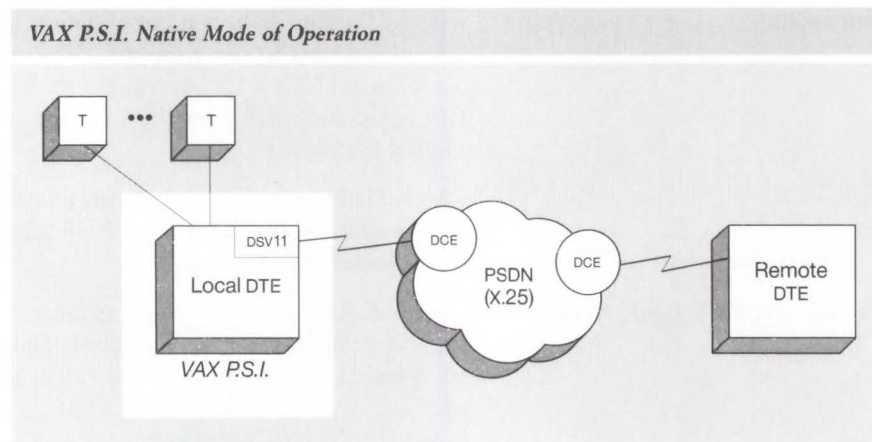
Most facilities and options of the CCITT recommendations can be supported with VAX P.S.I. Consult the Software Product Description for details.

VAX P.S.I. can be configured for either multihost or native mode operations. When installed in native mode, VAX P.S.I. supports access to the PSDN or DTE only from processes in the VAX processor on which it is installed. When installed in multihost mode in a DECnet-VAX node, VAX P.S.I. acts as a connector node to the PSDN or DTE, supporting access to the network by other properly configured local or remote VAX hosts. These additional hosts must be DECnet-VAX systems on which the VAX P.S.I. Access software has been installed.

VAX P.S.I. is a layered VMS product and may be used in the following ways:

- Process-to-process (X.25) communication
- Process-to-terminal communication (remote terminal)
- Terminal-to-process communication (remote CPU)
- Full DECnet communication (Digital remote hosts only)
- As part of an OSI multivendor communications environment (when used with Digital's VOTS product and OSI applications)

For all the above uses, VAX P.S.I. provides accounting, security, and P.S.I. Mail. **▲ Refer to Software Product Description for further information.**



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VAX P.S.I. Access

VAX P.S.I. Access allows a properly configured DECnet-VAX system in a DECnet environment to make logical connections to PSDNs by way of one or more other P.S.I. connector nodes. VAX P.S.I. Access, with the connector node providing physical connections to a PSDN, enables process-to-process and terminal communications between the accessing VAX and remote DTE. The P.S.I. connector node may be one of the following:

- VAX P.S.I. installed in multihost mode. The corresponding version of VAX P.S.I. and VAX P.S.I. Access is required for full functionality, though basic communication will take place with earlier versions of VAX P.S.I.
- An X25router 2000. ▲ Refer to Software Product Description 28.86.

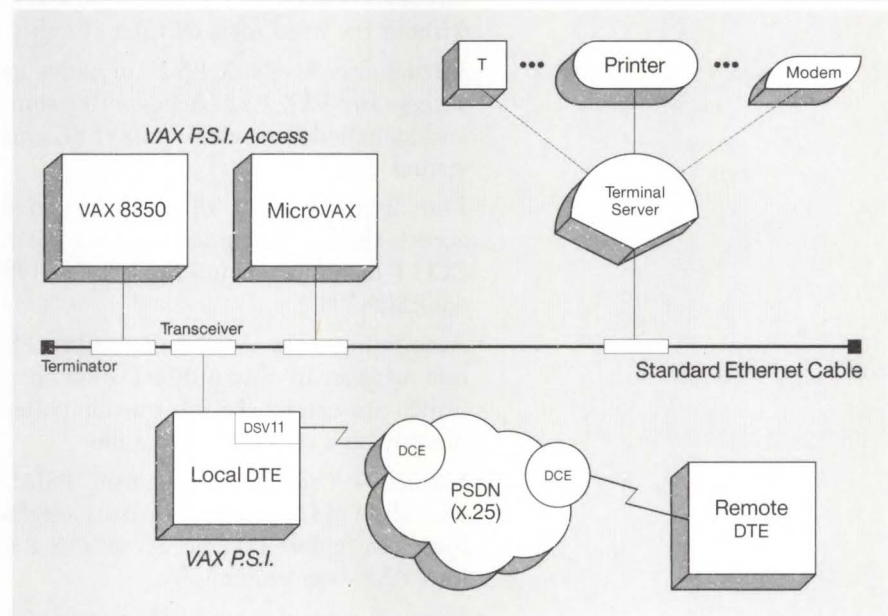
DECnet logical links are established by VMS to connect the VAX P.S.I. Access host to the connector node. These links may use any supported DECnet communications path between the VAX P.S.I. Access node and the connector node, provided they do not themselves use an X.25 connection. VAX P.S.I. Access uses these links to transmit X.25/X.29 messages between the connector node and the VAX P.S.I. Access host.

A single VAX P.S.I. Access host can logically connect to one or more connector nodes concurrently and hence access all PSDNs accessible from those connector nodes. During installation of VAX P.S.I. Access, one of these connector nodes/PSDN combinations is established as the default DTE/DCE connection that outgoing calls will normally use.

VAX P.S.I. Access provides all of the user interfaces of the full-function VAX P.S.I. product, with the ability to utilize these interfaces from a DECnet-VAX node not directly connected to the PSDN. If such connection to a packet switching data network is necessary, the full-function VAX P.S.I. product is required. Applications that work correctly on VAX P.S.I. may be used with VAX P.S.I. Access, and vice versa, if the application is not sensitive to the differences in timing or throughput involved in the transfer.

▲ Refer to Software Product Description 27.78 for more information.

VAX P.S.I. Multihost Mode of Operation



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Features (VAX P.S.I. and VAX P.S.I. Access)

- Support for multiple networks—A VAX P.S.I. node (native or multihost mode) may be connected to more than one network. This is useful for connection to both a public and private network, or (in those countries where applicable) to several public ones.
- Support for DCE mode of operation—The VAX P.S.I. product may be used to configure individual lines as either a DTE or DCE. Two VAX P.S.I. nodes may be connected “back-to-back,” with one as a DTE and the other as a DCE. Point-to-point configurations are valid only where both ends fully conform to ISO standards 7776/8208.
- Support for CCITT 1984 networks—VAX P.S.I. has the capability to connect to networks conforming to the CCITT 1984 revision of the X.25 family of protocol recommendations.
- Co-residency of P.S.I. and P.S.I. Access—Both VAX P.S.I. and VAX P.S.I. Access can be installed in the same node, granting local users/processes the ability to access a network or networks connected to another P.S.I. multihost node.
- Process-to-process communication—VAX P.S.I. and VAX P.S.I. Access allow application programs to access the packet level of the protocol as defined by the X.25 recommendation. This interface enables an application program using VMS System Services to communicate with complementary software on other systems (Digital or non-Digital DTEs) accessible via the X.25 connection.
- Terminal communications—VAX P.S.I. and VAX P.S.I. Access support terminal communications according to CCITT recommendations X.3, X.28, and X.29. Remote terminals may access the VAX, and local terminals on the VAX may access remote CPUs.

Packetnet Communications Software

- PSImail—Users of the VMSmail utility may exchange electronic mail directly between VAX P.S.I. (or VAX P.S.I. Access) nodes over a PSDN, without the need for a DECnet circuit connection between the nodes.
- Virtual circuits—VAX P.S.I. (in native mode, or configured for multihost access) and VAX P.S.I. Access offer communication over both Permanent and Switched Virtual Circuits (PVC and SVC), and support up to 512 virtual circuits in total per CPU.
- Line discipline—For VAX P.S.I. in native mode, or configured for multihost access, the line discipline used for PSDN communications complies with CCITT recommendation X.25 (1978, 1980 or 1984) and/or with DIS7776 and ISO8208.
- Accounting—The Accounting utility, PSIAccounting, enables the system manager to obtain information on network usage. The Accounting utility can extract the information collected and display the information directly on a terminal or to a file.
- Security—A security mechanism (PSIAuthorize), which is consistent with the VMS access and security mechanisms, offers the means of controlling both remote DTE access to VAX P.S.I. and access to the network by the VAX P.S.I. user community.
- Network management—VMS provides a Network Control Program (NCP) for managing DECnet-VAX, the VAX P.S.I. products, and other Digital communications software. In addition, extensive event-logging and tracing capabilities are available. Trace data may be stored on a file, or displayed “live” on a local terminal.
- Communications—For the best performance, Digital recommends using a DMA device. **▲ Refer to the Software Product Description for a list of devices VAX P.S.I. supports, and for any restrictions in line speed or function.**

Prerequisite Hardware and Software

DECnet-VAX for VAX P.S.I. multihost operation, VAX P.S.I. Access, or DECnet (DLM communications across the PSDN).

The KMS/KMV link-level software and drivers are *not* required when these devices are to be used only with VAX P.S.I. The DMB32 synchronous driver is required for use with VAX P.S.I.

▲ For additional prerequisite hardware and software, refer to Software Product Description 25.40 for VAX P.S.I., and 27.78 for VAX P.S.I. Access.

VAX P.S.I. and VAX P.S.I. Access Order Codes

Option	Order Code	Order Code
Licenses (A license is required for each CPU.)	VAX P.S.I.	VAX P.S.I. Access
Single-use or first license for VAXcluster	QL-071A*-AA	QL-061A*-AA
Cluster member ¹	QL-071A*-AB	QL-061A*-AB
Initial license, primary and cluster ²	QL-071A*-CA	QL-061A*-CA
Monthly rental, single-use ²	QL-071A*-DA	QL-061A*-DA
Monthly rental, cluster ²	QL-071A*-DB	QL-061A*-DB
Software revision right-to-copy	QL-071A*-HZ	QL-061A*-HZ
Materials and Installation		
Distribution and documentation	QA-071AA-H#	QA-061AA-H#
Documentation only	QA-071AA-GZ	QA-061AA-GZ
Installation service	QT-071A*-I#	QT-061A*-I#
U.S. Software Services³		
DECsupport service	QT-071A*-9#	QT-061A*-9#
Basic service	QT-071A*-8#	QT-061A*-8#
Self-maintenance service	QT-071A*-3#	QT-061A*-3#

Supported processors (): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RX33 (7), TK50 (5)

¹Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/725/730.

²Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

³For service agreements in other countries, consult a local Digital sales representative.

RSX-11 P.S.I./M and RSX-11 P.S.I./M-PLUS

RSX-11 P.S.I./M and RSX-11 P.S.I./M-PLUS allow suitably configured RSX-11M and RSX-11M-PLUS systems to connect to a single Packet Switching Data Network (PSDN) conforming to the CCITT recommendation X.25 (June 1980). Access to the RSX-11 P.S.I. products is supported for user programs written in MACRO-11, FORTRAN IV/RSX, and PDP-11 FORTRAN/RSX. RSX-11 P.S.I. products support task-to-task and incoming or outgoing remote terminal communications via the network.

The RSX-11 P.S.I. products can coexist with or operate as a layered product under DECnet-11M or DECnet-11M-PLUS to allow use of DECnet facilities over PSDNs, as well as point-to-point connectors, such as private leased lines or switched telephone networks. **▲ For details, refer to Software Product Descriptions 10.42 and 10.43.**

The communications discipline used is the CCITT recommendation X.25. Specifically, the product supports EIA-232-D/CCITT V.28 at the hardware level, the symmetric LAPB variant of the X.25 frame level protocol, and the X.25 packet level protocol over point-to-point, four-wire, synchronous, full-duplex lines.

Packetnet Communications Software

Features

- Supports access from remote terminals according to the CCITT recommendations X.3, X.28, and X.29 (1978 and 1980). Terminals are supported in "Remote X.29 Terminal" mode in which code conversions between ASCII and the actual code used by the terminal are performed by the network.
- Includes a host PAD to permit outgoing X.29 calls from a local terminal connected to the PDP-11 to a remote DTE.
- For intertask communication, application programs use RSX-11M or RSX-11M-PLUS executive calls to set up and break connections with the network, to send and receive data, and to issue control and synchronization requests.
- Offers communications over both Permanent and Switched Virtual Circuits (PVCs and SVCs).
- Manages virtual-circuit calls on behalf of DECnet by using user-data fields as well as subaddressing.
- A Network Control Program and Configuration File Editor are provided for the control of the operation of the X.25 software. This includes loading and unloading.

Prerequisite Hardware

- Supports all current PDP-11s and MicroPDP-11s.
- Requires at least one of the following communications controllers for each processor:
 - For the PDP-11/23/53/73/83: a DPV11-DA or KMV1A-A
 - For the PDP-11/24/44/70/84: a DUP11-DA, KMS11-BD/BE, or KMS11-PX/PY

Prerequisite Software

- RSX-11 operating system for RSX-11 P.S.I./M
- RSX-11M-PLUS operating system for RSX-11 P.S.I./M-PLUS

RSX-11 P.S.I. Order Codes

Option	Order Code	
License (A license is required for each CPU.)	RSX-11M	RSX-11M-PLUS
Single-use license	QJD91-UZ	QJD92-UZ
Materials		
Distribution and documentation	QJD91-HD QJD91-HH QJD91-HM QJD91-H5 QJD91-HV	QJD92-HD QJD92-HH QJD92-HM QJD92-H5 QJD92-HV
Software revision right-to-copy	QJD91-HZ	QJD92-HZ
Documentation only	QJD91-GZ	QJD92-GZ

Open Systems Interconnection (OSI) is a set of developing standards produced by the International Organization for Standardization (ISO). OSI has been developed by ISO to allow computers made by various manufacturers to communicate with each other using internationally accepted protocols. Users are thus enabled to explore networking in an open environment. OSI is based on an architectural reference model that defines a layered protocol structure for systems communications. The Digital Network Architecture (DNA) is based on the OSI Reference Model.

The OSI model has seven layers with well-defined functions. Each layer builds upon the functionality offered by lower layers. Used with other Digital products, six of the seven layers can be provided. VAX P.S.I. and 802.3/Ethernet products provide services at the Physical, Data Link, and Network Layers of the OSI model. VAX DEC/MAP provides network services for the manufacturing environment at the network, transport, session, and application layers. VOTS provides services at the Transport Layer and OSAK provides services at the Session Layer. Message Router X.400 Gateway, combined with Digital's other MAILbus products, provides mail, messaging, and document interchange services at the Application layer. **▲ Refer to "MAILbus Electronic Mail Interchange" in Section 5 for more information.**

Digital's OSI Products

Layer Number	Network Management		Digital OSI Products
	OSI Layers	DNA Layers	
7	Application	User	(Customer written application) Message Router/X.400 Gateway VAX FTAM VAX DEC/MAP OSAK VOTS VAX P.S.I. or VAX P.S.I. ACCESS IEEE 802.3 Products IEEE 802.4 Products*
6	Presentation	Network application	
5	Session	Session control	
4	Transport	Transport	
3	Network	Routing	
2	Data Link	Data Link	
1	Physical Link	Physical Link	

*Available from Concord Communication, Inc. for UNIBUS or VAXBI processors only.

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The following Open Systems Interconnection products are available:

- VAX FTAM
- VAX DEC/MAP
- Message Router X.400 Gateway
- VAX OSI Applications Kernel (OSAK), which includes VAX OSI Transport Service (VOTS)
- VAX P.S.I. **▲ For more information, refer to "Packetnet Communications Software" in this section.**

Open Systems Interconnection (OSI) Products

VAX FTAM Open Systems Multivendor File Transfer

VAX FTAM (File Transfer, Access, and Management), a layered product on VMS V5.0, allows VMS systems to use the international standard protocol ISO 8571 to transfer files between other ISO-FTAM-compliant systems in a multivendor network. VAX FTAM copies files, deletes files, and displays information about files between open systems.

An open computer system implements the standards for each of the seven layers of the Open Systems Interconnection (OSI) Basic Reference Model for communications as defined by the International Organization for Standardization. An FTAM system is any open system containing an FTAM implementation that conforms to the FTAM standard and includes the implementations of the necessary underlying OSI services.

VAX FTAM contains components that together include the protocols and services of layers 3 through 7 of the OSI Basic Reference Model, described earlier in this section: the File Transfer, Access, and Management service element; the Association Control Service Element (ACSE) of the Application layer; the Presentation layer; the Session layer; the Transport and Network layers.

VAX FTAM conforms to ISO 8571 and supports transfer of the following document (file) types: FTAM 1—unstructured files containing ASCII data and having stream record formats, FTAM 2—sequential text files with variable record formats and carriage-return attributes, and FTAM 3—unstructured files containing binary data and having stream record formats.

▲ For more information, refer to **Software Product Description (SPD) 29.86**.

Features

- Effortless file transfer between multivendor systems
- Based on ISO standards
- DCL-level access to user facilities
- Flexible and transparent access to local files
- Support for RMS-style format for file specifications
- Support for various file types
- Support for any file-naming convention
- Management tools

Prerequisite Hardware

▲ Refer to the order code table for a list of supported processors.

When used in a Local Area Network Environment, VAX FTAM requires that an Ethernet Communications Controller be installed on the VAX system. ▲ Refer to “Ethernet Communications Controllers” in Section 2 and to SPD 29.86 for more information.

Also, a transceiver cable is needed to connect the Ethernet controller to a tap on the local area network. ▲ Refer to “Baseband 802.3/Ethernet IEEE Products” in Section 2 for appropriate order numbers.

▲ For optional hardware requirements for X.25 packet-switched networks, refer to VAX P.S.I. (SPD 25.40) or VAX P.S.I. Access (SPD 27.78).

Open Systems Interconnection (OSI) Products

Prerequisite Software

VMS V5.0

The required software depends on the physical medium of the open systems network. The network can be an ISO 8802-3 (IEEE 802.3) LAN, or an X.25 packet-switched network. To support the ISO 8802-3 data link, VAX FTAM uses standard VMS LAN drivers.

For an X.25 wide area network, the VAX P.S.I. (SPD 25.40) or VAX P.S.I. Access software (SPD 27.78) is required.

VAX FTAM Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license	QL-VFWA*-AA
Cluster license ¹	QL-VFWA*-AB
Initial license, primary and cluster ²	QL-VFWA*-CA
Monthly rental, single-use ²	QL-VFWA*-DA
Monthly rental, cluster ²	QL-VFWA*-DB
Software revision right-to-copy	QL-VFWA*-HZ
Materials and Installation	
Distribution and documentation	QA-VFWAA-H#
Documentation only	QA-VFWAA-GZ
Installation service	QT-VFWA*-I#
U.S. Software Services³	
DECsupport service	QT-VFWA*-9#
Basic service	QT-VFWA*-8#
Self-maintenance service	QT-VFWA*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/750 (L), VAX-11/780/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): TK50 (5), RX33 floppy diskette (7) 1,600 bpi magtape (M)

¹Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/725/730.

²Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

³For service agreements in other countries, consult a local Digital sales representative.

Open Systems Interconnection (OSI) Products

VAX DEC/MAP

VAX DEC/MAP is a multivendor, broadband, local area network for the manufacturing environment, which adheres to the Manufacturing Automation Protocol (MAP) specification Version 2.1. The MAP Version 2.1 specification is based on the seven-layer, International Standards Organization/Open Systems Interconnection (ISO/OSI) network reference model.

This product is available in two configurations that comprise both software and hardware.

- The DTUN*—Designed for the UNIBUS and VAXBI-bus systems, it includes the KMS1P communications controller, firmware, appropriate cables, and software layered on the VMS operating system.
- the DTQNA—Designed for the MicroVAX II, it includes the DTQNA MAP controller, firmware, appropriate cables, and software layered on the VMS operating system. The DTQNA offers the a frequency agile modem and also an internal and external (NEMA 12 enclosure) modem option.

The MAP network architecture specifies the protocols and services for the Physical, Data Link, Network, Transport, Session, Presentation and Application Layers—Layers 1–7, respectively. The software (VAX DEC/MAP) for the DTUN* provides the Network Layer through the Applications Layer (Layers 3–7): the Physical and Data Link Layers, Layers 1 and 2, are implemented in hardware from Concord Communication, Inc. (CCI), and are not included in the VAX DEC/MAP V2.0 product. The software (VAX DEC/MAP) for the DTQNA implements the Session Layer to the Application Layer (Layers 5–7), the Physical through the Transport Layers (Layers 1–4) are found on the hardware (DTQNA). The Presentation Layer is null as specified by MAP V2.1. The network media is 75-ohm broadband CATV cable.

The VAX DEC/MAP software provides the user interface to the communication services that consist of File Transfer, Access, and Management (FTAM), Common Application Service Elements (CASE), Manufacturing Messaging Format Standard (MMFS).

VAX DEC/MAP Network Management includes the MAP Control Program (MAPCP). MAPCP enables a network manager to read and modify local and remote parameters, isolate faults through event logging and loopback testing, perform system verification, and maintain the local directory cache. MAPCP commands are similar to DECnet NCP commands. Also included is the Directory Service/Client Services Agent (CSA) which provides name-to-address resolution.

▲ For more information, refer to Software Product Description 27.66.

Open Systems Interconnection (OSI) Products

Specifications and Standards used for VAX DEC/MAP

DEC/MAP Component	Specifications and Standards	OSI Layer
Network Management	Network Management Agent (NMA) only defined in the MAP V2.1 Spec. Network	Manager
Application		Application
<ul style="list-style-type: none"> • NBS Phase I FTAM • MAP CASE V2.1 • MAP V2.1 MMFS • Directory Service/CSA 	Based on ISO FTAM DP2 ISO based and defined in Service Definition and Protocol Spec. (7/85) Conformance class 0 MAP V2.1	
Presentation	Undefined in MAP V2.1, therefore NULL layer	Presentation
Session	ISO Session Standard (ISO/IS 8326, 8327) Only Kernel and full-duplex is implemented as required in MAP V2.1	Session
Transport	ISO Transport, Class 4 Service as specified in ISO/IS 8072, ISO/IS 8073.	Transport
Network	ISO Internet (ISO/IS 8473)	Internet
Data Link	IEEE 802.2 Class 1, Logic Link Control; IEEE 802.4 Token Bus, Media Access Control	Data Link
Physical	IEEE 802.4 Broadband	Physical

Interoperability

Digital guarantees the operation of the VAX DEC/MAP product between Digital nodes *only*, with the prerequisite hardware supplied by Concord Communication, Inc. The DTQNA product has successfully completed conformance testing at ITI (Industrial Technological Institute), an independent testing facility for MAP products.

Required Hardware

VAX DEC/MAP software is a layered product, supported on the VMS operating system. This product requires 7,500 blocks (3.84 MB) of system disk space for installation and 6,500 blocks (3.33 MB) of system disk space for permanent use.

This product is part of a packaged system: The customer cannot purchase software separately from hardware.

Minimum hardware:

- Any valid VAX UNIBUS-compatible configuration, including the VAXBI machines, which require a UNIBUS adapter, and MicroVAX II (BA23, BA123, BA2**, H9642 only)
- Broadband cableplant
- CCI headend remodulator, 10 Mb/s (part number L5-R051-2100)
- CCI Map Server/Plus, (TIM), 10 Mb/s (part number L0T051-0820, for UNIBUS or BI-bus machines only)

Note: The CCI Map Server/Plus must be purchased through Concord Communication, Inc. (CCI).

Prerequisite Software

VMS Operating System

Open Systems Interconnection (OSI) Products

VAX DEC/MAP Order Codes

Option	Order Code	
Licenses (A license is required for each CPU.)	DTUN*	DTQNA
Single-use license (with hardware)	DTUN*-AA, -AC ¹	DTQNA-DA, -DB DTQNA-DC, -DE ²
Software revision right-to-copy	Q*VFZ-HZ	QL-VFZAN-HA
Materials and Installation		
Distribution and documentation	Included in kit	Included in kit
Documentation only	QA-VFZAA-GZ	QA-VFZAB-GZ
Installation service	Q*VFZ-I#	Included in kit
U.S. Software Services³		
DECsupport service	Q*VFZ-9#	QT-VFZAA-95
Basic service	Q*VFZ-8#	QT-VFZAA-85
Self-maintenance service	Q*VFZ-3#	QT-VFZAA-35

Supported processors (): VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2)

#Supported media (#): 5, M

¹Choose -AA for FCC-compliant cabinet, -AC for non-FCC-compliant cabinet. For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Supports MicroVAX II (BA23, BA123, BA200-series, H9642) only. Specify -DA for internal modem for BA23, BA123, H9642 and BA200 series; -DB for external modem for BA23 configuration; -DC for external modem for BA200 series; -DE for the external modem option for BA123, H9642.

³For non-U.S. service agreements, consult a local Digital sales representative.

VAX OSI Applications Kernel (OSAK)

The VAX OSI Applications Kernel is a layered product on VMS that provides an OSI-conformant base on which to develop products. The product consists of interfaces to the Session and Transport layers of the OSI Basic reference model for communications, as defined by the ISO and discussed earlier in this section.

The product conforms to the following protocol standards:

- ISO 8327: 1987—Basic Connection Oriented Session Protocol Specification
- ISO 8073: 1986—Basic Connection Oriented Transport Protocol Specification
- ISO 8473—Protocol for providing Connectionless Mode Network Services

Open Systems Interconnection (OSI) Products

Features

- The VAX OSI Applications Kernel combines both the VAX OSI Transport Service (VOTS) and the VAX OSI Applications Kernel into a single package, simplifying both migration to Phase V DECnet for current users and the ordering of OSI products.
- The VAX OSI Transport Service provides and supports many of the options stated in International Standard ISO 8073. An end system, VOTS is implemented according to International Standard ISO 8473, and supports many of the options listed in the specification.
- The VAX OSI Applications Kernel software is a privileged shareable image, which can be linked with VMS users' programs. It provides the higher level services that allow interprocess communications over an OSI network to one or more remote systems. The VAX OSI Applications Kernel is layered on VAX OSI Transport Service.

▲ Refer to SPD 27.47 for further information.

Prerequisite Hardware

Any valid VAX/VMS system configuration as specified in the order code table.

Prerequisite Software

VMS Operating System V5.0

The software may be used over either an ISO 8802-3 (IEEE 802.3) local area network or an X.25 packet-switched network. To support the ISO 8802-3 data link, VAX OSAK uses standard VMS drivers. For an X.25 wide area network, the VAX P.S.I. V4.2 or VAX P.S.I. Access V4.2 software (SPD 25.40 and SPD 27.78) is required.

▲ For more information on precise product specifications, requirements for local and wide area usage, and conformance to standards, refer to SPD 27.47.

Open Systems Interconnection (OSI) Products

VAX OSI Applications Kernel Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license	QL-VD9A*-AA
Cluster license ²	QL-VD9A*-AB
Initial license, primary and cluster ²	QL-VD9A*-CA
Monthly rental, single-use ²	QL-VD9A*-DA
Monthly rental, cluster ²	QL-VD9A*-DB
Software revision right-to-copy	QL-VD9A*-HZ
Materials and Installation	
Distribution and documentation	QA-VD9AA-H#
Documentation only	QA-VD9AA-GZ
Installation service	QT-VD9A*-I#
U.S. Software Services³	
DECsupport service	QT-VD9A*-9#
Basic service	QT-VD9A*-8#
Self-maintenance service	QT-VD9A*-3#
<p>*Supported processors (*): MicroVAX II (N), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8500/8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)</p> <p>#Supported media (#): RX33 (7), TK50 (5), 1,600 bpi magtape (M)</p> <p>¹Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.</p> <p>²Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.</p> <p>³For service agreements in other countries, consult a local Digital sales representative.</p>	

VAX Public Access Communications (VAXPAC)

VAX Public Access Communications (VAXPAC) lets VMS or MicroVMS users connect to a remote system using asynchronous lines. VAXPAC allows users to access database services that provide information such as investment reports, credit verification, or international news.

The remote system may be any system that accepts and displays data using an asynchronous interface compatible with EIA-232-D, EIA-422, or EIA-423-A.

VAXPAC users can operate as if the terminal were directly connected to the remote system, can capture data from the remote system in a file for later printing or editing, or transfer a file (with error checking) to or from a system with cooperating software.

▲ For more information, refer to **Software Product Description 28.51**.

Features

- Provides access to all facilities through menu selections and extensive online help.
- Includes KERMIT error-correction file-transfer software; provides an interface that allows other file-transfer software to be invoked instead of KERMIT.
- Offers predefined connections that can be specified for either general use or designated individuals.
- Supports direct or telephone connections with autodial, dial from keyboard, or dial from handset for applicable modems.
- Includes maintenance facilities that let users customize VAXPAC operation.

Prerequisite Hardware

One of the following:

- Any valid MicroVAX II with 3-MB internal memory, TK50 or dual RX50 drive, one DZQ11 or DHV11, one RD52, and a VT100- or VT200-series terminal, or any MicroVAX 2000 or VAXstation 2000, plus one or more modems if using telephone connections: DF224 (Scholar), DF03-compatible, or Hayes Instruction Set compatible.
- Any valid MicroVAX 3500/3600 system with 3-MB memory, TK70, one RA70, CXY08 or DFA01, and VT100- or VT200-series terminal.

Prerequisite Software

One of the following:

- All components of MicroVMS, V4.4 or later
- VMS, V4.4 or later

File Transfer and Terminal Emulation Products

VAXPAC Order Codes

Option	Order Code
License Options: (A license is required for each CPU.)	
Single-use license ¹	Q*ZB1-UZ
Materials and Installation	
Distribution and documentation	Q*ZB1-H#
Software revision right-to-copy	Q*ZB1-HZ
Documentation only	QLZB1-GZ
Installation service	Q*ZB1-I#
U.S. Software Services¹	
Self-maintenance service	Q*ZB1-3#

Supported processors (): MicroVAX II (Z); MicroVAX 2000 (3); VAXstation II (4); VAXstation 2000 (8); VAX-11/730 [PC]; VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8530 (9); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M)

#Supported media: 3, 5

¹For service agreements in other countries, consult a local Digital sales representative.

VTERM II, poly-COM 220, and poly-COM 240 for the IBM PC/XT/AT

This product set is not currently available in Europe.

The Digital Distributed Software Program offers three products that run on the IBM PC/XT/AT to emulate Digital terminals. These products perform ASCII and binary file transfers between an IBM PC and a Digital host system. VTERM II allows the PC/XT/AT to emulate a VT52 or VT100 terminal, poly-COM 220 allows the PC/XT/AT to emulate a VT52, VT102, and VT220 terminal, and poly-COM 240 allows the PC/XT/AT to emulate a VT240 terminal.

VTERM II

VTERM II is an asynchronous communication package for the IBM PC developed by Coefficient Systems Corporation. VTERM II allows direct connection to a host computer at speeds up to 9600 baud. With a Digital mini or mainframe computer, users can run full screen, keypad oriented software such as EDT, TECT, WORD11, and EMACS transferring text and binary files between the PC and the host.

VTERM II Features

- Plus compatible with VT100
- Full VT100 keyboard and video emulation
- 20 user definable keys
- Full VT100 and VT52 escape sequence recognition
- Status display line on screen
- 80 column display—132 with adapter board available from Coefficient Systems Corporation
- DOS-VTERM toggle key allows switching between the DOS screen and the host screen without losing the communications link
- Setup mode key
- Printer support for VT1XX-AC and VT102 ports using any IBM PC compatible printer

File Transfer and Terminal Emulation Products

poly-COM 220 and 240

poly-COM 220 is the successor to poly-COM and allows the use of an IBM PC/XT/AT computer as any one of the Digital VT52, VT102, and VT220 terminals for file transfer. The program supports all Digital full screen editors, including EDT, and all programs that use advanced terminal features such as Digital's ALL-IN-1. poly-COM 220 provides an instant horizontal shift key which allows the user to view and work on text up to 132 columns wide. poly-COM 240 adds Digital VT240 emulation to poly-COM 220 and provides full Digital color graphics terminal emulation.

poly-COM 220 Features

- Plus compatible with VT100 series and VT220
- Full VT100 and VT200 keyboard and video emulation
- 8-bit international character support with compose key
- 21 soft function keys "user definable"
- VT100 escape sequence recognition and VT220 8-bit terminal control
- Status display line on screen
- Instantaneous horizontal shift for 132-character display
- DOS-VTERM toggle key allows switching between the DOS screen and the host screen without losing the communication link
- Setup mode key
- Printer support for VT1xx-AC and VT102 ports using any IBM PC compatible printer
- Host control functions allows the host to control the IBM PC through poly-COM 220
- Screen Save function which blanks the PC screen after an inactive time period that is user definable.

poly-COM 240 Features

- Plus compatible with VT100 series and VT220
- Full VT100 and VT220 keyboard and video emulation
- 8-bit international character support with compose key
- 21 soft function keys "user definable"
- VT100 escape sequence recognition and VT200 8-bit terminal control
- Status display line on screen
- Instantaneous horizontal shift for 132-character display
- Setup mode key
- Printer support for VT1XX-AC and VT102 ports using any IBM PC compatible printer
- VT240 and VT125 device ID
- ReGIS graphics supported
- Full support for IBM PC and Epson graphics printers

Required Hardware

For the Digital host, the same hardware used for asynchronous terminal ports accommodates the IBM PC.

For the PC, a serial communications port is required for direct cable connection to the Digital host or to a modem.

File Transfer and Terminal Emulation Products

VTERM II, poly-COM 220, and poly-COM 240 Order Codes

Option	Order Code
VTERM for IBM PC with 96K*	QAX97-C3
poly-COM 220 for IBM PC with 192K	QAX98-C3
poly-COM 240 for IBM PC with 256K	QAX99-C3
*Host source included	

Host Software for poly-COM Package Order Codes

Option	Order Code
poly-XFR, RSX	QA139-CD (H)*
poly-XFR, RT-11	QA140-CY (H, D)*
poly-XFR, RSTS	QA141-CD
poly-XFR, VMS	QA142-CY (G, M)*
*Optional media	

WPS-PLUS/PC

WPS-PLUS/PC is a document-processing software system that provides Gold Key style word processing for users of IBM PCs and IBM PC/XTs running IBM PC-DOS Version 2.10, 3.0, or 3.10. ▲ **Refer to Software Product Description 30.75 for more information.**

Features

WPS-PLUS/PC allows PC-DOS users to

- Create, edit, and print documents, as well as retrieve documents by document name, number, or keyword.
- Produce form letters and maintain mailing lists.
- Convert a WPS-PLUS document to and from a DX file format and ASCII file format.
- Communicate through user-developed scripts.
- Create and modify printer attribute and character print tables.
- Transfer documents with Digital hosts running WPS-PLUS/VMS or WPS-PLUS/ALL-IN-1.
- Include technical characters and scientific equations in a document.
- Run WPS-PLUS/VMS on the VAX in VT100 emulation mode, which also supports the Digital Multinational and Technical Character Sets.
- Include diagrams, matrixes and VT100 character set equations, and composite and multinational characters in a document.
- Transfer documents between the IBM PC and IBM PC/XT and any Digital host running the poly-XFR for PC-DOS/IBM Personal Computers Communications package, where the host does not have WPS-PLUS/VMS or WPS-PLUS/ALL-IN-1.

Required Hardware

Any valid IBM PC or IBM PC/XT personal computer configuration with

- At least 384 Kbytes of memory.
- A minimum of two 5.25 inch, 362-KB floppy drives, or one 5.25 inch, 362-KB floppy drive and a hard disk.
- IBM PC/XT keyboard.

Prerequisite Software

PC-DOS Operating System, Versions 2.10, 3.0, or 3.10

WPS-PLUS/PC Order Codes

Option	Order Code
Single-use license, binaries, documentation, warranty	
Quantities 1-9	QBA72-AI
Quantities 10-24	QBA73-AI
Quantities 25-99	QBA74-AI
Quantities 100 plus	QBA75-AI
Installation service	QBA72-II
Basic service	QBA72-8I
Single product update service	QBA72-3I

Additional Software Products

Software Development Tools

Digital's Software Development Tools facilitate the development of layered telecommunications protocols for Digital's family of direct memory access (DMA) intelligent communications processors.

The development tools are especially useful to OEMs and end users who write their own communications packages. Well-defined programming standards and methodology help reduce project development costs.

Digital-supplied firmware routines build an executive that acts as the communication processor's operating system. With the development tools, system programmers can easily implement private protocols for custom networking applications.

Digital offers Development Tools for the following intelligent communications processors.

- KMV1A-M Direct Memory Access Intelligent Communications Processor
- KCT32 Direct Memory Access Intelligent Communications Processor

Features

- Facilitates custom network applications
- Extensive documentation
- Reduced development costs
- Linker and loader
- Single-step, start, stop, and breakpoint program debugger

Software Development Tools Order Codes

Option	Order Code
VMS	
KCT32 development tools*	Q*128
RSX-11S, RSX-11M, RSX-11M PLUS	
KMV1A-M development tools	QJS98
MicroVMS	
KMV1A-M development tools*	QZZ36-xx
KMV1A-M MicroVMS driver	QZZ35-xx

*VAX-11 RSX (Q*382) is required for VMS and MicroVMS development.

HDLC Framing Software

Digital offers HDLC framing software for the KMS11-BD/BE and the KMV1A-M. These software packages provide a basic HDLC frame; they do not provide the addressing and sequencing that must be supplied by the user for some applications. The framing software packages are particularly useful in multivendor environments and in applications requiring proprietary protocols. The KMS11-BD/BE Framing Software can also be configured for Bisync (BSC) Framing.

Additional Software Products

HDLC/BSC Framing Software Codes

Option	Order Code
VMS	
KMS11-BD HDLC/BSC framing software	Q*920
RSX-11S, RSX-11M	
KMV1A HDLC framing software	QJS32
RSX-11M PLUS	
KMV1A-M HDLC framing software	QJS39

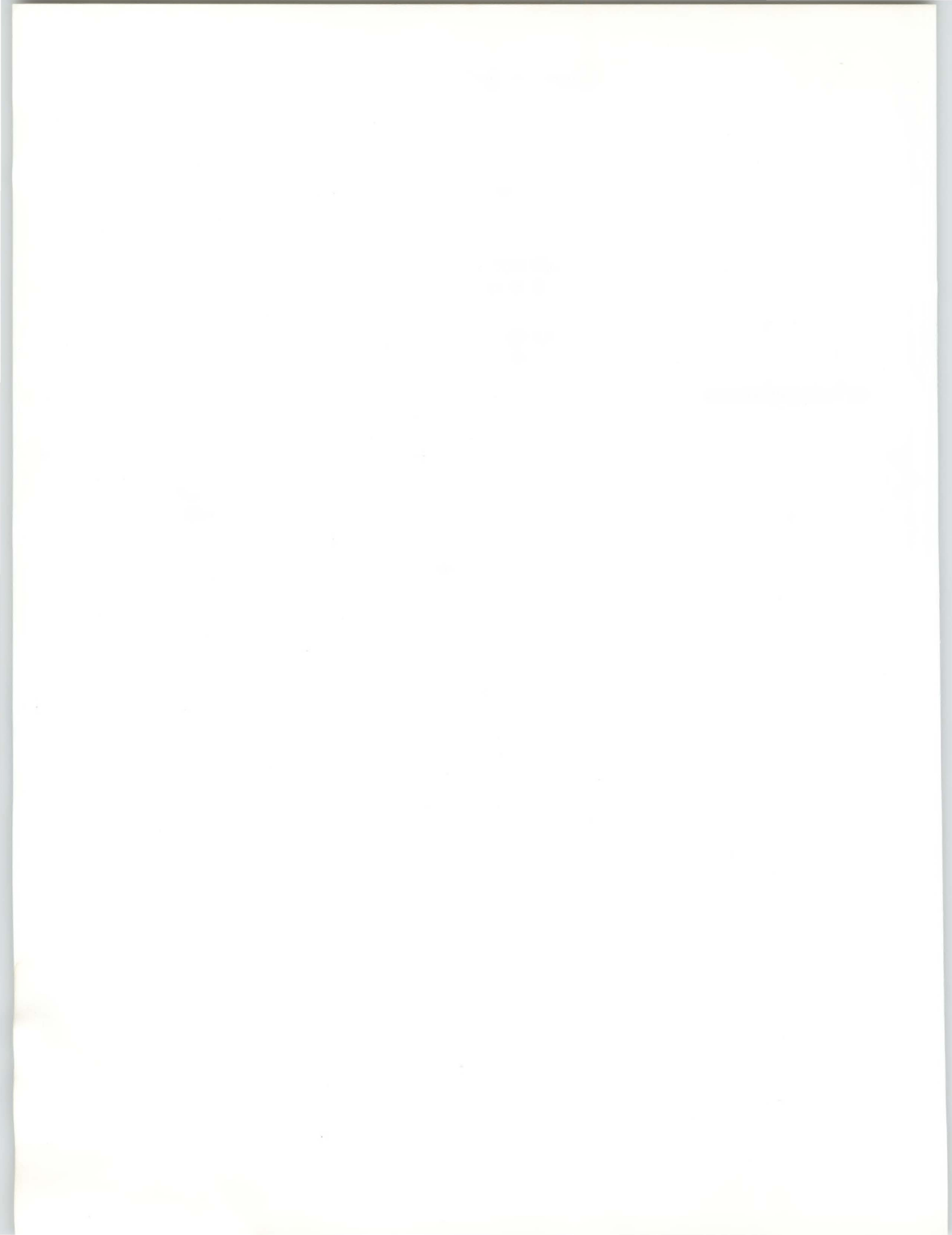
X.25 Link Level Software

Digital offers X.25 Link Level software for the KMS11-BD/BE, KMS1P-M, and KMV1A-M. These packages provide point-to-point communications between host processors, making them particularly useful in a multivendor environment. The packages operate in full-duplex mode, and implement the CCITT 1980 recommendations for X.25 LAPB Link Level Protocol.

These packages are not required when the devices are used by Packetnet software. ▲ For more information, refer to "Packetnet Communications Software" in this section.

X.25 Link Level Software Order Codes

Option	Order Code
VMS	
KMS11-BD/BE	Q*757
MicroVMS	
KMV1A-M MicroVMS driver	QZZ35
KMV1A-M MicroVMS X.25 link level	QZZ37
RSX-11S, RSX-11M	
KMS11-BD/BE, KMS1P-M	QJ757
KMV1A-M	QJS97
RSX-11M-PLUS	
KMS11-BD/BE, KMS1P-M	QJ770
KMV1A-M	QJS97



Section 5

Distributed Applications

This section contains the following topics...

Integrated Personal Computing

DECnet System Services

Business Communications



Distributed Applications

Distributed applications support large network environments, allowing network resources to be accessed as readily as if they were on a single system.

This section describes the following distributed applications, which enhance the value and usefulness a network delivers:

- **Integrated Personal Computing**—These applications allow personal computers to participate in a DECnet network and to share network resources such as printers and disks. PC users can share data with other DECnet users, and connect their PCs as terminals to DECnet nodes.
- **DECnet System Services**—These services simplify network use and allow a user to access network resources as if those resources were on the user's system. They also allow a system manager to remotely control systems in the network.
- **Business Communications**—These applications allow users to exchange mail in a multivendor environment, to participate in online conferencing, and to share videotex information-retrieval services.

Because customers must access and retrieve information easily, they require high performance regardless of network topology and a consistent interface for distributed resources. Digital's distributed applications provide efficient access to information in Digital and multivendor networking environments.

Digital's Integrated Personal Computing combines the advantages of MS-DOS personal computing with the power of VMS to provide comprehensive desktop solutions in a multivendor, enterprise-wide networked environment. Integrated Personal Computing solutions create an environment that gives customers more features, functions, and growth potential than a PC local area network, with competitive performance and price.

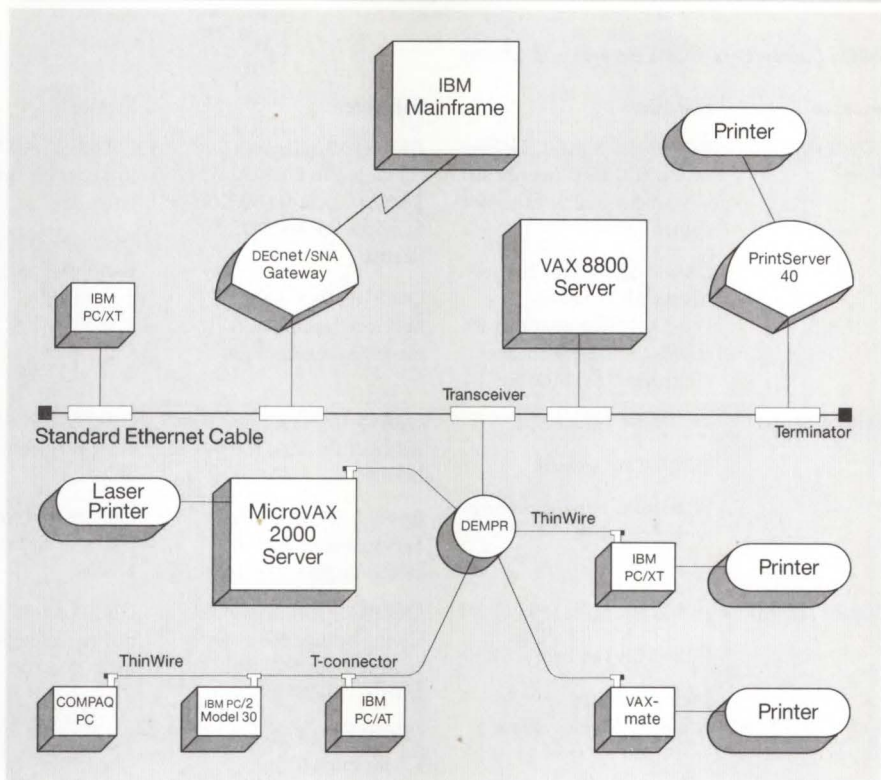
Digital's PC integration products are based on international industry standards such as OSI, MS-Net, MS-DOS, and NETBIOS. They implement Digital's Personal Computing Systems Architecture (PCSA) to extend the MS-DOS desktop environment to the DECnet/VMS environment. PCSA transparently integrates the personal, departmental, and enterprise computing environments to offer

- Shared files, data, and applications.
- Centralized, simplified management of PC resources.
- Flexible, incremental growth.
- Multivendor support.

The integrated personal computing solution, which combines VAX/VMS systems and personal computers in a server/client relationship, includes

- VAX and MicroVAX server computers running VAX/VMS Services for MS-DOS and DECnet-VAX software, and
- Networked personal computers running DECnet/PCSA Client software, which includes DECnet-DOS.

Integrated Personal Computing Environment



NBG-197-00

VAX/VMS Services for MS-DOS, which runs on a VAX or MicroVAX server, acts like an extension to the local MS-DOS system, making facilities such as VMS files, VMS directories, or VAX printers appear as MS-DOS equivalents. This capability allows simple interchange of data between PC and VAX-based applications. MS-DOS applications adhering to the NETBIOS programming interface standard can be used without software modification.

The license for VAX/VMS services for MS-DOS is included with the DECnet-VAX license at no additional charge. Customers can purchase the DECnet/PCSA Client license, which allows personal computers to run software that communicates with VAX/VMS Services for MS-DOS, in the following ways:

- As DECnet/PCSA Client software-only option.
- As part of the PC Network Packages, which include appropriate PC network hardware for running the DECnet/PCSA Client software.
- As part of the PC Integration Packages for MicroVAX II or 2000, which combine the server license, three client licenses, and appropriate network hardware.

Integrated Personal Computing

The following table summarizes the products available for PCSA servers and clients.

Product Summary of PCSA Servers and Clients

Processor	Hardware	Software	Service	Options
VAX/MicroVAX Server	DEPCA-RA Starter Kit for MicroVAX 2000 Server, or DESVA-AA 802.3/Ethernet controller DEPCA-SA Starter Kit for MicroVAX II Server, or DESTA-AA for adapting a standard 802.3/Ethernet controller to ThinWire	DECnet-VAX license (included in DEPCA-RA/SA): includes VAX/VMS Services for MS-DOS license Q*A93-H VAX/VMS Services for MS-DOS media/documentation	QS938-SZ PCSA DECstart (first server installation only) Q*A93-** DECsupport, Basic, Self-maintenance	Not applicable
VAXmate Server	PC500-BA (green) PC500-CA (amber) RCD3x-FC expansion box with hard disk	Q6A93-UZ VAXmate Services for MS-DOS license Q6A93-H7 VAXmate Services for MS-DOS media/documentation	QS939-SZ PCSA DECstart (first service installation only) Q6A93-*7 DECsupport, Basic, or Self-maintenance service	FP287 Math Coprocessor PC50X-MA 2-MB RAM
VAXmate Client	PC500-BA (green) PC500-CA (amber) Includes DECnet/PCSA Client VAXmate license	Q6ZP3-UZ DECnet/PCSA Client license (one required per PC; included with PC500) Q6ZP3-H* DECnet/PCSA Client media/documentation (one copy per network)	Q6ZP3-3*/3Z Self-maintenance Service/Right-to-copy	PC50X-AA 2-MB RAM FP287 Math Coprocessor PC50X-MA Modem RCD3x-FC expansion box with hard disk
IBM PC/XT/AT, PS/2 Model 30, and Selected Compatible Clients	DEPCA-KA/DEPCB-V* IBM PC Network Integration Pkg ¹ or DEPCA-BA/DEPCB-B* PC network Services Pkg ² (Both include QBZP3-UZ DECnet/PCSA Client PC license), or a supported third-party Ethernet controller ¹	QBZP3-U* DECnet/PCSA Client PC license ² (one required per PC; included in DEPCA-KA/BA) QBZP3-H* DECnet/PCSA Client media/documentation (one copy per network)	QBZP3-3*/3Z Self-maintenance Service/Right-to-copy	DEPCA-AU for direct connection to standard 802.3/Ethernet cable); VSXXX-AA mouse
PS/2 Models 50/60/80 Client	Asynchronous support only	QBZP3-UZ DECnet/PCSA Client license (one required per client) QBZP3-H* DECnet/PCSA Client media/documentation (one copy per network)	QBZP3-3*/3Z Self-maintenance Service/Right-to-copy	
Standalone VAXmate	PC500-BA (green) PC500-CA (amber) RCD3x-FC expansion box with hard disk	Q6005-A7 license, media, and documentation for standalone use	Q6005-*7 DECsupport, Basic, or Self-maintenance Service	PC50X-AA 2-MB RAM FP287 Math Coprocessor PC50X-MA Modem

*▲ Refer to the product order code tables to complete the order code.

¹▲ Refer to Software Product Description 55.07 for supported configurations.

²Quantity pricing available.

VAX/VMS Services for MS-DOS and DECnet/PCSA Client

VAX/VMS Services for MS-DOS allows the VAXmate, IBM PC, IBM PC/XT, IBM Personal Computer AT, IBM PS/2, and selected PC compatibles to act as clients to VAX or MicroVAX servers in a local area network. The PC clients use selected facilities and services of the server system, and can access information and services on other types of systems in DECnet networks.

VAX/VMS Services for MS-DOS consists of networking and server software. VAX/VMS Services for MS-DOS implements Digital's Personal Computing Systems Architecture (PCSA), which integrates industry-standard personal computing into larger-scale multiuser computing environments. The network software is based on an adaptation of MS-NET, which allows it to be used in a DECnet-based network.

VAX/VMS Services for MS-DOS provides file services, disk services, print services, file transfer, and network management and control. It also offers remote boot capability for VAXmates and for PCs equipped with Digital's DEPCA 802.3/Ethernet controller.

DECnet/PCSA Client software includes DECnet-DOS and MS-NET networking software, NETBIOS interface support, VT200-series terminal emulation, Microsoft's MS-Windows, DOS operating system enhancements, and an Online User Information System. MS-DOS is included for VAXmate; PC-DOS or MS-DOS is a prerequisite for other PCs.

With DECnet/PCSA Client software, VAXmate and PC systems function as clients in the integrated personal computing (PCSA) environment, utilizing the services provided by a VAX or MicroVAX configured as a server.

DOS applications adhering to the NETBIOS programming interface standard can be used without modification with DECnet/PCSA Client and VAX/VMS Services for MS-DOS software. In the PCSA environment, the same NETBIOS applications can run on local area and wide area DECnet networks, and can communicate with other DECnet applications.

Features

- 802.3/Ethernet-based communications for high-speed data exchange.
- Asynchronous communication for lower-speed remote data access.
- Access to VAX-based server systems to provide centralized application and data storage, file and record sharing, centralized system management, and the ability to share resources such as laser printers and disk storage.
- Full compatibility with Digital's DECnet family of networking products.
- Industry-standard compatibility for running off-the-shelf MS-DOS applications software.

Prerequisite Hardware

- Server systems: Any valid VAX or MicroVAX system connected to the same local area network as the PC clients.
- Client systems: Several IBM personal computers, selected PC compatibles, and selected third-party Ethernet controllers are supported.

▲ Refer to Software Product Description (SPD) 30.50 for more information on VAX/VMS Services for MS-DOS, SPD 55.09 for more information on VAXmate Services for MS-DOS, SPD 55.07 for more information on PC configurations, and SPD 55.10 for more information on VAXmate configurations.

Integrated Personal Computing

Prerequisite Software

- VAX or MicroVAX server systems: VMS or MicroVMS operating system and DECnet-VAX.
- IBM PC client systems: PC DOS V3.20 or V3.30
- COMPAQ client systems: COMPAQ MS-DOS V3.20 Rev A or V3.30
- VAXmate client systems: no prerequisites

Ordering Information

Customers do not purchase a license to run VAX/VMS Services for MS-DOS, as this license is included with the DECnet-VAX license. The license to use the DECnet/PCSA Client software for the IBM PC may be purchased

- As described in the following information.
- As part of the PC Network Integration Package or PC Network Services Package, which combines the Client license with appropriate network hardware. ▲ Refer to “PC Network Integration Package and PC Network Services Package” in this section for more information.
- As part of the PC Integration Packages for MicroVAX 2000 and MicroVAX II, which combine the DECnet-VAX server license, client licenses, and appropriate network hardware. ▲ Refer to “PC Integration Packages for MicroVAX 2000 and MicroVAX II” in this section for more information.

Follow these instructions to purchase VAX/VMS Services for MS-DOS and the DECnet/PCSA Client software.

- For VAXmate clients, order
 - A DECnet/PCSA Client license (Q6ZP3-Ux) for each VAXmate that will run the DECnet/PCSA Client software. This license includes the license to use DECnet-VAXmate. License packages are available for multiple VAXmate clients as indicated in the DECnet/PCSA Client Software Order Code Table.
 - At least one copy of the binaries and documentation for the VAXmate clients. (One copy may be used to load multiple VAXmates.)
- For IBM PC and PC-compatible clients, order
 - A DECnet/PCSA Client license (QBZP3-Ux) for each PC that will run the DECnet/PCSA Client software. This license includes the license to use DECnet-DOS. License packages are available for multiple PC clients as indicated in the DECnet/PCSA Client Software Order Code Table.
 - At least one copy of the binaries and documentation for the IBM PC or PC-compatible clients. (One copy may be used to load multiple PCs.)
- For the server system, order the binaries and documentation (Q*A93-H#) for the VAX or MicroVAX system that will run VAX/VMS Services for MS-DOS.
- To realize a smooth installation, new sites should order the PCSA DECstart Integration Service for MS-DOS (QS938-SZ) from Software Services.

Integrated Personal Computing

VAX/VMS Services for MS-DOS Server Software Order Code

Option	Order Code
Distribution and documentation	Q*A93-H#
Supported processors (): MicroVAX II (Z); VAX-11/725/730 (C); VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M); VAX 8974/8978 (2)	
#Supported media: 3, 5, M	

DECnet/PCSA Client Software Order Codes

Option	Order Code	
Licenses (A license is required for each CPU.)	VAXmate	IBM PC and Compatibles
Single-use license	Q6ZP3-UZ	QBZP3-UZ
64-pack license	Q6ZP3-U6	QBZP3-U6
96-pack license	Q6ZP3-U7	QBZP3-U7
128-pack license	Q6ZP3-U8	QBZP3-U8
192-pack license	Q6ZP3-U9	QBZP3-U9
500-pack license	Q6ZP3-UB	QBZP3-UB
1000-pack license	Q6ZP3-UC	QBZP3-UC
Distribution		
Distribution and documentation	Q6ZP3-H3	QBZF7-HB
	Q6ZP3-H5	QBZF7-HI
		QBZF7-H5
Software revision right-to-copy	Q6ZP3-HZ	QBZF7-HZ

PC Network Integration Package and PC Network Services Package

The PC Network Integration Package and PC Network Services Package allow the IBM PC, PC/XT, Personal Computer AT, PS/2 Model 30, and selected PC compatibles to participate in 802.3/Ethernet local area networks using VAX/VMS Services for MS-DOS software.

The PC Network Services Package includes

- DEPCA 802.3/Ethernet/mouse controller for the IBM PC.
- ThinWire 802.3/Ethernet cable kit.
- License to use DECnet/PCSA Client software. **▲ For more information on DECnet/PCSA Client, refer to "VAX/VMS Services for MS-DOS and DECnet/PCSA Client" in this section.**

The PC Network Integration Package includes all the components in the PC Network Services Package, plus a Digital keyboard and three-button mouse. (This package varies for each country.) The Digital keyboard displays GOLD KEY labels for ALL-IN-1 and WPS-PLUS, as well as IBM PC labels.

Ordering Information

To order individual PC Network Integration Packages or PC Network Services Packages, follow these instructions.

- For each personal computer, order one PC Network Integration Package or one PC Network Services Package as described in the following Order Code Table.

Integrated Personal Computing

- Order at least one copy of the binaries and documentation for the DECnet/PCSA Client software. ▲ Refer to “VAX/VMS Services for MS-DOS and DECnet/PCSA Client” in this section for ordering information.
- To realize a smooth installation, new sites should order the PCSA DECstart Integration Service for MS-DOS (QS938-SZ) from Software Services.

In addition to being a component of the PC Network Packages, the DEPCA-AA 802.3/Ethernet controller is available as a module-only option, typically purchased when using non-DECnet network software or when upgrading client PCs from asynchronous to 802.3/Ethernet communications. ▲ For more information, refer to “802.3/Ethernet Communications Controllers” in Section 2.

Three PC Network Packages are bundled into the PC Integration Packages at a lower cost. ▲ For more information, refer to “PC Integration Packages for MicroVAX 2000 and MicroVAX II” in this section.

PC Network Packages Order Codes

Option	Order Code
PC Network Integration Package includes DEPCA-AA ThinWire 802.3/Ethernet/mouse controller and ThinWire cable kit, Digital VSXXX-AA three-button mouse, LK250 keyboard with cable for IBM PC family, DECnet/PCSA Client single-use software license, Personal Workstation Handbook, and DEPCA Owner's Manual.	DEPCA-KA DEPCB-V*
PC Network Services Package includes DEPCA-AA ThinWire 802.3/Ethernet/mouse controller, ThinWire cable kit, DECnet/PCSA Client single-use software license, and DEPCA Owner's Manual.	DEPCA-BA DEPCB-B*

*Variations for local language keyboards are: A (English), C (Canadian French), D (Danish), E (Canadian Bilingual), F (Finnish), G (German), I (Italian), K (Swiss French), L (Swiss German), M (Swedish), N (Norwegian), P (French), S (Spanish), T (Hebrew)

PC Integration Packages for MicroVAX 2000 and MicroVAX II

The PC Integration Packages for MicroVAX 2000 and MicroVAX II reduce the entry-level cost of connecting IBM PCs and selected compatibles to MicroVAX server systems over an 802.3/Ethernet local area network using VAX/VMS Services for MS-DOS and PCSA Client software. Each PC Integration Package provides the components to link three PCs to a MicroVAX system in a local area network.

The PC Integration Package for the MicroVAX II includes

- One IBM PC Network Integration Package (DEPCA-KA) and two PC Network Services Packages (DEPCA-BA). ▲ Refer to “PC Network Integration Packages and PC Network Services Package” in this section for a detailed description.
- One QZD04-UZ DECnet-VAX end-node license, which includes the license to use VAX/VMS Services for MS-DOS on a MicroVAX server system.

The PC Integration Package for the MicroVAX 2000 includes all the components in the MicroVAX II package, plus the DESVA-AA 802.3/Ethernet communications controller for the MicroVAX 2000.

Integrated Personal Computing

Prerequisite Hardware

An 802.3/Ethernet communications controller might be needed for early MicroVAX II systems that did not include the controller with the purchase of the system.

Ordering Information

Order the following:

- A PC Integration Package for either the MicroVAX II or 2000.
- The binaries-and-documentation kit for VAX/VMS Services for MS-DOS.
▲ Refer to "VAX/VMS Services for MS-DOS and DECnet/PCSA Client" in this section for the order codes.

The binaries and documentation for DECnet-VAX are included with the binaries and documentation for VMS V5.0.

- The binaries-and-documentation kit for DECnet/PCSA Client software.
▲ Refer to "VAX/VMS Services for MS-DOS and DECnet/PCSA Client" in this section for the order codes.
- To realize a smooth installation, new sites should order the PCSA DECstart Integration Service for MS-DOS (QS938-SZ) from Software Services.

Cables for 802.3/Ethernet are not included because existing networks and physical arrangements can vary.

PC Integration Package Order Codes

Option	Order Code
PC Integration Package for MicroVAX II	DEPCA-SA
PC Integration Package for MicroVAX 2000. Includes one DESVA-AA 802.3/Ethernet communications controller.	DEPCA-RA

DECnet System Services (DSS) is a set of networking products that make a network of VAX systems—including single systems, VAXclusters, and Local Area VAXclusters—appear to be a single system for many key functions. DSS allows users to share and manage network resources as easily as if these resources were directly attached to the local system. DSS products include

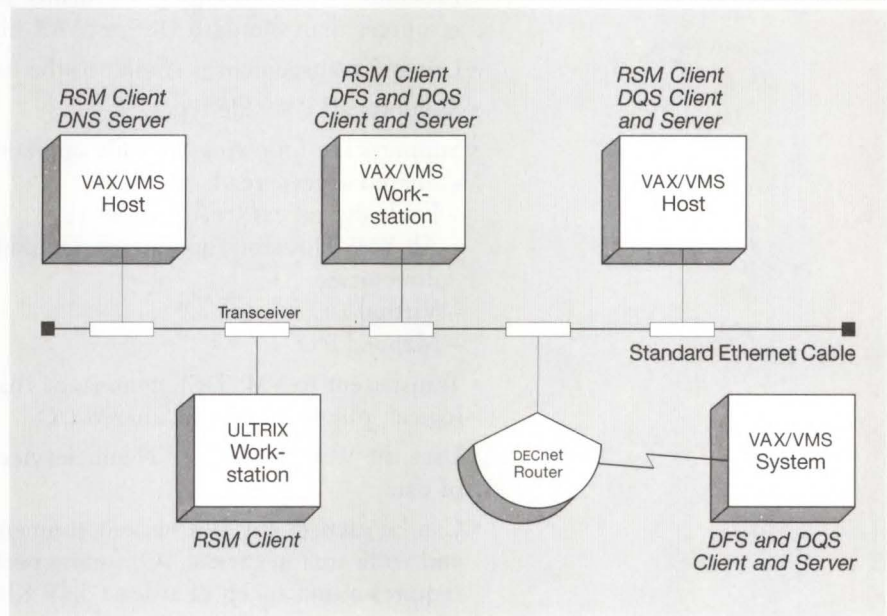
- **VAX Distributed File Service (DFS)**—offers high-performance, network-wide file operations.
- **VAX Distributed Queuing Service (DQS)**—provides distributed use and management of network printing resources.
- **Remote System Manager (RSM)**—provides system management services for multiple VMS and ULTRIX systems in a distributed environment.
- **VAX Distributed Name Service (DNS)**—provides a network-wide base of names for distributed applications.

Because all DSS products are transparent to existing applications, applications do not have to be rewritten. Also, the average VAX user does not have to be retrained to use the DSS facilities.

Features

- Provides an easy mechanism for individual systems, VAXclusters, and Local Area VAXclusters to share data, printers, and system management resources.
- Files and printers do not have to be duplicated throughout a network because these resources can be made available to anyone needing access.
- One system manager can manage multiple networked systems.
- Transparency to applications makes it unnecessary to rewrite programs to take advantage of DSS.
- Provides for various management styles ranging from fully centralized to fully distributed network management.
- Provides network transparency to both users and applications.
- Supports local and wide area networks, and cluster topologies.

DECnet System Services Configuration



NBG-111-00

VAX Distributed File Service (DFS)

The VAX Distributed File Service (DFS) is a VMS layered product that provides DECnet-VAX users with high-speed, transparent access to files stored on remote VMS disks as if they were on local disks. DFS supports applications that use virtual I/O and do not require write sharing.

Using DFS, directory structures (a directory and all of its subdirectories) can be made available to other DFS nodes. These directory structures are given names which are registered with the VAX Distributed Name Service. The VAX Distributed Name Service provides location independence between the "name" that is associated with a directory structure and the physical location of that directory structure. If this directory structure were moved to a different location, only a single update is required. After this single update, all DFS nodes automatically use the new location.

DFS nodes that wish to access distributed directory structures simply specify the name of the directory structure, using the mount command supplied with DFS.

A DFS license is required on each VMS node that either makes a directory structure available to other users, or wants to access remote directory structures.

DECnet System Services (DSS)

Features

- Provides users with high performance file access while using fewer CPU resources than standard DECnet-VAX file access.
- Use and management is similar to the use and management of a local disk.
- Supports all VMS file types.
- Supports the following VMS file operations:
 - Shared access (read)
 - Exclusive access (read and write)
 - All VMS Directory operations, including the creation and deletion of directories
 - Virtual I/O
 - Mapped I/O
- Transparent to VMS DCL commands that do not manipulate identifiers, use logical, physical, or write-shared I/O.
- Uses the VAX Distributed Name Service to provide location independence of data.
- Can be used in any DECnet environment, including local area networks and wide area networks. (Optimum performance for directory operations requires a link speed of at least 56.0 Kb/s.)
- Provides file security through standard VMS proxy mechanism.
- Performs end-to-end checksum to guard against network faults.

Required Hardware

Any valid VAX or MicroVAX system with VMS or MicroVMS configured to operate on a DECnet network. ▲ **Refer to the software order code table for a list of supported processors.**

Prerequisite Software

- VMS or MicroVMS operating system, V4.4 or later (MicroVMS Base Component required)
- DECnet-VAX, V4.4 or later
- VAX Distributed Name Service, V1.0

DECnet System Services (DSS)

Distributed File Service Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-VEQA*-AA
Cluster member ²	QL-VEQA*-AB
Initial license, primary and cluster ³	QL-VEQA*-CA
Monthly rental, single-use ³	QL-VEQA*-DA
Monthly rental, cluster ³	QL-VEQA*-DB
Software revision right-to-copy	QL-VEQA*-HZ
Materials and Installation	
Distribution and documentation	QA-VEQAA-H#
Documentation only	QA-VEQAA-GZ
Installation service	QT-VEQA*-I#
U.S. Software Services⁴	
DECsupport service	QT-VEQA*-9#
Basic service	QT-VEQA*-8#
Self-maintenance service	QT-VEQA*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), TK50 (5), RX33 (7)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

VAX Distributed Queuing Service

The VAX Distributed Queuing Service (DQS) uses DECnet to extend the standard VMS print queue service, enabling users to print jobs on printers distributed across a local or wide area network, and monitor or change parameters of the job after it is queued.

DQS operates within the client/server environment: Print requests originate from a client node, and are directed to server nodes that provide print services. Any node with DQS software can be configured to operate as client only or as both client and server. DQS does not limit the number of client or server nodes, or queues. The system manager creates the queues and establishes the correspondence between client queues and queues on server nodes.

DECnet System Services (DSS)

Features

- Supports local and wide area networks, allowing multiple VMS systems to share printers.
- Provides completely transparent support for most qualifiers of the VMS PRINT command.
- Attempts to transfer a print job whenever a server becomes available, if it was previously inaccessible.
- DQS server queues can be configured to direct print jobs to a different queue if a printer is unavailable.
- Allows additional DQS queues and DQS nodes to be added without reinstalling DQS.
- Can be configured to limit access to servers, and to keep usage records.

Required Hardware

Any valid VAX or MicroVAX system with VMS or MicroVMS configured to operate on a DECnet network. ▲ **Refer to the software order code table for a list of supported processors.**

Prerequisite Software

- VMS or MicroVMS operating system, V4.4 or later (MicroVMS Base Component required)
- DECnet-VAX, V4.4 or later

DECnet System Services (DSS)

Distributed Queuing Service Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-VENA*-AA
Cluster member ²	QL-VENA*-AB
Initial license, primary and cluster ³	QL-VENA*-CA
Monthly rental, single-use ³	QL-VENA*-DA
Monthly rental, cluster ³	QL-VENA*-DB
Software revision right-to-copy	QL-VENA*-HZ
Materials and Installation	
Distribution and documentation	QA-VENAA-H#
Documentation only	QA-VENAA-GZ
Installation service	QT-VENA*-I#
U.S. Software Services⁴	
DECsupport service	QT-VENA*-9#
Basic service	QT-VENA*-8#
Self-maintenance service	QT-VENA*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), TK50 (5), RX33 (7)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

VAX Distributed Name Service (DNS)

The VAX Distributed Name Service (DNS) provides a network-wide name service to select Digital distributed applications. (The initial release of DNS does not include a programmer's interface.) DNS provides these select Digital application programs with the ability to create, read, modify, and delete the names and characteristics of network resources.

DNS presents a consistent, network-wide set of names, called the namespace, which allows users to refer to resources using the same name from any node in the network, without knowing where the resource is located.

The name service is implemented using a client/server model, with the node running DNS acting as the server. Client software is provided within Digital applications that use DNS.

DECnet System Services (DSS)

DNS provides a network-wide name service when it is installed on a single node. DNS can be installed on additional nodes in a network to provide availability and performance benefits. As a general rule, it is suggested that the DNS be placed on two nodes in each local area network to provide adequate performance and redundancy for most network topologies.

DNS stores name information in databases on DNS nodes. When more than one DNS node is present in the network, these nodes cooperate to maintain consistent databases. Overall availability of the name service can be enhanced by replicating some or all of the directories on multiple DNS nodes.

Features

- Provides a consistent network-wide set of names that allows selected applications to refer to network resources using the same name from any node in the network.
- Provides access control to each name stored in the name service on a per-user basis.
- Includes a DNS management control program to control DNS operation and display statistical and error information.
- Provides network event logging using the DECnet-VAX event logging facility. (The DECnet-VAX NCP utility can be used to enable and disable name service events.)

Required Hardware

Any valid VAX or MicroVAX system with VMS or MicroVMS configured to operate on a DECnet network. ▲ **Refer to the software order code table for a list of supported processors.**

Prerequisite Software

- VMS or MicroVMS operating system, V4.4 or later (MicroVMS Base Component required)
- DECnet-VAX, V4.4 or later

Distributed Name Service Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-VERA*-AA
Cluster member ²	QL-VERA*-AB
Initial license, primary and cluster ³	QL-VERA*-CA
Monthly rental, single-use ³	QL-VERA*-DA
Monthly rental, cluster ³	QL-VERA*-DB
Software revision right-to-copy	QL-VERA*-HZ
Materials and Installation	
Distribution and documentation	QA-VERAA-H#
Documentation only	QA-VERAA-GZ
Installation service	QT-VERA*-I#
U.S. Software Services⁴	
DECsupport service	QT-VERA*-9#
Basic service	QT-VERA*-8#
Self-maintenance service	QT-VERA*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RX33 (7), TK50 (5)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

Remote System Manager

Remote System Manager (RSM) is a network application that centralizes and facilitates the recurring system management tasks of

- Distributing and installing software.
- Backing up and restoring files across the network.
- Tracking software configurations among participating systems.

The Remote System Manager environment consists of a number of VMS or ULTRIX-32 systems configured with DECnet on a local area or wide area network. One system is the server, running VMS, and the others are clients, running VMS or ULTRIX-32. The server provides services to clients that are defined in the server's registration and network databases.

DECnet System Services (DSS)

The Remote System Manager server software comprises a menu interface and a set of management tools. The primary user interface consists of two main menus: an installation menu and a management menu. The installation menu is used to perform the initial registration and software installation of clients. The management menu is used to perform ongoing, repetitive management tasks. The management tools perform such functions as initial software installation, application tools management, file backup, file restoration, distribution of RSM logical names, RSM symbols and the DECnet database, and remote execution of single DCL commands.

RSM supports most members of the VAX family as clients. RSM networks can comprise multiple servers, distributing the support of a broad client base.

Features

- Centralized software installation and updating relieves users of system management responsibilities and ensures current versions of applications and tools. Centralized file backup relieves users of file backup at the workstation.
- Reduced need for system support resources at client site provides greater flexibility for system placement, and lowers operating costs.
- Supports VMS and ULTRIX-32 operating systems.
- Supports wide area, local area, and large networks. Allows flexibility in balancing system management among servers in such networks.
- Supports clusters as clients.
- Simplifies system management for larger, wide-area networks and minimizes the costs associated with systems support personnel.
- Useful for managing networks of VAX and MicroVAX systems, each of which might be serving several PCs using VAX/VMS Services for MS-DOS.

Required Hardware

- **▲ For the RSM server, refer to the appropriate order code table for supported processors.**
- For the RSM client, all VAX and MicroVAX systems. **▲ Refer to the appropriate order code table for supported processors.** At least one client must have a load device, such as a TK50 tape drive. **▲ Refer to Software Product Description 29.59 for specific system and disk storage requirements.**

Software Requirements

- For VMS servers and clients:
 - VMS V4.4 through V4.7
 - DECnet-VAX V4.2 through V4.5
 - VAX Distributed Name Service (DNS) installed on at least one node in the network (two are recommended) and accessible to the RSM server via DECnet
- For ULTRIX-32 clients:
 - ULTRIX-32, V2.0 through V2.2
 - DECnet-ULTRIX-32
 - ULTRIX-32 worksystem software

Note: For installation of operating system software, both the RSM server and client must be in the same LAN or extended LAN.

DECnet System Services (DSS)

Remote System Manager VMS Server Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-B13A*-AA
Cluster member ²	QL-B13A*-AB
Initial license, primary and cluster ³	QL-B13A*-CA
Monthly rental, single-use ³	QL-B13A*-DA
Monthly rental, cluster ³	QL-B13A*-DB
Software revision right-to-copy	QL-B13A*-HZ
Materials and Installation	
Distribution and documentation	QA-B13AA-H#
Documentation only	QA-B13AA-GZ
Installation service	QT-B13A*-I#
U.S. Software Services⁴	
DECsupport service	QT-B13A*-9#
Basic service	QT-B13A*-8#
Self-maintenance service	QT-B13A*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RX33 (7), TK50 (5)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

DECnet System Services (DSS)

Remote System Manager Client Software Order Codes

Option	VMS	ULTRIX-32 ⁵
Licenses (A license is required for each CPU.)		
Single-use or first license for VAXcluster ¹	QL-B14A*-AA	Q*ZEZ-UZ
Cluster member	QL-B14A*-AB ²	
Initial license, primary and cluster ³	QL-B14A*-CA	Q*ZEZ-1P
Monthly rental, single-use ³	QL-B14A*-DA	Q*ZEZ-JP
Monthly rental, cluster	QL-B14A*-DB ³	
Software revision right-to-copy	QL-B14A*-HZ	Q*ZEZ-HZ

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RX33 (7), TK50 (5)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730 for VMS.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650 for VMS.

⁴For service agreements in other countries, consult a local Digital sales representative.

⁵ULTRIX-32 Client Software not available for VAX 6210, VAX 6220, VAX 6230, VAX 6240, VAX 8530, VAX 8810, VAX 8820, VAX 8840, VAX 8974, VAX 8978, MicroVAX I, VAXstation I, or VAXstation 8000.

The following applications supply answers for specific multivendor requirements:

- **MAILbus Electronic Mail Interchange**—Electronic mail and messaging services allows users and application programs to exchange mail or messages in a multivendor environment. These services are based on the CCITT X.400 standard for message handling.
- **VAX Notes**—A computer conferencing software product, VAX Notes allows users to create and access online conferences.
- **VAX VTX**—Videotex is a distributed information retrieval service that the user can navigate by selecting choices from a menu. VAX VTX, a software product layered on VMS, provides videotex services compliant with CCITT F.300 regulations.

MAILbus Electronic Mail Interchange

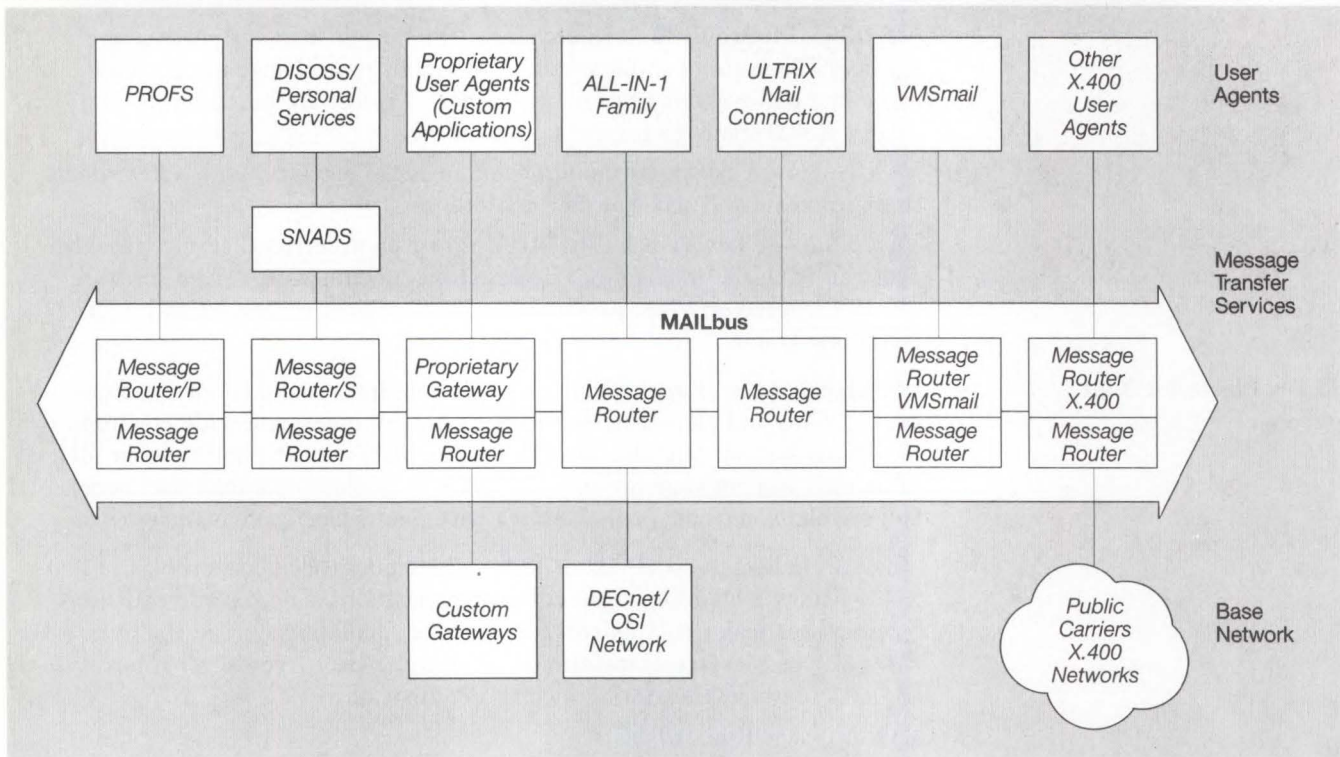
MAILbus is a set of applications software that links multivendor electronic mail systems and messaging applications into an enterprise-wide electronic messaging system. MAILbus provides a company with the ability to tie all of its mail systems together in a corporate-wide electronic mail backbone, and enables electronic mail exchange with public electronic mail systems.

Messages delivered on MAILbus follow the model specified in the CCITT X.400 Message Handling System Recommendations. The recommendations outline three major components for a message-handling system, the OSI network, the Message Transfer Service, and the User Agents. MAILbus is Digital's Message Transfer Service and consists of

- **VAX Message Router Base.**
- **VAX Message Router VMSmail Gateway.**
- **ULTRIX Mail Connection.**
- **VAX Message Router/S Gateway (for IBM SNADS).**
- **VAX Message Router/P Gateway (for IBM PROFS).**
- **VAX Message Router X.400 Gateway.**
- **VAX MAILGATE for MCI Mail.**
- **VAX Message Router Programmer's Kit (API).**

Business Communications

Digital's Distributed Electronic Messaging Solution Components



NBG-152-00

VAX Message Router

VAX Message Router is a key component of the MAILbus. It is a layered VMS application that provides a store-and-forward message transfer service, a directory service, and a messaging network management service. Messages can consist of any information, including text, data and arbitrary files, that need to be transferred within a DECnet network.

Electronic mail user agents, such as ALL-IN-1 or DECmail-11, attach directly to MAILbus to access network store-and-forward services. Other user agents, such as VMSmail, attach to MAILbus through Gateway products, which include VMSmail, MCI Mail, UNIX System V, IBM SNADS, and IBM PROFS. An additional product, the Message Router X.400 Gateway, adapts MAILbus to run in a fully compliant OSI environment.

In order to access the store-and-forward services of Message Router, a user agent or gateway must perform some or all of the following functions:

- Format and display messages.
- Interact with Message Router to send or receive messages.
- Convert a received message from Message Router format to the application format.
- Convert a sending application format into the Message Router format.

Message Router must be installed on any network node that contains user agents or gateways that require connection to MAILbus. It is a standard component of ALL-IN-1 and PC ALL-IN-1 configurations, all Mail Gateways, and Message Router Programmer's Kit.

▲ For more information, refer to Software Products Description 26.33.

Features

- Used by Mail Agents and Gateways to exchange messages in a Digital-only or multivendor environment.
- Logs the progress of messages and informs the sending application if not deliverable. Messages that cannot be immediately delivered are retained in a Message Router node until they can be forwarded. (The system manager controls the number and frequency of retries before the Message Router returns a message to the sender as undeliverable.)
- May be installed in selected VMS nodes along a routing path to store messages that may, for example, be retained for transmission at off-peak hours, or logged into a central, record-keeping node for accounting or statistical analysis.
- May be used by any application adhering to Message Router or X.400 protocols that needs to transfer data in a multivendor environment.
- Used by mail gateways to convert messages addresses between their MAILbus form and the form used in the foreign mail systems.
- Contains application management services for automated system management, including exception reporting and Management Action Procedures (MAPS), which allow an organization to significantly reduce mail network management costs.
- Provides a procedure to configure a simplified, low-management network with the ability to easily reconfigure the network to allow for expansion.

VAX Message Router Base

The VAX Message Router Base is supplied as a separate package for installation with customer-written Message Router applications. Also, it may be installed on selected VMS nodes along a routing path, wherever there is a need to store and log messages in transit. This allows for a centrally managed message transfer service.

Required Hardware

Any valid VAX, MicroVAX, or VAXstation system configuration that supports the DECnet Phase IV network. ▲ **Refer to the order code table for a list of supported processors.**

Prerequisite Software

- VMS or MicroVMS operating system V5.0
- DECnet-VAX, V5.0

Business Communications

Message Router Base Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-732A*-AA
Cluster member ²	QL-732A*-AB
Initial license, primary and cluster ³	QL-732A*-CA
Monthly rental, single-use ³	QL-732A*-DA
Monthly rental, cluster ³	QL-732A*-DB
Software revision right-to-copy	QL-732A*-HZ
Materials and Installation	
Distribution and documentation	QA-732AA-H#
Documentation only	QA-732AA-GZ
Installation service	QT-732A*-I#
U.S. Software Services⁴	
DECsupport service	QT-732A*-9#
Basic service	QT-732A*-8#
Self-maintenance service	QT-732A*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), VAXstation II (Q), VAXstation 2000 (R), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D)

#Supported media (#): Magtape, 1,600 bpi (M), RX01 (Y), RX33 (7), TK50 (5), TU58 (G)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

VAX Message Router VMSmail Gateway

VAX Message Router VMSmail Gateway is a layered VMS application that allows VMSmail users to send and receive mail in a network from other systems that use the MAILbus. The VMSmail Gateway package contains the Message Router Base and the Gateway to the VMS Personal Mail Utility.

Features

- Allows VMS mail users to exchange messages using Message Router store-and-forward management, thus ensuring guaranteed delivery.
- Allows VMS mail users to exchange messages with users of other mail agents on the MAILbus.
- Allows VMS mail users to exchange messages with the users of non-Digital supplied mail systems via the X.400 Gateway, Message Router/S Gateway, or Message Router/P Gateway.
- Converts incoming Digital DX format and WPS-PLUS documents into ASCII before delivering them to the VMSmail user.
- Includes management tools to configure and operate the Gateway.

Business Communications

Required Hardware

Any valid VAX, MicroVAX, or VAXstation system configuration that supports the DECnet Phase IV network. ▲ Refer to the order code table for a list of supported processors.

Prerequisite Software

- VMS or MicroVMS operating system V4.4 or later
- DECnet-VAX

Message Router VMSmail Gateway Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-730A*-AA
Cluster member ²	QL-730A*-AB
Initial license, primary and cluster ³	QL-730A*-CA
Monthly rental, single-use ³	QL-730A*-DA
Monthly rental, cluster ³	QL-730A*-DB
Software revision right-to-copy	QL-730A*-HZ
Materials and Installation	
Distribution and documentation	QA-730AA-H#
Documentation only	QA-730AA-GZ
Installation service	QT-730A*-I#
U.S. Software Services⁴	
DECsupport service	QT-730A*-9#
Basic service	QT-730A*-8#
Self-maintenance service	QT-730A*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), VAXstation II (Q), VAXstation 2000 (R), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D)

#Supported media (#): Magtape, 1,600 bpi (M), RX01 (Y), RX33 (7), TK50 (5), TU58 (G)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

ULTRIX Mail Connection

The ULTRIX Mail Connection, an electronic mail product layered on ULTRIX, provides high-performance, direct access to the VMS Message Router and thus to the MAILbus domain and all its gateways and user agents. The product allows ULTRIX users to exchange mail messages with VMS-based users (ALL-IN-1, VMSmail), IBM users (via Message Router/P and Message Router/S Gateways), and X.400-based users (via Message Router/X.400 Gateway). In addition to the gateway, the ULTRIX Mail Connection provides an enhanced mail user agent.

Users on ULTRIX and non-Digital UNIX-based systems can use the ULTRIX Mail Connection as an exchange gateway between any of their UNIX-based systems and MAILbus, enabling effective, simple mail communication between industry standard (UNIX-based systems) and proprietary (VMS) communities.

Note that the ULTRIX Mail Connection gateway handles only ASCII text: Incoming mail messages with non-ASCII body parts, such as WPS-PLUS documents, cause a delivery message to be sent to the ULTRIX recipient with a brief description of the type of message and the sender's name/address, allowing users to make other arrangements.

▲ Refer to Software Product Description 29.05 for further information.

Features

- Provides connectivity between UNIX-based mail and MAILbus through VMS Message Router V3.0.
- Allows ULTRIX users to exchange mail with ALL-IN-1, VMSmail users, plus access X.400, IBM/PROFS, and IBM/SNADS gateways.
- Acts as a gateway between non-Digital UNIX-based systems and MAILbus.

Required Hardware

For ULTRIX, in addition to the minimum ULTRIX hardware requirements for the prerequisite ULTRIX and DECnet software, ULTRIX Mail Connection requires a minimum of 5 Mbyte disk space allocated permanently.

For VMS, in addition to the minimum hardware requirements for the prerequisite VMS and Message Router software, ULTRIX Mail Connection requires 1,000 blocks of (512 Kbytes) disk space allocated permanently.

Required Software

For the ULTRIX system:

- ULTRIX-32 V2.2 or later, or ULTRIX Worksystem Software V1.1 or later
- DECnet-ULTRIX V2.2 or later

For VMS:

- VMS V4.6, V4.7, or V5.0; or MicroVMS V4.6 or V4.7
- Message Router V3.0 or V3.1
- DECnet-VAX V4.6, V4.7, or V5.0

ULTRIX Mail Connection

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-VFGA*-AA
Cluster member ²	QL-VFGA*-AB
Initial license, primary and cluster ³	QL-VFGA*-CA
Monthly rental, single-use ³	QL-VFGA*-DA
Monthly rental, cluster ³	QL-VFGA*-DB
Software revision right-to-copy	QL-VFGA*-HZ
Materials and Installation	
Distribution and documentation	QA-VFGAA-H#
Documentation only	QA-VFGAA-GZ
Installation service	QT-VFGA*-I#
U.S. Software Services⁴	
DECsupport service	QT-VFGA*-9#
Basic service	QT-VFGA*-8#
Self-maintenance service	QT-VFGA*-3#
Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/750 (L), VAX-11/780/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)	
#Supported media (#): RX50 (3), TK50 (5), TU58 (G), RL02 (H), 1,600 bpi magtape (M), RX01 (Y)	
¹ For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.	
² Not available on MicroVAX I, VAXserver I, VAXstation I, or VAX-11/725/730.	
³ Not available on MicroVAX I, VAXserver I, VAXstation I, VAX-11/700 series, or VAX 8600/8650.	
⁴ For service agreements in other countries, consult a local Digital sales representative.	

**VAX Message Router/S Gateway
(for IBM SNADS)**

Message Router/S Gateway is a layered VMS application that allows the transparent exchange of electronic mail, messages, revisable and final-format documents, and MS-DOS files between the users of Digital and IBM Office Networks. The Message Router/S Gateway links IBM systems into a multivendor office network using an international standard (CCITT X.400).

The IBM DISOSS/370 contains the mainframe implementation of Systems Network Architecture Distribution Services (SNADS), which provides a store-and-forward function for the transmission of electronic mail and documents through an SNA network. IBM System 36 and 38, and IBM 5520 also support SNADS, although the connection between DECnet and SNA networks must be through the IBM mainframe. From the Digital office network, WPS-PLUS, ASCII, and Digital Document Exchange (DX) documents and messages are converted to DCA revisable format for transmission to SNADS systems. Documents and messages in DCA format received by the Message Router/S Gateway from the SNADS environment are converted to the Digital DX document format for delivery within the network. MS-DOS files are transferred with no conversion in either direction.

Business Communications

The Message Router/S Gateway need be installed on only one VAX/VMS system in the Digital network, where it serves all Digital network systems that send or receive messages to or from the SNADS environment. The Message Router Base must be installed on the same system as the Message Router/S Gateway. ▲ **Refer to Software Product Description 29.24 for more information.**

Features

- Allows users in the IBM SNADS environment to communicate with any other Message Router User Agent or Gateway on the Digital network (once the appropriate entries are made in the Digital Distributed Directory Services).
- Mail senders need know only the recipient's address. IBM users address Digital users following the conventions of the SNADS environment; Digital users address IBM users following the conventions of the Digital environment.
- Digital and IBM users can be included in the same message address or distribution list.
- Delivery confirmation and non-delivery notification messages are supported.

▲ **For more information about general Message Router capabilities, refer to "Message Router" in this section.**

Required Hardware

- Any valid VAX, MicroVAX, or VAXstation system that supports the DECnet Phase IV network. ▲ **Refer to the order code table for a list of supported processors.**
- One of the following:
 - A properly configured DECnet/SNA Gateway system. ▲ **Refer to Software Product Description 30.15 for specific requirements.**
 - VMS/SNA installed for single-system connection through a synchronous line. ▲ **Refer to Software Product Description 27.01 for specific requirements.**

Prerequisite Software

- VMS or MicroVMS Operating System, V4.4 or later (MicroVMS requires both Extended Base and Program Development components.)
- DECnet-VAX, V4.4 or later
- Message Router Base, V3.0 or later
- DECnet/SNA VMS APPC/LU6.2 Programming Interface, V2.0

Message Router/S Gateway Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-VDUA*-AA
Cluster member ²	QL-VDUA*-AB
Initial license, primary and cluster ³	QL-VDUA*-CA
Monthly rental, single-use ³	QL-VDUA*-DA
Monthly rental, cluster ³	QL-VDUA*-DB
Software revision right-to-copy	QL-VDUA*-HZ
Materials and Installation	
Distribution and documentation	QA-VDUAA-H#
Documentation only	QA-VDUAA-GZ
Installation service	QT-VDUA*-I#
U.S. Software Services⁴	
DECsupport service	QT-VDUA*-9#
Basic service	QT-VDUA*-8#
Self-maintenance service	QT-VDUA*-3#
Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), VAXstation II (Q), VAXstation 2000 (R), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)	
#Supported media (#): Magtape, 1,600 bpi (M), RX01 (Y), TK50 (5), TU58 (G), RX33 (7)	
¹ For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.	
² Not available on MicroVAX, VAXstation, or VAX-11/730.	
³ Not available on MicroVAX, VAXstation, VAX-11/700 series, or VAX 8600/8650.	
⁴ For service agreements in other countries, consult a local Digital sales representative.	

**VAX Message Router/P Gateway
(for IBM PROFS)**

Message Router/P (MR/P) Gateway is a layered VMS application that allows the transparent exchange of electronic mail, messages, revisable and final-form documents, and MS-DOS files between users in a DECnet environment and users in a IBM Professional Office System (PROFS) or Conversational Monitor System (CMS) in an SNA environment. Digital and IBM users employ standard methods to prepare and send documents and messages. MR/P converts mail messages and documents from either environment and forwards them in a format appropriate to the recipient. MR/P can send mail messages and documents from PROFS users to users in the Digital network, SNADS network (via the Message Router/S gateway), and X.400 network (via Message Router X.400 gateway). Communications between DECnet and IBM SNA environments is through a DECnet/SNA gateway or VMS/SNA software.

The Message Router/P Gateway need be installed on only one VAX/VMS system in the Digital network, where it serves all Digital network systems that send or receive messages to or from the PROFS or CMS environment. The Message Router Base must be installed on the same system as the Message Router/P Gateway. **▲ Refer to Software Product Description 28.94 for more information.**

Features

- Allows IBM PROFS or VM CMS users to communicate with any Message Router User Agent or Gateway on the Digital network, once the appropriate entries are made in the Digital Distributed Directory Service. ▲ Refer to “DECnet Distributed Services” in this section for more information on the Distributed Directory Service.
- Mail senders need know only the recipient’s address: PROFS users address Digital users as they would other PROFS users; Digital users address PROFS users as they would other Digital users.
- Digital and IBM users can be included in the same message address or distribution list.
- Delivery confirmation and non-delivery notification messages are supported.

▲ For more information about other Message Router capabilities, refer to the Message Router topic in this section.

Required Hardware

- Any valid VAX, MicroVAX, or VAXstation system that supports the DECnet Phase IV network. ▲ Refer to the order code table for a list of supported processors.
- One of the following:
 - A properly configured DECnet/SNA Gateway system. ▲ Refer to Software Product Description 30.15 for specific requirements.
 - VMS/SNA installed for single-system connection through a synchronous line. ▲ Refer to Software Product Description 27.01 for specific requirements.

Prerequisite Software

- VMS or MicroVMS Operating System V4.4 or later. (MicroVMS requires both Extended Base and Program Development components.)
- DECnet-VAX V4.4 or later
- Message Router Base V3.0 or later
- DECnet/SNA VMS API V2.2

Message Router/P Gateway Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-VCGA*-AA
Cluster member ²	QL-VCGA*-AB
Initial license, primary and cluster ³	QL-VCGA*-CA
Monthly rental, single-use ³	QL-VCGA*-DA
Monthly rental, cluster ³	QL-VCGA*-DB
Software revision right-to-copy	QL-VCGA*-HZ
Materials and Installation	
Distribution and documentation	QA-VCGAA-H#
Documentation only	QA-VCGAA-GZ
Installation service	QT-VCGA*-I#
U.S. Software Services⁴	
DECsupport service	QT-VCGA*-9#
Basic service	QT-VCGA*-8#
Self-maintenance service	QT-VCGA*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), VAXstation II (Q), VAXstation 2000 (R), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RX01 (Y), TK50 (5), TU58 (G), RX33 (7)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

VAX Message Router X.400 Gateway

VAX Message Router X.400 Gateway is a layered VMS application that provides a communication path between a Message Router-based network and any other message transfer service that conforms to the CCITT 1984 X.400 Recommendations for Message Handling Systems. The Message Router X.400 Gateway allows users of mail agents running on Message Router, such as ALL-IN-1, to communicate with X.400 mail systems either in other networks or within the same network.

Message Router supports messages constructed using the encoding defined by the National Bureau of Standards (NBS) Specification for the Message Format for Computer-based Message Systems. The structure of the messages follows the format specified in the CCITT X.400 Recommendations. The Message Router X.400 Gateway converts the messaging protocols between NBS and X.409 encoding.

The Message Router X.400 Gateway (together with Digital's OSI products) provides interconnection between Digital's mail systems and other X.400 systems, which may be within the same network, or within private or public X.400 networks. ▲ Refer to Software Product Description 27.50 for more information.

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Features

- Conforms to the CCITT X.400 Recommendations as defined in the profiles produced by CEPT (A311), CEN/CENELEC (A3211), and the NBS/X.400 profile.
- Includes Message Router Base and components of the VAX OSI Applications Kernel (OSAK), which includes the transport (VOTS). The Message Router X.400 Gateway can run on any node in the mail network, provided that it is connected to the mail system by Message Router and has access on the same node to Message Router and either VAX P.S.I. or VAX P.S.I. Access.
- Complements the ALL-IN-1 Integrated Office and Information System, VMS mail, and other mail systems that can access the Message Router.
- Allows electronic mail to be exchanged with other electronic mail systems or public service providers that support the X.400 Recommendations.
- Provides for electronic mail interchange between two independent DECnet networks.
- Provides a directory service to translate between Digital addressing and CCITT X.400 Originator/Recipient name forms.
- Includes management tools to configure and operate the Gateway.

Required Hardware

- Any valid VAX, MicroVAX II, VAXstation II system configuration that supports the DECnet Phase IV network.
- A communications device supported by VAX P.S.I. or a communications device supporting 802.3/Ethernet for Packetnet (X.25) communication.

Prerequisite Software

- VMS or MicroVMS operating system V4.4.
- DECnet-VAX, VAX P.S.I. or VAX P.S.I. Access V4.0, and VOTS V1.1.
- Any mail system running on Message Router (requires VMSmail Gateway V2.1 for VMSmail connection).

Message Router X.400 Gateway Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-VDMA*-AA
Cluster member ²	QL-VDMA*-AB
Initial license, primary and cluster ³	QL-VDMA*-CA
Monthly rental, single-use ³	QL-VDMA*-DA
Monthly rental, cluster ³	QL-VDMA*-DB
Software revision right-to-copy	QL-VDMA*-HZ
Materials and Installation	
Distribution and documentation	QA-VDMAA-H#
Documentation only	QA-VDMAA-GZ
Installation service	QT-VDMA*-I#
U.S. Software Services⁴	
DECsupport service	QT-VDMA*-9#
Basic service	QT-VDMA*-8#
Self-maintenance service	QT-VDMA*-3#
Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)	
#Supported media (#): Magtape, 1,600 bpi (M), RX01 (Y), TK50 (5), TU58 (G), RX33 (7)	
¹ For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.	
² Not available on MicroVAX, VAXstation, or VAX-11/730.	
³ Not available on MicroVAX, VAXstation, VAX-11/700 series, or VAX 8600/8650.	
⁴ For non-U.S. service agreements, consult a local Digital sales representative.	

VAX MAILGATE for MCI Mail

VAX MAILGATE for MCI Mail is a VMS electronic mail-handling facility that communicates with the nationwide MCI Mail System to extend VMS-based capability. VAX MAILGATE allows ALL-IN-1 users to add the delivery options of MCI Mail to their inhouse mail systems. Messages can be delivered to any address allowed by MCI Mail; likewise, VAX ALL-IN-1 users can receive mail from anyone who connects to MCI Mail.

ALL-IN-1 customers can specify delivery and handling information for their messages by using addressing screens customized for use with MCI Mail. Users also have online help for these screens.

Messages can be sent to

- Users on their own VAX.
- MCI Mail subscribers.
- Users on other systems connected to MCI Mail.
- Telex users.

In addition, a user with a registered MCI letterhead and signature can send printed copies of a message to a anyone at nearly any postal address.

Business Communications

MAILGATE forms a gateway to MCI Mail by translating message formats between the VAX Message Router and MCI Mail, and by transferring the messages between the VAX system and MCI Mail. Outgoing messages and addressing information are collected from the user by the User Agent (ALL-IN-1), and then passed to the Message Router. MAILGATE then transfers the messages from the Message Router to a message queue to await transfer to MCI Mail. MAILGATE transmits outgoing messages in the queue to MCI Mail over a 1200 baud asynchronous dialup line using an MCI proprietary protocol. ▲ **Refer to Software Product Description 27.34 for further information.**

Features

- Standard address and message-input methods can be used for ALL-IN-1. MAILGATE also provides special ALL-IN-1 addressing screens with online help.
- With VMS security features, users can control access to messages, configuration data, and images. They can also specify default message handling information.
- The MGMAN utility allows the system manager to control the message queue, MAILGATE processes, and configuration parameters.
- Configuration information is kept in a database; customization includes
 - MCI Mail access information.
 - Modem type and asynchronous port.
 - Whether each outgoing message causes MAILGATE to dial MCI Mail.
 - How long to wait after messages have been transferred before dialing MCI Mail again.
 - The maximum number of messages transferred in one direction before changing direction.
 - Whether events are logged.
 - Whether user access to MCI Mail is controlled.
 - Whether undeliverable messages are returned to the sender or queued for review by the system manager.

Required Hardware

- Any valid VAX, MicroVAX II, or VAXstation II system configuration that supports a DECnet Phase IV network with a minimum of 2 MB of memory. (An R80/RL02 configuration is required for the VAX-11/730.) The VAX-11/725 is not supported.
- A homogeneous VAXcluster running Message Router and MAILGATE on the same node.
- One of the following UNIBUS or Q-bus (non-server) communications devices: DHU11, DZ11, DMZ32, DZQ11, DHV11.
- Any of the following 1200 baud modems:
 - DF03-AC, -RC
 - DF112-AA, -AM
 - DF124-AA, -AM
 - DF224-AA

Note: MAILGATE is normally installed at 1200 baud; increased baud rates are possible. ▲ **Refer to Software Product Description 27.34 for block space and minimum disk space requirements.**

Business Communications

Prerequisite Software

- VMS operating system, V4.4 or later.
- Message Router for VMS, V2.0 or later.
- ALL-IN-1, V2.0 or later.

The VAX Message Router, V2.0 must be installed on all routing nodes.

Note: An MCI Mail Remote Electronic Mail account is necessary to use this software package. All necessary contractual agreements between MCI Mail and the customer are to be made by these two parties. Digital Equipment Corporation does not participate in this process.

VAX MAILGATE for MCI Mail Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-742A*-AA
Cluster member ²	QL-742A*-AB
Initial license, primary and cluster ³	QL-742A*-CA
Monthly rental, single-use ³	QL-742A*-DA
Monthly rental, cluster ³	QL-742A*-DB
Software revision right-to-copy	QL-742A*-HZ
Materials and Installation	
Distribution and documentation	QA-742AA-H#
Documentation only	QA-742AA-GZ
Installation service	QT-742A*-I#
U.S. Software Services⁴	
DECsupport service	QT-742A*-9#
Basic service	QT-742A*-8#
Self-maintenance service	QT-742A*-3#

Supported processors (): MicroVAX II (N), VAXstation II (Q), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), #Supported media (#): Magtape, 1,600 bpi (M), TK50 (5), TU58 (G), RX33 (7)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

Business Communications

VAX Message Router Programmer's Kit

The VAX Message Router Programmer's Kit allows customers to write applications that exchange messages over the network. The Message Router provides guaranteed delivery, thus relieving the application program from the need to consider the network state. User-written applications may exchange messages with the Digital-supplied mail systems and gateways, or may run independently.

The Message Router Programmer's Kit contains the Message Router Base and a run-time library of high-level interface routines that can be invoked from a user application. The kit includes documentation to guide the programmer in writing User Agents and Gateways.

Required Hardware

Any valid VAX, MicroVAX, or VAXstation system configuration that supports the DECnet Phase IV network. ▲ **Refer to the order code table for a list of supported processors.**

Prerequisite Software

- VMS or MicroVMS operating system V4.4 or later
- DECnet-VAX

Message Router Programmer's Kit Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-733A*-AA
Cluster member ²	QL-733A*-AB
Initial license, primary and cluster ³	QL-733A*-CA
Monthly rental, single-use ³	QL-733A*-DA
Monthly rental, cluster ³	QL-733A*-DB
Software revision right-to-copy	QL-733A*-HZ
Materials and Installation	
Distribution and documentation	QA-733AA-H#
Documentation only	QA-733AA-GZ
Installation service	QT-733A*-I#
U.S. Software Services⁴	
DECsupport service	QT-733A*-9#
Basic service	QT-733A*-8#
Self-maintenance service	QT-733A*-3#

Supported processors (): MicroVAX II (N), MicroVAX 2000 (P), VAXstation II (Q), VAXstation 2000 (R), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D)

#Supported media (#): Magtape, 1,600 bpi (M), TK50 (5), TU58 (G), RX33 (7), RX01 (Y)

#Supported media: 5, 7, G, M, Y

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXstation, or VAX-11/730.

³Not available on MicroVAX, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For service agreements in other countries, consult a local Digital sales representative.

VAX Notes

VAX Notes is a computer conferencing software product that allows users to create and access online conferences or meetings. Computer conferencing lets users conduct meetings with people in different geographic locations via computer, so that participants can join in a discussion from their desks at any time. It also keeps a detailed record of the proceedings of a meeting, which can be searched by a variety of criteria, such as name of participant, subject, or keyword.

VAX Notes can be used as an “electronic bulletin board” or collaborative document for authoring and reviewing. It can be used for internal classes or seminars, and can provide expertise to groups that lack resources in a given area by referencing expert resources in a company. VAX Notes provides an efficient communication flow across the corporate hierarchy.

▲ Refer to Software Product Description 27.06 for detailed information.

Features

- Distributed access—VAX Notes has been designed for optimal multinode access in a DECnet network, using server technology to achieve rapid response, even from distant nodes. VAX Notes conferences can exist on and be accessed from any VMS node in a DECnet network, offering true distributed processing and access capabilities. Users on remote nodes need not have an account on the node where the conference is located.
- Moderator support—A moderator is a person responsible for managing a conference, which can be public or private. For private conferences, the moderator can restrict access to a specific group of participants by specifying name and network location. Public conferences have no restrictions on who may participate. The moderator may send announcements of new conferences to participants, and has the ability to delete notes entered by other participants. Moderators may also create special notices which are displayed for all participants each time the conference is accessed.
- Ease-of-use—All functions can be accessed by easy-to-use commands, supported with online contextual help. Documentation quickly familiarizes new users with VAX Notes.
- Choice of editor interfaces—VAX Notes provides three screen-oriented user interfaces for editing, allowing users to specify EVE (an extensible interface), EDT-style keypad interface, or WPS-style Gold keypad interface on ANSI-compatible terminals. VAX Notes also includes a line-mode editor for use on non-ANSI terminal devices.
- Topics and replies—VAX Notes uses a simple topic-and-replies structure to maintain conferences, with no difficult hierarchy to navigate. Directory listings show all topics by author, title and date, and the number of replies. All notes can be read either sequentially or at random. Also, users may read only those notes which they have not yet seen. VAX Notes allows participants to search for various topics and replies using the DIRECTORY and KEYWORD commands.
- Imported Text—VAX Notes allows notes and replies to be created outside VAX Notes (using any editor which can produce ASCII output files), then later imported to the conference.
- Mail Integration—VAX Notes uses VMSmail (included in the VMS Operating System) to allow users to send notes or messages to other users from within VAX Notes.

Business Communications

Prerequisite Hardware

VAX, MicroVAX or VAXstation configurations as specified in Software Product Description 27.06.xx-A

Note: VAX Notes supports screen-oriented editing only on terminals that respond to ANSI control functions and that operate in ANSI mode. VAX Notes screen-oriented editing optimizes the features of the DIGITAL VT200 and VT100 families of terminals.

Line-mode editing is provided for non-ANSI terminals supported by the VMS Operating System.

Prerequisite Software

VMS Operating System V5.0. VAX workstations require VMS Workstation Software.

Note: Optional software includes DECnet-VAX, ALL-IN-1, ALL-IN-1 Office Menu, and VAX DECspell.

Ordering Information

VAX Notes contains three licensing options: a full-function Server, a reduced-function Client, and a User-based option. The Server and User-based options allow access to all VAX Notes capabilities; the User-based option restricts the number of simultaneous users on the node or VAXcluster where the user-based option is installed. The Client option contains the majority of VAX Notes functions, but prevents the creation of conferences. The VAX Notes Client does not function without a VAX Notes Server installed in the network. Use of the VAX Notes Client and User-based options within the same cluster is prohibited.

Business Communications

<i>VAX Notes Order Codes</i>	
Option	Order Code
Server Licenses (A license is required for each CPU.)	
Single-use license ¹	QL-960A*-AA
Cluster license	QL-960A*-AB
Initial license, primary and cluster	QL-960A*-CA
Monthly rental, single-use	QL-960A*-DA
Monthly rental, cluster	QL-960A*-DB
Client Licenses (A license is required for each CPU.)	
Single-use license ¹	QL-VESA*-AA
Cluster license	QL-VESA*-AB
Initial license, primary and cluster	QL-VESA*-CA
Monthly rental, single-use	QL-VESA*-DA
Monthly rental, cluster	QL-VESA*-DB
User-based Licenses (A license is required for each CPU.)	
Single-use license ¹	QL-960A9-AA
Cluster license	QL-960A9-AB
Initial license, primary and cluster	QL-960A9-CA
Monthly rental, single-use	QL-960A9-DA
Monthly rental, cluster	QL-960A9-DB
Software revision right-to-copy	QL-960A*-HZ
Materials and Installation	
Distribution and documentation	QA-960AA-H#
Documentation only	QA-960AA-GZ
Installation service	QT-960A*-I#
U.S. Software Services for Server and User-based²	
DECsupport service	QT-960A*-9#
Basic service	QT-960A*-8#
Self-maintenance service	QT-960A*-3#
U.S. Software Services for Client²	
DECsupport service	QT-VESA*-9#
Basic service	QT-VESA*-8#
Self-maintenance service	QT-VESA*-3#
<p>*Supported processors (*): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation I/II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/725/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)</p> <p>#Supported media (#): RX33 (7), TK50 (5), TU58 (G), 9-track 1,600 bpi magtape (M), RX01 (Y)</p> <p>¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.</p> <p>²For service agreements in other countries, consult a local Digital sales representative.</p>	

VAX VTX

VTX is a software package layered on VMS that provides videotex services compliant with CCITT F.300 recommendations. Videotex is a distributed information retrieval service that utilizes a tree structured database through which the user navigates by selecting choices from a menu. The content of the videotex information base consists of full screen "pages" of information.

The information contained in the infobase is prepared using standard Digital editors, such as WPS-PLUS, TPU, EDT, DECgraph, and DECslide, to create the "pages" of information. VAX VTX provides

- A distributed videotex service environment on VAX or MicroVAX systems and Digital networks.
- Access through terminals to page and menu-oriented, distributed, text or graphics information bases.
- An application-level protocol that permits communication between VAX VTX and transaction-oriented "remote" applications.

VAX VTX services the non-technical and senior management person with both quick access to the system and the ability to peruse on-line information without training. VAX VTX provides services to two primary categories of user:

- The information provider (IP) prepares page-oriented information for entry into a VAX VTX infobase.
- The end-user or subscriber views, extracts, and uses the information stored in the VAX VTX infobase.

VAX VTX consists of five primary components: Server (SRV), Terminal Control/Concentrator (TCP/CON), Terminal Specific Module (TSM), Infobase Update and Information Provider Assistance services (UPD) and VTX Infobase Structure Tool and Assister (VISTA). ▲ Refer to SPD 26.57 for further information.

VAX VTX Application Link Utilities

VAX VTX Application Link Utilities (VAX VALU), a companion product to VAX VTX, extends the capabilities of VTX by providing a linkage to other applications or databases within a Digital or non-Digital environment. The VAX VALU product set consists of three utilities:

- VTX Application Service (VAS)
- External Link (ELK)
- Remote Update Server Link (RUSL)

VAX VALU is available as a development license and as a runtime license. ▲ Refer to Software Product Description 26.94 for further information on VAX VALU.

Features

- VAX VTX VISTA (VTX Infobase Structure Tool and Assister)—provides an environment for the Information Provider to storyboard, design, build and maintain a VTX infobase through the new capabilities of the VTX Infobase Structure Tool and Assister (VISTA)—The Information Provider can build a complete menu structure through a simple pictorial interface.
- Concentrator support—for X.29 virtual devices, construction of X.25-based gateways, concentrator support for 3270 class terminals based on the use of the DECnet/SNA VMS 3270 Data Stream Programming interface and customer-written IBM application.
- Ability to modify the Terminal Control Program—The Terminal Specific Module (TSM) allows for changes in keypad to function mapping.
- Template files—a means by which a VTX Information Provider can associate some background set of information (usually containing company logos and other static information) with the page of information that is currently being entered.
- Context-sensitive keywords—segmented keyword files allow for keyword matches based on the subscriber's current page context.
- ALL-IN-1 Terminal Control Program—included in the VTX base product and fully integrated with ALL-IN-1 as part of ALL-IN-1, Version 2.2 release, enables the ALL-IN-1 user to access VTX using GOLD key mappings for the standard VTX functions. Also allows for integration with the ALL-IN-1 interrupt and scratchpad menus.
- Extensive online help—available whenever the end-user requests input.
- Support for common user interface—enables a customer site to establish a common user interface across the entire range of VAX VTX information retrieval applications.

Prerequisite Hardware

- Any valid VAX system configuration running VMS with at least 2 Mbytes of dedicated memory
- MicroVAX II systems must have
 - Minimum of one Mbyte of memory
 - TK50 tape drive for installation of the software
 - RD-series system disk
- VAXstation II systems must have
 - Minimum of one Mbyte of memory
 - TK50 tape drive for installation of the software

▲ Refer to SPD 26.57 for block space requirements and supported terminals.

Prerequisite Software

VMS V4.4 to V5.0 or MicroVMS V4.4 or V4.7

▲ For information on VMS classes and tailoring, refer to SPD 25.01 and to SPD 26.57.

Business Communications

Ordering Information

- Order a VAX VTX full license for the CPU on which the VTX information base will be developed and run. This license provides a functionally complete system containing all five VTX components.
- Order a Terminal Control/Concentrator license for each additional CPU that needs to access the information base over the network. This license provides only the TCP/CON and the TSM components. No information base development can be done with the TCP/CON license. A VAX VTX full license on another CPU is a prerequisite.
- Order the VAX VALU development license for the CPU on which the VALU application will be developed. This license provides all three VALU components. ▲ Refer to SPD 26.94 for ordering information.
- Order the VAX VALU runtime license to copy a VALU application to another CPU. ▲ Refer to SPD 26.94 for ordering information.

VAX VTX Full License Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-031A*-AA
Cluster member ²	QL-031A*-AB
Initial license, primary and cluster ³	QL-031A*-CA
Monthly rental, single-use ³	QL-031A*-DA
Monthly rental, cluster ³	QL-031A*-DB
Software revision right-to-copy	QL-031A*-HZ
Materials and Installation	
Distribution and documentation	QA-031AA-H#
Documentation only	QA-031AA-GZ
Installation service	QT-031A*-I#
U.S. Software Services⁴	
DECsupport service	QT-031A*-9#
Basic service	QT-031A*-8#
Self-maintenance service	QT-031A*-3#

Supported processors (): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation I/II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

#Supported media (#): Magtape, 1,600 bpi (M), RX50 (3), TK50 (5)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX I, VAXstation I, or VAX-11/725.

³Not available on MicroVAX I, VAXstation I, or VAX-11/725.

⁴For service agreements in other countries, consult a local Digital sales representative.

Terminal Control/Concentrator Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use or first license for VAXcluster ¹	QL-033A*-AA
Cluster member ²	QL-033A*-AB
Initial license, primary and cluster ³	QL-033A*-CA
Monthly rental, single-use ³	QL-033A*-DA
Monthly rental, cluster ³	QL-033A*-DB
Software revision right-to-copy	QL-033A*-HZ
Materials and Installation	
Distribution and documentation	QA-033AA-H#
Documentation only	QA-033AA-GZ
Installation service	QT-033A*-I#
U.S. Software Services⁴	
DECsupport service	QT-033A*-9#
Basic service	QT-033A*-8#
Self-maintenance service	QT-033A*-3#

Supported processors (): MicroVAX I/II (N), MicroVAX 2000 (P), MicroVAX 3500/3600 (B), VAXstation II (Q), VAXstation 2000 (R), VAXstation 3200/3500 (C), VAXserver 3500/3600/3602 (C), VAX-11/730 (M), VAX-11/750 (L), VAX-11/780/782/785 (K), VAX 6210 (2), VAX 6220 (3), VAX 6230 (4), VAX 6240 (D), VAX 8200/8250 (J), VAX 8300/8350 (H), VAX 8530 (G), VAX 8550 (E), VAX 8600/8650 (F), VAX 8700 (E), VAX 8800 (D), VAX 8810 (E), VAX 8820 (D), VAX 8840/8842/8974 (V), VAX 8978 (5)

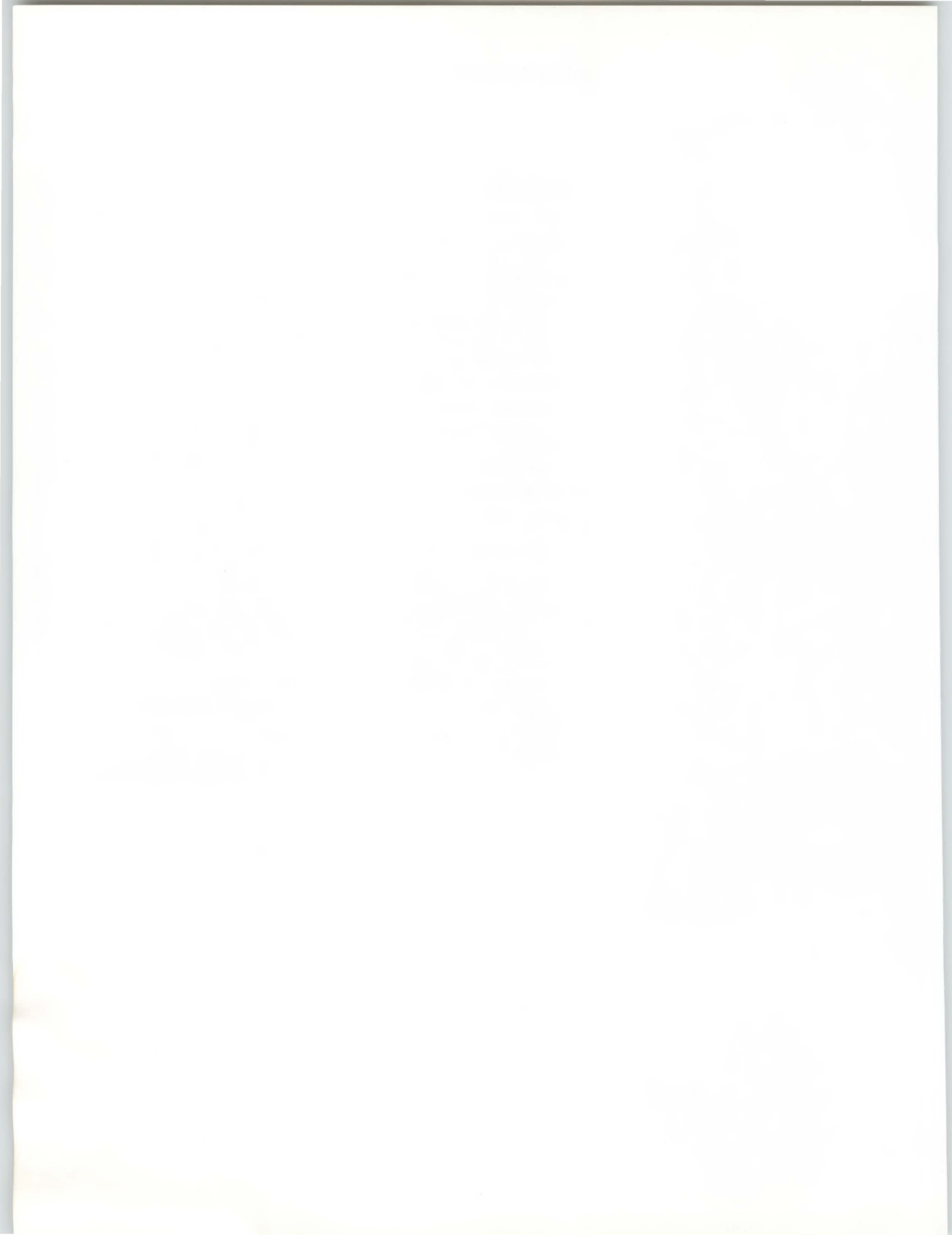
#Supported media (#): Magtape, 1,600 bpi (M), RX50 (3), TK50 (5)

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX I, VAXstation I, or VAX-11/725.

³Not available on MicroVAX I, VAXstation I, or VAX-11/725.

⁴For service agreements in other countries, consult a local Digital sales representative.



Section 6

Manageability: Services and Products

This section contains the following topics...

Services for the Planning and Design Phase

Services for the Implementation and Startup Phase

Services for the Operations and Growth Phase

Related Network Services

Computer Special Systems

Network and System Management Products

Network Security



Manageability: Services and Products

Manageability provides the service and product mix that enables customers to design, control, direct, and support an entire network, as well as manage change in a responsive and flexible manner.

Customers regularly require network information for pro-active planning and performance of the system. They also need high network availability, ease of use, and system security. Digital addresses these requirements with

- **Life-cycle network services.**
- **Network and system management software.**
- **802.3/Ethernet encryption device for security.**

Digital supports OSI-based network management, open industry standard interfaces, and voice/data/video network management. Because network management and control features are embedded in the architecture, the network can maintain itself and adjust to changes in the system by automatically circumventing failed components.

Digital's Network Services, provided through its Customer Services organizations, include Educational Services, Field Service, Software Services, and the Computer Special Systems group, and address customer needs in each phase of the network life cycle with services for

- **The network planning and design phase.**
- **The network implementation and startup phase.**
- **The network operations and growth phase.**

Services for each phase have a modular structure so that the customer can select only those services needed. For complex network projects, program management resources are also available from the service organizations to help plan and manage the delivery of all the network services needed throughout the network life cycle.

In addition to the life-cycle network services, Digital offers related services such as software and hardware installation, preventive maintenance, telephone support, and education. Also, the Computer Special Systems (CSS) group offers design and manufacturing services to meet custom needs.

Availability

Although Digital's Network Services are developed for worldwide availability, packaging and delivery models as well as service availability may differ outside the United States. Check with the local Digital service organizations to determine the services available in your area. Specific differences in the European network services are noted in this section.

Services provided in the Planning and Design Phase aid customers in planning and designing their new or expanding networks. This includes the design of distributed applications, the design and analysis of the network topology, the actual layout of the hardware components of the network, and training seminars to aid in determining appropriate network strategies. These services include

- **NETplan/Requirements Analysis.**
- **NETplan/Design Analysis.**
- **NETplan/Application Design.**
- **NETplan/Protocol Design.**
- **NETplan/Physical Design.**
- **NETplan/Planning Seminars.**

NETplan/Requirements Analysis

NETplan/Requirements Analysis consists of customer interviews and data interpretation by Software Services to plan local or wide area networks. The service assists the customer in planning a new network or modifying an existing one to meet identified business needs, organizational constraints, and operational requirements. Digital Software Services consultants analyze information flows, network requirements based on business needs, organizational structures, and operational procedures in order to establish network design criteria and constraints.

NETplan/Requirements Analysis provides the planning needed to enable the customer to meet current network requirements and plan for future growth. The service also assists the customer in identifying potential problem areas that might affect the network design.

In NETplan/Requirements Analysis, Software Service consultants interview customers to identify their business plans, applications, and users, as well as network performance, availability, reliability, and cost constraints. Software Services then interprets the data by translating the customer's business needs and application requirements into network design criteria. The result of these activities is a comprehensive requirements analysis document describing business and network requirements and network design assumptions, and providing a network inventory.

In Europe, the activities performed and documentation provided in NETplan/Requirements Analysis are offered in combination with NETplan/Design Analysis. This combined Network Planning and Design Service is offered as the DEC NETplan service.

NETplan/Design Analysis

NETplan/Design Analysis, delivered by Software Services, consists of designing and analyzing alternative network solutions, and selecting a recommended network design for local and wide area networks. The service assists the customer in designing a new network or redesigning an existing one to meet identified network design criteria and constraints.

Services for the Planning and Design Phase

NETplan/Design Analysis assists the customer in selecting a recommended network design based on an indepth analysis of predicted performance, associated communications facilities, and approximate cost. The service also provides the customer with an indication of potential problem areas or limitations of the network design. The results of the design analysis are compiled in a written report and discussed with the customer in a presentation. Topics addressed are alternative network designs, the analysis conducted on each alternative, and the recommended network design.

In Europe, the activities performed and documentation provided in NETplan/Design Analysis are offered in combination with NETplan/Requirements Analysis. This combined Network Planning and Design Service is called the DEC NETplan Service.

NETplan/Application Design

The NETplan/Application Design Service assists customers with distributed application design activities. This service, offered by Professional Software Services (PSS) in the United States and Software and Applications Services (SWAS) in Europe, is tailored to meet the customer's needs in any of the following areas:

- Distributed application requirements analysis
- Distributed application design
- Distributed application specification development
- Project leadership of complex distributed application design efforts

Features

- Digital's design skills fit the customer's requirements.
- Tasks performed remain under the supervision, management, and control of the customer.
- Expertise is provided by the manufacturer of the customer's hardware, system software, and layered product software.
- The cost is minimized by buying exactly the service needed.

The deliverables for any distributed application design project are specified as part of project planning activities, and typically include the results of application requirements analyses, application design documentation, and functional design specifications.

NETplan/Protocol Design

The NETplan/Protocol Design Service assists customers in using application interface options available within the Digital environment to design distributed applications for communication between Digital and other vendor's hardware and software. This assistance is currently limited to Digital's DECnet/SNA Gateway products, which facilitate communication between applications on VAX systems and IBM mainframes.

This service, offered by PSS in the United States and SWAS in Europe, is tailored to meet customer distributed application design needs in a multivendor network environment for any of the following areas:

- Distributed application requirements analysis
- Distributed application design

Services for the Planning and Design Phase

- Distributed application specification development
- Project leadership of complex distributed application design efforts

▲ **For a list of service features, refer to NETplan/Application Design in this section.** The deliverables for any protocol design project are specified as part of project planning activities, and are typically similar to those of NETplan/Application Design.

NETplan/Physical Design

When planning and designing the physical layout of a network, issues such as the type of building, type of occupancy, local codes, and restrictions must be taken into consideration. To ensure that the physical design fully meets the needs of the customer's application and minimizes potential problems during installation, Digital Field Service offers a comprehensive NETplan/Physical Design service.

In addition to the cable routing, the cableplant topology, design frequencies, component input and output levels, and anticipated network expansion must all be included in the electrical design.

Site Survey Report

Initially, Field Service conducts a site survey and prepares a Site Survey Report. This identifies all existing equipment to be connected to the network, outlines any structural work required (including aerial and underground cable runs), and identifies any other factors that may affect installation costs or timeframes.

Physical Layout Design

From the Network Design and Site Survey Report, Field Service develops the Physical Layout Design for the network. This includes a set of working drawings indicating the proposed cableplant runs and location of all networked equipment, proposed cable frequency allocations, calculated input/output levels at design frequencies of the cable components, and a bill of material for the components used in the design. The Physical Layout Design is used as the basis for generating a comprehensive Installation Plan with schedules and costs, including quotations from vendors or contractors.

In Europe, the NETplan/Physical Design activities are offered as a DECsite/Local Area Network Physical Design Service providing support for network physical implementation services.

NETplan/Planning Seminars

NETplan/Planning Seminars are provided by Educational Services to aid the customer's staff in determining the networking strategy and multivendor interconnect strategy most appropriate for the customer environment. The seminars, targeted toward network planners and managers, include

- Open Systems Interconnection, which discusses the International Standards Organization (ISO) Model for a layered network architecture, the need for standards among product vendors, advantages of a layered architecture, functions of the OSI, DNA, and SNA layers, and Digital's product set that is compatible with OSI.
- Digital/IBM Complementary Computing, which presents an introduction to the complete DNA/SNA interconnect product line, including the DECnet/SNA Gateway and the VMS/SNA link to IBM networks.

These services assist customers in all network implementation and startup activities. This includes managing installations, orienting users, establishing operating procedures and standards, developing applications, and training. The services are

- **NETstart/Installation Management.**
- **NETstart/Certification.**
- **NETstart/Startup Assistance.**
- **NETstart/Application Development.**
- **NETstart/Protocol Development.**
- **NETstart/Startup Training.**

NETstart/Installation Management

Field Service manages all of the installation activities to ensure a smooth, timely, and well-coordinated network installation. Working from the Network Design and Physical Layout Design, Field Service manages the site preparation and installation activities to ensure completion on time with high-quality standards.

Network Installation Plan

The first step in the installation process is the development of the Network Installation Plan. This plan defines the schedules for all site preparation and installations, and identifies the individuals responsible for each activity. The scope of a network installation may require that part of the work be subcontracted to a qualified contractor able to meet Digital's high-quality standards. As the customer's prime contractor, Digital manages and schedules all subcontractor activities.

Pre-installation Inspection

Field Service conducts a pre-installation inspection of the site with the installer and reviews all details of the required work. This allows Field Service to prepare the final, detailed quotation for the installation.

Installation Inspections

During site preparation and installation, Field Service carries out installation inspections and any required interim testing. These inspection and testing services are also available to customers who are either using their own personnel or dealing directly with a contractor for site preparation or installation work.

For broadband networks, installation inspections include cableplant certification.

Network Acceptance Testing

Upon completion of the installation of the equipment, Field Service carries out Network Acceptance Testing of the cable installation and associated communications equipment.

Network Documentation

Field Service provides site documents including "as-built" drawings of the installed network (showing cable routing, equipment location), and electrical test results. This documentation becomes part of the Site Management Guide for sites under Digital Service Agreements.

In Europe, the NETstart/Installation Management activities are currently offered as a DECsite Turnkey/Installation Management Service providing support for network physical implementation services.

Services for the Implementation and Startup Phase

NETstart/Certification

Digital Field Service conducts broadband network certification tests to ensure that the network meets or exceeds all design specifications.

Network Certification

Channel Certification—Field Service conducts certification of broadband Ethernet. This channel certification ensures successful product connectivity and qualifies the customer's network products for onsite maintenance agreements.

Certification Report

Certification tests are conducted for continuity, frequency response, signal-to-noise ratios, hum modulation, and RF radiation. Field Service then provides a Certification Report that includes documentation of critical signals and noise levels and photographs of cable frequency responses. Any areas for which specifications are not met are highlighted and corrective actions are proposed.

NETstart/Startup Assistance

Digital's Software Services offers start-up assistance to help users and network support personnel get up to speed quickly. Consultation and assistance is offered for network software implementation, orientation on how to use the network, and establishing standards for network operation and management. Specific subjects, such as account and security procedures, application development considerations, and network troubleshooting procedures, are also addressed.

These services cover Digital's DECnet software, and are structured to ensure an efficient startup of the customer's DECnet network. They are designed for managers, operations personnel, and program developers who are either just starting to learn about network communications and DECnet, understand network communications but are new to DECnet, or are familiar with DECnet but need assistance in expanding their DECnet configuration.

In the United States, these services are offered as DECnet DECstart and DECnet DECstart-Plus. They are packaged to deliver a defined set of tasks at the customer's site for a fixed price.

In Europe, these services are offered as DEC NETstart. Tasks are selected based on the level of service required, then adapted to each customer's needs through planning discussions with a Digital network specialist. As a result of the level of service selected and the planning discussions conducted, a fixed quote and delivery plan are proposed.

The DEC NETstart service consists of 22 structured tasks made available in three levels of service:

- NETstart 3 intended for first-time users of Digital network products, or for users with some experience but with limited manpower resources
- NETstart 2 intended for users with some DECnet experience who are expanding their network and need support during this period
- NETstart 1 intended for users with a good level of DECnet experience who need support only in implementing the network software

Services for the Implementation and Startup Phase

NETstart/Application Development

The NETstart/Application Development Service assists customers in distributed application development and implementation. This service, offered by Professional Software Services (PSS) in the United States and Software and Applications Services (SWAS) in Europe, is tailored to meet the customer's needs in any of the following areas:

- Distributed application coding and testing
- Distributed application design (software code) reviews
- Distributed application performance analysis and tuning
- Distributed application implementation and acceptance testing
- Project leadership of complex distributed application development efforts

The deliverables for any distributed application development project are specified as part of project planning activities, and typically include coded and tested applications, distributed application documentation, and implementation of the distributed application in the customer's network.

NETstart/Protocol Development

NETstart/Protocol Development Services assists customers in using application interface options available within the Digital environment to develop and implement distributed applications that communicate between Digital and other vendor's hardware and software. This assistance is currently limited to Digital's DECnet/SNA Gateway products, which facilitate communications between VAX systems and IBM mainframes.

This service, offered by PSS in the U.S. and SWAS in Europe, is provided as a project tailored to meet customer needs in a multivendor environment for any of the following areas:

- Distributed application coding and testing
- Distributed application design (software code) reviews
- Distributed application performance analysis and tuning
- Distributed application implementation and acceptance testing
- Project leadership of complex distributed application development efforts

The deliverables for any protocol development or implementation project are specified as part of project planning activities, and are similar to those of NETstart/Application Development.

NETstart/Startup Training

NETstart/Startup Training are training courses offered by Educational Services that prepare the customer's staff to design, develop and use distributed applications, and to use the network. The training courses include

- Using DECnet-VAX: How to Use VAXmail and Other DECnet Utilities.
- Programming DECnet-VAX.
- Programming DECnet-RSX.
- Managing and Programming VAX P.S.I.
- Managing and Programming DECnet-RSX.

Using DECnet-VAX provides an introduction to DECnet as it is implemented on the VMS operating system to aid users in communicating with other users within the network. The remaining courses provide details about the implementation of the communications software (DECnet-VAX, DECnet-RSX and VAX P.S.I.) on Digital's systems as an aid to managing and developing applications that utilize the network.

These services provide network operations support including network maintenance management, management tools assistance, and operations training. The services are

- **NETsupport/Maintenance Management.**
- **NETsupport/Management Tools Assistance.**
- **NETsupport/Operations Training.**

NETsupport/Maintenance Management

NETsupport/Maintenance Management provides customers with a single point of contact and a single service contract to resolve all network maintenance issues for Digital networks and multivendor networks. This service focuses on the maintenance of a customer's entire network in a partnership role with the customer. NETsupport/Maintenance Management enables Digital to act as the customer's agent to the service vendors for all of the equipment in the network. Digital negotiates the contractual levels of service and pricing with each vendor, and presents the customer with a single-source solution for managing all network maintenance services.

NETsupport/Maintenance Management provides services that extend to the entire network including multivendor equipment.

NETsupport/Maintenance Management provides five major service elements: maintenance planning, configuration management, fault isolation, fault-resolution management, and predictive maintenance. The Central NETsupport Center (located at the Customer Support Center in Colorado Springs, Colorado) provides fault isolation and diagnosis, fault resolution management, maintenance planning, technical assistance, vendor relations, and reporting. Configuration management is performed by the local area NETsupport consultant.

NETsupport/Maintenance Management includes the installation on the customer's network of a network maintenance server with network support software tools. This network maintenance server acts as Digital's "tool box" containing network fault-isolation tools. The maintenance server is accessible from the Central NETsupport Center, and serves as the network remote diagnostic console.

Wide Area and Local Area Interconnect Services are offered as part of this service. ▲ **Refer to "Related Network Services" in this section for more information.**

In Europe, network maintenance management service activities are offered as the NETsystem Maintenance Management Service.

NETsupport/Management Tools Assistance

NETsupport/Management Tools Assistance is provided by Software Services to assist customers in implementing and utilizing Digital's advanced network management products. ▲ **Refer to "Network and System Management Products" in this section for descriptions of these products.** This service is currently limited to the NMCC/DECnet Monitor. Assistance is provided in planning, implementation, and startup.

Services for the Operations and Growth Phase

In the United States, this service is provided as the NMCC/DECnet Monitor DECstart Service. This service provides assistance in implementing NMCC/DECnet Monitor, Digital's comprehensive software product that monitors the nodes, lines, and circuits in a DECnet network. The service helps customers use the NMCC/DECnet monitor to maximize their network performance, and consists of pre-installation assistance, software implementation, and user orientation. As part of this service, the Digital software consultant assists in selecting the operating parameters and options that best address customer network management goals. The Digital software consultant also helps the customer plan, install, and evaluate NMCC/DECnet Monitor operations against stated goals.

Europe offers an enhanced version of this service called NETmon Traffic Monitoring and Consulting Service, which focuses on Digital implementing and using the software to assist customers in monitoring and analyzing the performance of the network. NETmon is a structured, modular service that is adapted to a customer's needs. The principal elements of the service include

- A Digital network consultant to assist in defining the various aspects of monitoring and analysis, and to establish a base of software tools, parameters, and data structures that are used in the monitoring activity.
- Onsite orientation in the use of the principal monitoring tool (NMCC/DECnet Monitor).
- Two consulting reports per year that analyze the network performance and capacity characteristics, and interpret the traffic data.
- A monitoring tool (NMCC/DECnet Monitor) and the associated prerequisite software (RDB Relational Database and GKS Graphic software), which the customer can also use.
- Support of the installed tools and the monitoring activity.

NETmon is provided primarily as an annual service agreement with emphasis in the first year on establishing sound monitoring practices and gaining firm operational control over the network. In subsequent years, the emphasis shifts to proactive capacity management and price/performance decisions. For customers with temporary network performance consulting and traffic monitoring or audit service needs covering a limited time period (maximum three months), a one-time NETmon Audit Service is also available.

NETsupport/Operations Training

NETsupport/Operations Training is provided by Educational Services to help customers effectively manage and operate their computer network. Training courses are provided in the areas of

- VAX and PDP-11 Data Communications.
- Digital Ethernet Hardware Maintenance.
- DECnet Network Management.
- Network Troubleshooting.
- DECnet-VAX Network Security.
- DECnet-VAX Internals.

The courses are designed for network managers, system managers with network responsibilities, maintenance engineers, and technicians.

Digital's Network Services provide a coordinated network-level solution to a customer's network planning, implementation, startup, and operational needs. These services complement many existing network component-level services and packages available from Digital's Customer Services organizations.

Seminars and training courses addressing the design, implementation, and operations phases are part of a complete Network Training Curriculum offered by Digital's Educational Services. This includes courses for people at all the skill levels required to run a successful and efficient network.

As part of Digital's commitment to meet the total computing needs of its customers, Field Service provides a single-source service for its own products and those of selected manufacturers in the networks market. Most networks, including those with non-Digital products, may be completely maintained under a standard Digital Service Agreement. Field Service delivers its services on a worldwide basis, thus ensuring a consistent and high-quality response to distributed or multinational networking requirements.

The related network services that Field Service provides include

- Wide Area Interconnect Service for the wide area links and data communications equipment (DCE).
- Local Area Interconnect Service for the cableplant and associated interconnect hardware.
- Software installation services for network and communications products.
- Maintenance services for the network hardware and software products.
- DECsite and DECmove services.

Software Services provides a comprehensive set of related network services that offer customers support for individual layered networking products, network management and operations, and customer-specific networking needs. The related network services include Startup Packages, Network Tools, and the Computer Services Business, which provides automated information and software access to customers. The Computer Services Business includes service bureau services, disaster recovery services, and facility management services.

Digital Educational Services offers courses in their training centers in the United States, Japan, Canada, Mexico, Europe, and Australia. The network curriculum begins with the Introduction to Data Communications course, which provides the basic foundation for building additional skills. The curriculum can then be categorized into three areas: network architectures training, programmer training, and network management training.

Digital Educational Services offers the following courses:

- Introduction to Data Communications
- Open Systems Interconnection
- Digital Network Architecture
- Digital/IBM Cooperative Connection
- Programming DECnet-VAX
- Programming DECnet-RSX
- Managing and Programming DECnet-RSX

Related Educational Services Training Courses

Related Network Services

- Managing and Programming VAX P.S.I.
- DECnet-VAX Network Management
- DECnet Network Management
- DECnet-VAX Network Security
- DECnet-VAX Internals
- Network Troubleshooting
- Using DECnet-VAX: How to Use VAXmail and Other DECnet Utilities

In addition, Digital Press publishes the following books that cover networks:

- *Technical Aspects of Data Communications*
- *Local Area Networks: An Introduction to the Technology*
- *KERMIT: A File Transfer Protocol*

A complete list of courses and course descriptions is available in the Customer Course Catalog.

Wide Area Interconnect Service

Wide Area Interconnect Service is focused on remote fault isolation, resolution, and verification for wide area links and data communication equipment (DCE). Wide Area Interconnect Service is offered network wide. The service covers fault identification, problem notification, response tracking, escalated attention to critical problems, verification of repairs, and predictive maintenance.

Wide Area Interconnect Service is offered as a stand-alone service and also as part of the comprehensive NETsupport/Maintenance Management Service.

Local Area Interconnect Service

Local Area Interconnect Service addresses the broad range of services necessary to isolate, repair, verify, and maintain the cableplant and interconnect hardware in good operating condition. Digital acts as the customer's single-source, prime contractor for cableplant maintenance services. This service offers customers Basic and DECservice level of maintenance support for standard baseband 802.3/Ethernet networks as well as fiber and twisted-pair cableplants. Scheduled preventive maintenance is provided according to equipment standards as specified by Digital and component manufacturers. Under terms of the contract, broadband networks receive regularly scheduled preventive maintenance according to standards specified by Digital and component manufacturers. For European options, contact the local Digital sales office.

Software Installation Services

Installation services are available for the VMS/SNA, DECnet/SNA Gateway, and DECnet products. This service provides assistance in installing the equipment and familiarizing the customer with the operation of these products.

Digital installs most Digital network and communications products at no additional cost when they are purchased with an operating system and System Startup Service Package for that operating system. There are some exceptions to this.

Related Network Services

The following networking products are not installed with a System Startup Package:

X25router 2000	Micro/RSX 2780/3780 Emulator
Micro/RSX 3271 Protocol Emulator	MUX200/VAX
NMCC/DECnet Monitor	NMCC/VAX ETHERnim
RSX-11/P.S.I./M	UN1004/RSX
VAX 2780/3780 Protocol Emulator	VAX 3271 Protocol Emulator
VAX NTR Protocol Emulator	VAX OSI Transport Service
VAX P.S.I. and P.S.I. Access	VMS/SNA

The DECnet/SNA Gateway and VMS/SNA products are not installed with a System Startup Package, but the installation service may be purchased separately as an Orientation and Installation Service. Any DECnet/SNA Access Routines purchased with DECnet/SNA Gateways or VMS/SNA are installed as part of the Orientation and Installation Service. This includes

- DECnet/SNA VMS APPC/LU6.2 Programming Interface.
- DECnet/SNA VMS Application Programming Interface.
- DECnet/SNA VMS Data Transfer Facility (VMS server and VMS client).
- DECnet/SNA VMS DISOSS Document Exchange Facility.
- DECnet/SNA VMS Distributed Host Command Facility.
- DECnet/SNA VMS Printer Emulator.
- DECnet/SNA VMS Remote Job Entry.
- DECnet/SNA VMS 3270 Data Stream Programming Interface.
- DECnet/SNA VMS 3270 Terminal Emulator.

▲ Refer to the appropriate Software Product Description for more information about installation services.

Ongoing Maintenance

Field Service provides the full range of on-site and off-site contractual services for the network and its associated communications equipment including Digital-qualified vendor products and broadband network interconnection cables. Baseband network interconnection cables (such as coaxial, fiber optic, or twisted pair cables) will be repaired or replaced on a time and materials basis only. Digital may use a qualified contractor to carry out cable repair work.

DECservice

DECservice is Digital's most comprehensive onsite service product, providing a commitment to fast response time, continuous service effort, extended-hours coverage, preventive maintenance, installation of the latest engineering changes, and automatic priority attention for complex problems.

Basic Service

To those customers who do not need the level of service provided by DECservice, Digital offers the Basic Service Agreement, which provides economical, full service coverage. Customer service calls receive priority second only to DECservice calls. Services provided include preventive maintenance, installation of the latest engineering changes, and automatic priority attention for complex problems.

Related Network Services

Software Product Services

For customers who do not require startup assistance for their operating system, Software Product Services offers DECsupport, Basic, and Self-Maintenance annual service contracts that cover Digital networking software products and select non-Digital communications software products. ▲ Refer to “Software Services Startup Packages” in this section for an explanation of the startup assistance available.

DECsupport Service for Software

DECsupport provides maximum user productivity and system utilization by saving customers the time and associated costs of doing their own routine software maintenance and installation of updates. It also provides critical on-site assistance when required. DECsupport provides

- Installation of updates.
- Preventive maintenance.
- Onsite remedial support if required.
- Telephone support.
- Digital’s Software Information Network.
- Software media and documentation updates.
- Technical newsletters.
- Software Performance Reports.

Basic Service for Software

Basic Service for Software is designed for customers who have the time, technical expertise, and resources to maintain their own systems, but who need technical support to answer questions or to solve problems. Basic Service for Software provides

- Telephone support.
- Digital’s Software Information Network.
- Software media and documentation updates.
- Technical newsletters.
- Software Performance Reports.

Self-Maintenance Service for Software

Self-Maintenance Service for Software is for customers who have technical staffs with the time and resources to maintain their own system software, and who require only software updates and written communication channels with Digital. Self-Maintenance Service for Software provides

- Software media and documentation updates.
- Technical newsletters.
- Software Performance Reports.

Related Network Services

DECsite Services

DECsite Services are available when customers require professional help to prepare new space for new equipment, or to move equipment to a new site. A project to meet these needs falls into three phases: decision, design, and delivery. DECsite Services are structured to meet customer needs in each phase and allow customers to control the extent of Digital's involvement and the pace of the project.

Features

- Modular services to plan, design, and build new, expanded, or renovated computer sites for Digital customers.
- Three levels of service—DECsite I, II, and III—and five forms of agreement let customers choose the extent of Digital's involvement. Customers control financial and timing commitments for the project.
- Digital brings a professional understanding of cost-effectiveness to computer site projects.
- All necessary physical elements are included: space allocation, power service, air conditioning, data wiring, fire security, access security, and materials.
- Digital provides professional project management and computer-site design knowledge during the decision and design phases, and uses experienced, Digital-qualified subcontractors for the delivery phase.

In Europe, DECsite services include the network physical design and installation services described elsewhere in this section.

DECsite I

In DECsite I, the decision phase, Digital professionals analyze the customer's computer environmental needs from the perspectives of operations, equipment complement, available space, building services, and future expansion. Digital provides the engineering analysis and budget estimates needed to determine building requirements.

DECsite II

In DECsite II, the design phase, Digital provides detailed construction drawings, specifications, and wire lists. DECsite II design documents can be used by the customer to build the facility using internal or contracted resources with confidence that the design will meet planned data processing needs. For customers who elect to build their own facilities, construction phase consultations are available.

DECsite III

In DECsite III, the delivery phase, Digital provides the finished facility. At the end of the design phase (DECsite II), Digital presents a price and schedule quote for customer approval. The advantage of choosing DECsite III is that a coordinated design/build project is usually the quickest way to complete construction, and Digital's DECsite professionals serve as the single source for the entire project. Only Digital-qualified building subcontractors are hired, and the DECsite professionals apply Digital's knowledge and experience to computer-related issues, thus providing complete project management. The customer can work with the Digital construction manager throughout the project instead of having to manage several vendors. Digital will complete the project to the customer's satisfaction and guarantee workmanship and materials for one year.

Related Network Services

DECmove Service

DECmove provides a comprehensive solution to the problems of moving computer equipment from one site to another. With the DECmove service, Digital handles all aspects of moving computer equipment, from qualifying movers to coordinating the moving schedule.

Features

- Management of all aspects of the customer's move, including selecting and qualifying movers, and defining the type of moving equipment and transportation required. When necessary, Digital arranges for temporary storage of customer's equipment.
- Handling of all aspects of deinstallation and reinstallation. Digital verifies equipment operation prior to dismantling and runs diagnostics after reinstallation to ensure that the equipment runs properly.
- Insuring the equipment against all risks except war and nuclear disaster. Damaged equipment manufactured or supported by Digital is repaired or replaced on a priority-one basis (bypassing normal manufacturing queues). Damaged equipment not manufactured or supported by Digital is replaced as promptly as possible.
- Coordinating the schedule of the move to minimize the impact on the customer's operations.
- Preparing a fixed price quote for the entire move. This prevents any hidden expenses and lets the customer handle Digital's moving services with a single purchase order.

Eligibility

DECmove is available only for equipment covered by a DECservice or Basic Service Agreement.

Startup Packages

For customers buying new systems, Startup Packages provide the support necessary to successfully install software, to use the system, and to maintain the software during the first year.

Digital offers three Startup Packages. Each service package provides training (available immediately upon purchase), software installation, DECstart (where applicable), and one year of service for the operating system and dependent software. In Europe, these service packages are referred to as OPTIMUM Services.

These packages are priced at the system level; that is, they cover all Digital-licensed software operating on a particular system at no additional charge.

Startup Package III

Startup Package III provides technical assistance and training for system users. It provides the most comprehensive full year of service support for operating systems and their dependent software. Startup Package III provides

- SPS DECsupport Agreement.
- Initial media/documentation.
- Training.
- DECstart Plus.
- Software installation.

Related Network Services

Startup Package II

Startup Package II is appropriate when a customer's technical staff has the time and resources to support the new system after Digital has trained the staff, installed the product, and oriented the staff concerning system operation. Startup Package II provides

- SPS Basic Agreement.
- Initial media/documentation.
- Training.
- DECstart.
- Software Installation.

Startup Package I

Startup Package I is appropriate for a technical staff requiring minimal training and having the time, resources and skills to install and support the new system. Digital provides telephone advisory support and media updates to maintain the software at its most current level. Startup Package I provides

- SPS Basic Agreement.
- Initial media/documentation.
- Training on selected systems.

Computer Services Business

Digital Computer Services Business is supplied by Software Services to provide automated information and software access to its customers. The services provided are available in the United States and the General International Area (GIA) only. The three principal service offerings are Service Bureau Services, Disaster Recovery Services, and Facility Management Services.

Service Bureau Services

These services, accessed locally and delivered remotely from Digital's Computer Services Centers, are

- Enhanced Application Network Services—Digital provides a combination of terminals/micros, customer host processors, Digital host processors, and Digital's nationwide network to develop and implement integrated applications.
- Hardware/Software Evaluation Services—Digital provides the availability of VAX, PDP, and DECSYSTEM-20 systems and software to enable customers to evaluate hardware and software products. Customers can evaluate products through demonstrations, benchmarks, and trial use.
- Project Resource Services—Digital provides VAX, PDP, and DECSYSTEM-20 computing resources and associated software to support Software Services consulting projects.
- Incremental Computer Resources—VAX, PDP, and DECSYSTEM-20 computing resources are provided to meet special customer needs such as peak load processing. Timesharing access is also available for predelivery software development and peak load processing.

A telephone support service offering a 24-hour-a-day, 365-day-a-year hotline staffed by Digital software experts is also available.

Related Network Services

Disaster Recovery Services

Backup and disaster recovery services allow customers to anticipate and plan for disruptions involving their computer facilities, and to continue processing critical applications at computer facilities other than their own. The services include

- Restart—Disaster Recovery Services for VAX, PDP, and DECSYSTEM-20 computing resources available within 24 hours for emergency processing
- Disaster/Plan 80—A planning methodology available to customers in developing their own contingency plan

Facility Management Services

Facility Management Services are long-term, customized, dedicated services consisting of computing resources and operational staff available either at the customer site or at a Digital site. Facility Management services free customers from the need to develop operations resources to support information systems.

Digital's Computer Special Systems (CSS) group offers design and manufacturing services for developing and supplying special function hardware, firmware, and software networking products to meet custom requirements. Typically, these available services provide

- Digital to non-Digital host and terminal interconnect.
- Links to public and private networks.
- Network bridges.
- High performance, intelligent front end communications processors.

Through CSS, Digital can provide efficient network performance and flexible network configurations that meet custom needs with full Digital hardware, software, and service support.

Digital's Network and System Management solutions comprise three layers:

- Inherent management capabilities in network hardware and software
- Network management application products
- Comprehensive network service for the entire life cycle of the network

The base of Digital's strength in management products is DECnet, which automates numerous management functions and provides the basic operational control capabilities for data networking.

Network components are controlled by specific network management products, positioned as being either "site level" (networks connecting systems within a building and multiple buildings in one campus) or "corporate level."

Site-level products are those network management products that are most useful in maintaining a "campus-wide" network. Corporate-level products are those products best suited to managing the wide area connections between sites. Note that these products do not require that network management personnel be located where these products are deploying their resources. They choose the balance between central and distributed management and support.

The following products comprise Digital's Network and System Management products:

- **DECnet**—offers basic operational control of the data communications network nodes. ▲ Refer to Section 4 for more information on DECnet.
- **The Remote System Manager (RSM)**—provides application and configuration management for multiple, distributed MicroVAX and/or VAXstation systems.
- **The Terminal Server Manager (TSM)**—provides configuration and fault management of terminal servers in an extended 802.3/Ethernet local area network.
- **NMCC/DECnet Monitor**—is a wide-area-network performance, fault, and configuration management tool for DECnet products.
- **NMCC/VAX ETHERnim**—is a fault isolation and configuration management tool for extended 802.3/Ethernet local area networks.
- **LAN Traffic Monitor**—is a management tool for measuring bandwidth utilization on multivendor 802.3/Ethernet local area networks.
- **Remote Bridge Management Software (RBMS)**—offers configuration management of LAN Bridges in an extended 802.3/Ethernet local area network.

Network and System Management Products

Remote System Manager

Remote System Manager (RSM) is a network application that centralizes and facilitates the recurring system management tasks of

- Distributing and installing software.
- Backing up and restoring files across the network.
- Tracking software configurations among participating systems.

▲ Refer to “DECnet System Services” in Section 5 for more information.

Terminal Server Manager

The Terminal Server Manager VMS (TSM) is a software tool that allows a user at a VAX host to remotely observe and control terminal servers anywhere in the extended local area network. The user can monitor the availability and modify the characteristics of all Digital terminal servers on the network.

▲ Refer to “802.3/Ethernet Communications Servers” in Section 2 for more information.

NMCC/DECnet Monitor

The NMCC/DECnet Monitor is a software tool for the observation and control of complex, corporate backbone networks. NMCC/DECnet Monitor responds to English-like commands and graphically presents network conditions within a color network map (if the user has an optional color monitor). This tool also works with a database of configuration information and network parameters that can be readily accessed and analyzed.

The NMCC/DECnet Monitor is designed to assist in three key areas of network management: availability, performance, and planning.

Features

- Nodes can be instructed to send all DECnet events to NMCC/DECnet Monitor. This avoids major problems and minimizes downtime because it enables a manager to detect problems early.
- Relational database capability provides for either active or passive collection of statistics.
- Visual displays of network configuration and performance information simplify interpretation of data and highlight conditions requiring attention. Network topology is displayed as a logical map for easy recognition of network elements and potential trouble spots.
- Histograms and bar charts display historical information to help users analyze trends and plan for growth and change.
- Realtime event logging with predetermined polling parameters enables users to detect problems early and more efficiently.
- Update and adjustment of line charges for an automatic assessment of the cost/performance of the network.
- Improved online help facility gives immediate information pertinent to a particular screen.
- Separate kernel and user interface give users the flexibility to mix and match centralized or distributed control.

Network and System Management Products

Prerequisite Hardware

- VAX-11/730 to VAX 8600 processor (Note: R80/RL02 configuration is required for VAX-11/730 system.)
- MicroVAX II with RD53 (or greater) system disk
- VT240, VT241, VT330, VT340 terminal, or VT100 or VT220 (for tabular representation)
- DECnet communication device
- Storage device of 35 Megabytes

Prerequisite Software

- VMS operating system V4.4 to V4.7
- DECnet-VAX V4.4 to V4.7
- Full or runtime license for VAX GKS
- Development license for VAX RDB/VMS

NMCC/DECnet Monitor Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license ¹	QSVM8-UZ
Migration option from OBSERVER V1.x	QSP42-UZ
Materials and Installation	
Distribution and documentation	QSVM8-H#
Software revision right-to-copy	QSVM8-HZ
Documentation only	QSVM8-GZ
NMCC Startup service	QSVM8-SZ
Installation service	QSVM8-I#
U.S. Software Services²	
DECsupport service	QSVM8-9#
Basic service	QSVM8-8#
Self-maintenance service	QSVM8-3#

Supported processors (): MicroVAX II (Z), VAX-11/780/782/785 (E), VAX 8200/8250 (5), VAX 8300/8350 (7), VAX 8500/8530 (9), VAX 8550 (2), VAX 8600/8650 (K), VAX 8700 (2), VAX 8800 (M)

#Supported media: 3, G, M, Y

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²For non-U.S. service agreements, consult a local Digital sales representative.

NMCC/VAX ETHERnim (Ethernet Network Integrity Monitor)

NMCC/VAX ETHERnim is a network management tool that aids in fault isolation and configuration management of extended local area networks. NMCC/VAX ETHERnim utilizes Phase IV DECnet software on a system configured as either a full-function DECnet node or a DECnet end node. It runs as a layered product on the VMS operating system. Full functionality of NMCC/VAX ETHERnim is achieved by having DECnet software and remote test command files in target nodes.

NMCC/VAX ETHERnim is designed to test the communications path through Ethernet protocol and DECnet. It also has the ability to gather system information for its database from remote VMS and RSX nodes by invoking test probes (remote command files).

NMCC/VAX ETHERnim is a multivendor product that recognizes non-DECnet local area network addresses, and gives the network manager the capability of maintaining a large amount of information about each node via a database that can be edited. It can be operated from local terminals (VT125, VT240, VT241) using ReGIS graphics for graphic representations of the network under test. Refer to Software Product Description 26.96.xx for more information.

Features

- Builds a permanent database containing basic information about each node that it detects is directly connected to the local area network.
- Provides a means of path testing to ISO levels I and II to all nodes on the Ethernet (with the exception of the MicroVAX I and VAXstation I), and to DNA network application and user layers for any node running DECnet Phase IV on the Ethernet.
- Provides a means of determining the VAX processor type for VMS DECnet nodes on the Ethernet.

Prerequisite Hardware

- Any valid VAX configuration with 802.3/Ethernet controller. (Note: VAX-11/730 systems require an R80/RL02.) Refer to Software Product Description 26.96 for more information.
- VT125, VT240, or VT241 graphics terminal

Prerequisite Software

VMS Operating System and DECnet-VAX, V4.6 to V4.7

Network and System Management Products

<i>NMCC/VAX ETHERnim Order Codes</i>	
Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license	Q*514-UZ
VAXcluster license ¹	Q*514-QZ
Initial license, primary and cluster ²	Q*514-1P
Periodic payment, primary ²	Q*514-JP
Periodic payment, cluster ²	Q*514-JZ
Materials and Installation	
Distribution and documentation	Q*514-H#
Software revision right-to-copy	Q*514-HZ
Documentation only	QL514-GZ
Installation service	Q*514-I#
U.S. Software Services³	
DECsupport service	Q*514-9#
Basic service	Q*514-8#
Self-maintenance service	Q*514-3#
Supported processors (): MicroVAX II (Z); MicroVAX 2000 (3); VAX-11/750 (D); VAX-11/780/785 (E); VAX 8200/8250 (5); VAX 8300 (7); VAX 8500/8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M)	
#Supported media: 3, 5, M	
¹ Not available on MicroVAX.	
² Not available on MicroVAX, VAX-11/700 series, or VAX 8600/8650.	
³ For non-U.S. service agreements, consult a local Digital sales representative.	

LAN Traffic Monitor

The LAN Traffic Monitor (LTM) is a tool used in multivendor environments to analyze the utilization of an extended LAN. A LAN Bridge 100, downline loaded with the unique monitoring software, is attached to the 802.3/Ethernet cable and transmits information to the LAN Traffic Monitor Host software program located on any VAX in the extended LAN. LAN Traffic Monitor permits multiple users from anywhere on the extended local area network to access the traffic data.

The LTM collects statistics on all local area network traffic regardless of higher level protocol. For example, users of DECnet, TCP/IP, LAT, and XNS can study performance on the network by higher level protocol. LTM gives the network manager the flexibility to monitor different segments of an extended local area network and have this information collected at a central location. LTM provides network utilization graphs that show the network manager the performance of the various local area network segments.

Features

- Provides timely, accurate information needed to maximize network performance and plan network growth.
- Guarantees the integrity of the traffic statistics by capturing every frame and continuously updating the application software.
- Displays data from multiple monitors on any host running the LTM software in the extended LAN.

Network and System Management Products

- Gathers traffic statistics from any device connected to the local area network and provides data based on nodes, addresses and/or protocol types.
- Provides performance measurements allowing for the optimum configuration and operation of the local area network.
- Simplifies analysis of local area network traffic data through the use of both graphic and tabular displays.
- Easy-to-use menu structure shortens the learning curve of the first-time user.

Required Hardware

LAN Bridge 100 (DEBET) with minimum revision level E

Prerequisite Software

- VMS V4.4 to V4.7
- DECnet-VAX on the host processor, V4.4 to V4.7

Optional Software

RBMS V1.1 for remote management of downline load feature in LAN Bridge 100.

LAN Traffic Monitor Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license ¹	Q*ZF3-UZ
VAXcluster license ²	Q*ZF3-QZ
Initial license, primary and cluster ³	Q*ZF3-1P
Periodic payment, primary ³	Q*ZF3-JP
Periodic payment, cluster ³	Q*ZF3-JZ
Materials and Installation	
Distribution and documentation	Q*ZF3-H#
Software revision right-to-copy	Q*ZF3-HZ
Documentation only	QLZF3-GZ
Installation service	Q*ZF3-I#
U.S. Software Services⁴	
DECsupport service	Q*ZF3-9#
Basic service	Q*ZF3-8#
Self-maintenance service	Q*ZF3-3#

Supported processors (): MicroVAX II (Z); MicroVAX 2000 (3); VAXstation II (4); VAXstation 2000 (8); VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8500/8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M)

#Supported media: 3, 5, M

¹For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX or VAXstation.

³Not available on MicroVAX, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For non-U.S. service agreements, consult a local Digital sales representative.

Remote Bridge Management Software (RBMS)

Remote Bridge Management Software (RBMS) is an optional product used with LAN Bridge 100s (standard, fiber optic, or microwave). RBMS significantly enhances the bridge's operation by allowing the network manager, at a VAX or MicroVAX host, to observe and control any LAN Bridge 100 in the network. For example, RBMS allows the network manager to put a Bridge in backup mode or to block traffic at selected bridges for security reasons.

RBMS resides on a VAX or MicroVAX host and works in conjunction with the LAN Bridge 100's management firmware. A subset of the IEEE 802.1 Management Protocol is used to communicate between the VAX host and the targeted bridge. RBMS provides the functions needed to support the actual control and observation of the LAN Bridge 100.

Features

- Displays counters, statistics, characteristics and the forwarding database.
- Allows the user to change the operational state, characteristics and forwarding database.
- Enables the user to remotely downline load LAN Bridge with LAN Traffic Monitor software, changing the device from its default state as a bridge.
- Uses the IEEE 802.1 management protocol for both DECnet and non-DECnet environments.
- Allows the user to name and refer to each bridge in ASCII format by mapping ASCII names to physical addresses.
- Enables the user to use one command to address a group of bridges through the use of global commands.
- Supports simultaneous access by multiple users on the same or different hosts.
- Provides extensive online help.
- Allows remote troubleshooting of hardware through the Bridge Self Test feature.

Prerequisite Hardware

- A valid VAX or MicroVAX system configuration with a Digital 802.3/Ethernet controller connected to an 802.3/Ethernet network which contains at least one LAN Bridge 100.
- One of the following Digital terminals: VT100 or VT200 series, LA12, LA34, LA35, LA36, or LA38.

Prerequisite Software

- VMS or MicroVMS, V4.4 to V4.7
- DECnet-VAX, V4.4 to V4.7

Network and System Management Products

Remote Bridge Management Software Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license ¹	Q*036-UZ,-UA,-U3
VAXcluster license ²	Q*036-QZ
Initial license, primary and cluster ³	Q*036-1P,-1A,-13
Periodic payment, primary ³	Q*036-JP,-JA,-J3
Periodic payment, cluster ³	Q*036-JZ
Materials and Installation	
Distribution and documentation	Q*036-H#
Software revision right-to-copy	Q*036-HZ
Documentation only	QL036-GZ
Installation service	Q*036-I#
U.S. Software Services⁴	
DECsupport service	Q*036-9#
Basic service	Q*036-8#
Self-maintenance service	Q*036-3#

Supported processors (): MicroVAX I (N); MicroVAX II (Z); VAXstation I (Q); VAXstation II (4); VAX-11/730 (C); VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8500/8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M); VAX 8974/8978 (2)

#Supported media: 3, 5, M

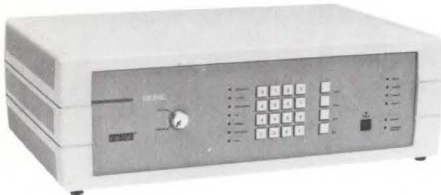
¹License for VAX 8974 is -UA; for VAX 8978 is -U3. For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX, VAXserver, VAXstation, or VAX-11/730.

³Initial and periodic licenses for VAX 8974 are -1A and -JA; for VAX 8978 are -13 and -J3. Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For non-U.S. service agreements, consult a local Digital sales representative.

Ethernet Enhanced Security System (DESN)



To help protect the security of network messages, Digital offers the DESNC Ethernet Enhanced Security System that selectively encrypts information across a network, without affecting other network nodes not requiring encryption.

The Ethernet Enhanced Security System is designed for users whose needs exceed current commercial security practice. This system allows implementation of security-enhanced 802.3/Ethernet local area networks (LANs) that permit multiple network nodes to share the same cableplant, assuring that only authorized nodes have access to sensitive data. The Ethernet Enhanced Security System:

Increases the protection of information on 802.3/Ethernet networks through cryptographic protection of data confidentiality and data integrity.

- Supports comprehensive network security management with node access control, key management, and monitoring and control.
- Is compatible with IEEE 802.3 and Ethernet standards.
- Supports single-segment, multiple-segment, and extended LANs defined by the *DECconnect System and Planning Configuration Guide*.

The Ethernet Enhanced Security System comprises two products integrated into standard 802.3/Ethernet environments—Digital's Ethernet Secure Network Controller (DESN) and VAX Key Distribution Center (KDC) layered product.

Features

- Network security management centralized at VAX KDC system provides focused management and control.
- Multiple, cooperating VAX KDC systems assure improved network availability and performance.
- Automatic key generation and distribution operate transparently.
- Comprehensive and flexible audit facilities support effective security audit and alarms as well as network monitoring and fault isolation.
- Performance is suitable for high-performance 802.3/Ethernet applications.
- DES-encrypted 802.3/Ethernet frames improve information confidentiality.
- DES-encrypted manipulation-detection codes (MDCs) improve information integrity.
- Node authentication increases security.
- Network security-policy enforcement supports logical groupings of nodes (for example, along security or organizational boundaries).
- Default network security policy quickly and easily enhances security for a network, with minimal impact on existing operations while supporting later development of more sophisticated policies.
- 802.3/Ethernet compliance provides the flexibility to support
 - Single-segment, multi-segment, and extended LANs.
 - Multiple, simultaneous higher-layer protocols, such as DECnet, LAT, TCP/IP, and NFS.
 - Different network technologies and topologies, for example, any DECconnect network.

Network Security

Qualifications

This product is currently available only in the United States and Canada. It represents the current state-of-the-art in commercial 802.3/Ethernet security systems; however, no single system provides complete security. Users should follow industry-recognized security practices and should not rely solely on a single security enhancing product to provide protection from computer misuse, loss of data, or loss of service.

U.S. Government regulations specify that cryptographic hardware and software can be exported by license only. Specifically, the Department of State's International Traffic in Arms Regulations (22 Code of Federal Regulations Subchapter M) require that an export license be obtained from the Department before any cryptographic hardware or software is exported from the United States. Accordingly, an explicit condition of sale of this product is that the purchaser agrees not to export or cause to be exported this product or any portion of this product from the United States without obtaining the requisite export license from the Department of State.

DESN

The DESNC is a standalone, store-and-forward cryptographic controller that provides real-time encryption and decryption of 802.3/Ethernet frames for LAN environments. Also, the DESNC provides security and network management services such as client node authentication, enforcement of network access control policies, and status reporting.

The DESNC is installed on the transceiver cable between client nodes and the LAN. The DESNC connects directly to the network via a standard 802.3/Ethernet interface (AUI D-shell connector). The DESNC appears as a node to the network.

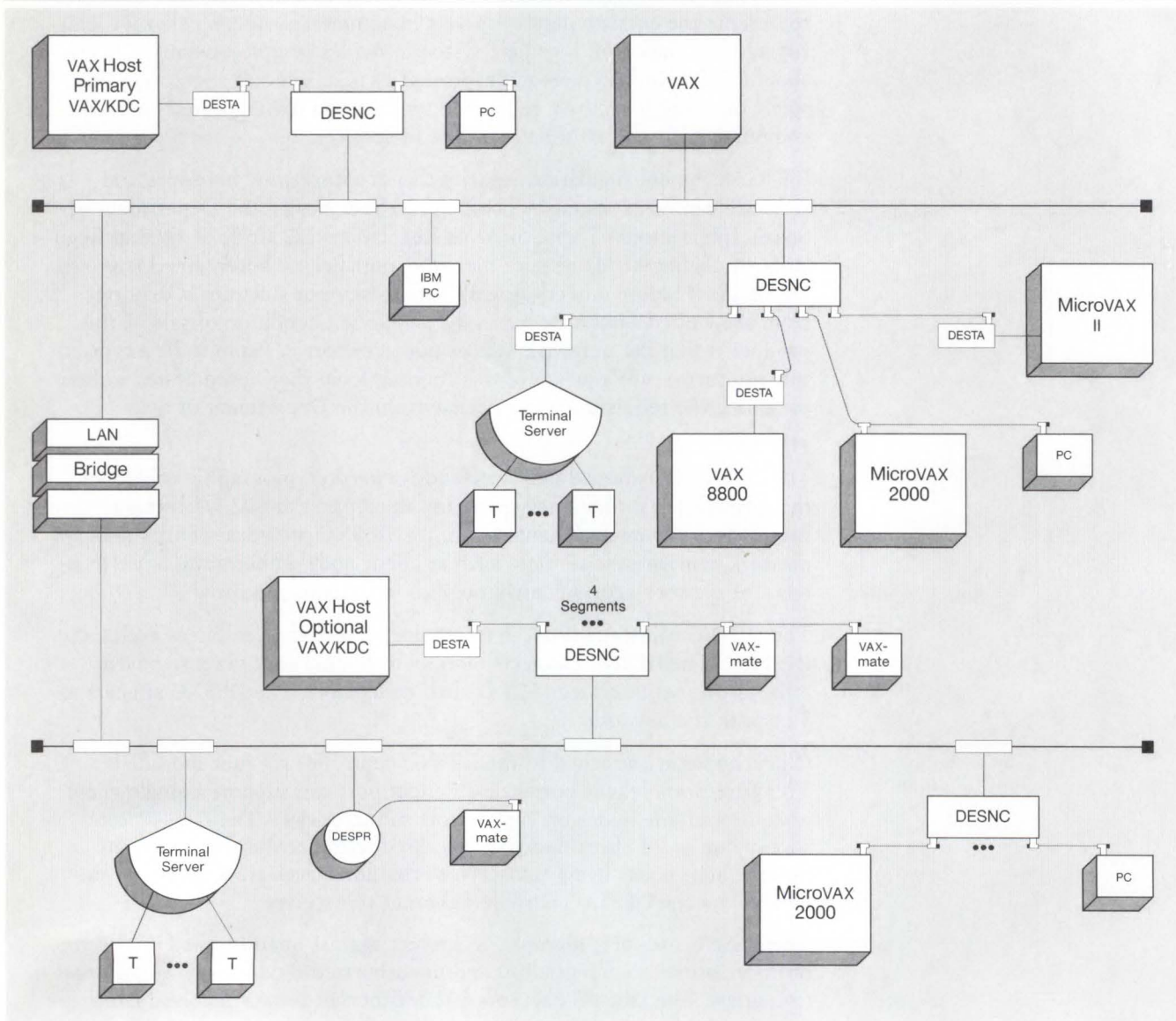
Client nodes are attached to the DESNC controller via four modified ThinWire ports (client ports). Each client port can support a single client node or multiple nodes on "client-port subnetworks." The DESNC can support up to 20 client nodes in any distribution across the four client ports. Client nodes using transceiver-cable interfaces are attached to the DESNC via the DESTA ThinWire Ethernet transceiver.

The DESNC uses cryptography to protect against unauthorized disclosure of information (confidentiality) and unauthorized modification of messages (integrity). The DESNC encrypts 802.3/Ethernet frames received from client nodes for transmission on the network, and decrypts 802.3/Ethernet frames received from the network for transmission to client nodes (refer to the following figure). The DESNC encryption process takes data (plaintext) and a cryptographic key (random 56-bit variable) as inputs and transforms the input data into an unintelligible form (ciphertext). The decryption process converts ciphertext back to plaintext.

The DESNC uses a hardware implementation of the Data Encryption Standard (DES) cryptographic algorithm defined by the National Bureau of Standards in *FIPS PUB 46*. The cryptographic process is transparent to the client nodes and cryptographic keys are provided by the VAX KDC layered product.

Network Security

Typical DESNC Configuration



NBG-112-00

The DESNC and VAX KDC system implement a default access control policy that allows all nodes on a network to communicate with each other, after successful authentication. Such a policy allows for rapid integration of DESNC controllers and VAX KDC systems with minimal impact on existing network operations. Under this open policy, client nodes (that is, nodes connected to DESNC controllers) communicate with each other using encrypted frames on the network. All other communication, such as client node-to-node is unencrypted.

Network Security

Customers can optionally use DESNC controllers in conjunction with an associated VAX KDC system to implement more sophisticated access control policies. Fundamentally, the network nodes can be partitioned into separate access classes (for example, logical groups such as engineering, finance, and marketing) that are protected from each other. The access control policy may be defined to allow two nodes to communicate unencrypted even if one of them is connected to a DESNC controller.

VAX KDC System

The VAX KDC system, attached to the LAN, manages the DESNCs. The VAX KDC system distributes operational firmware, keying material, and other security control information (for example, audit criteria) to the DESNC controllers.

A VAX KDC system comprises

- A VAX processor running VMS (VAX KDC node).
- The VAX KDC layered software, which runs on VMS.
- A DESNC configured to support a VAX KDC node (KDC-DESNK).

The VAX KDC system also provides tools to allow a system security manager to implement and manage a security-enhanced LAN. These tools allow a system security manager to

- Define and maintain the configuration of the DESNC(s).
- Monitor the operational and security status.
- Actively control the DESNCs on the LAN.
- Maintain an audit trail of security-relevant events.
- Define and maintain the network access control policy.

Configuration Requirements

Standard LAN topologies have few restrictions, and the addition of DESNC controllers and VAX KDC systems to an existing LAN will generally not disrupt operations or the basic network topology. However, some configuration requirements must be followed to ensure proper operation of a security-enhanced LAN. Also, in certain situations, additional guidelines can improve the efficiency and security of a security-enhanced LAN. Contact your local Digital Network Team representative for assistance in assessing configuration requirements.

Prerequisite Hardware

- Any VAX processor (excluding MicroVAX I) to support a VAX KDC system
- A valid 802.3/Ethernet local area network, either standard or ThinWire

Prerequisite Software

- VMS V4.6 or V4.7 to support a VAX KDC system
- DECnet-VAX V4.6 or V4.7 to support a VAX KDC system

Network Security

Ordering Information

Minimum configuration includes two DESNCs and one VAX KDC system on an 802.3/Ethernet LAN. This minimum configuration typically supports two to seven client nodes and can support a maximum of 39 client nodes.

Ethernet Enhanced Security System (DESN) Hardware Order Codes

Option	Order Code
Digital Ethernet Secure Network Controller (DESN) LAN Encryption Device, 120 Vac	DESN-BA

Ethernet Enhanced Security System System (VAX KDC) Software Order Codes

Option	Order Code
Licenses (A license is required for each CPU.)	
Single-use license ¹	Q*Z56-UZ,-UA,-U3
VAXcluster license ²	Q*Z56-QZ
Initial license, primary and cluster ³	Q*Z56-1P,-1A,-13
Periodic payment, primary ³	Q*Z56-JP,-JA,-J3
Periodic payment, cluster ³	Q*Z56-JZ
Materials and Installation	
Distribution and documentation	Q*Z56-H#
Software revision right-to-copy	Q*Z56-HZ
Documentation only	QLZ56-GZ
Installation service	Q*Z56-I#
U.S. Software Services⁴	
DECSupport service	Q*Z56-9#
Basic service	Q*Z56-8#
Self-maintenance service	Q*Z56-3#

Supported processors (): MicroVAX II (Z); VAXstation II (4); MicroVAX 2000 (3); VAXstation 2000 (8); VAX-11/725/730 (C); VAX-11/750 (D); VAX-11/780/782/785 (E); VAX 8200/8250 (5); VAX 8300/8350 (7); VAX 8500/8530 (9); VAX 8550 (2); VAX 8600/8650 (K); VAX 8700 (2); VAX 8800 (M); VAX 8974/8978 (2)

#Supported media: 3, 5, M

¹License for VAX 8974 is -UA; for VAX 8978 is -U3. For software licensing purposes, a VAX-11/782 is a multiprocessor that is considered a single CPU.

²Not available on MicroVAX I, VAXserver, VAXstation I.

³Initial and periodic licenses for VAX 8974 are -1A and -JA; for VAX 8978 are -13 and -J3. Not available on MicroVAX, VAXserver, VAXstation, VAX-11/700 series, or VAX 8600/8650.

⁴For non-U.S. service agreements, consult a local Digital sales representative

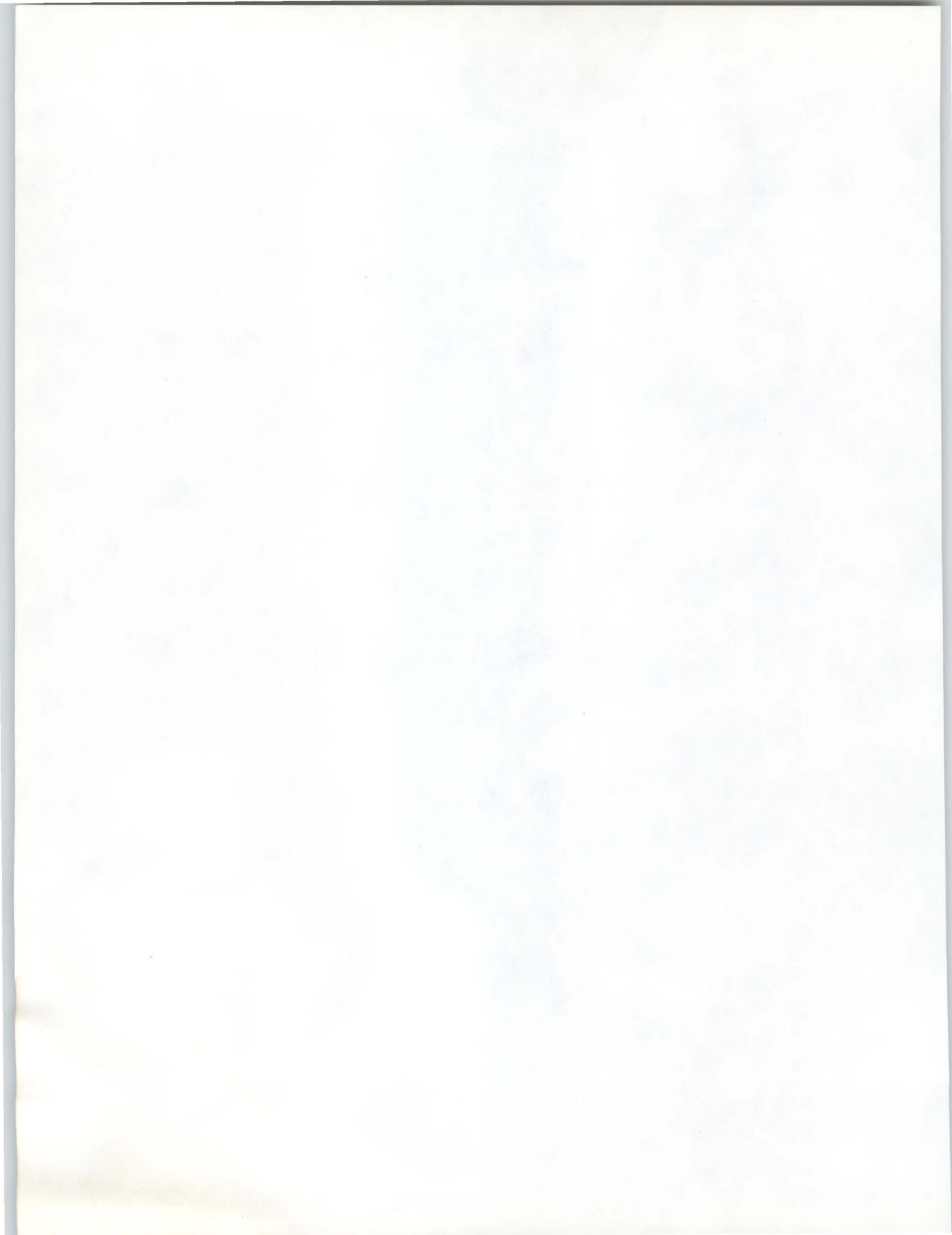
Appendices

A Network Configuration and Performance Guidelines

B Environmental Specifications

C Software Product Description List

D Related Documentation



Network Configuration and Performance Guidelines

Phase IV Network Terms

DNA Phase IV Network Configuration Guidelines

802.3/Ethernet configuration guidelines focus on connecting terminals, communications servers, and host systems to a local area network. The guidelines follow a brief overview of configuration guidelines for Phase IV networks including a discussion of connecting Phase III to Phase IV networks.

The information here, together with the product descriptions, should help in preparing a preliminary network plan. Digital sales representatives and Digital network specialists can give detailed network planning assistance.

Full-function node—a node that originates, terminates, and acts as a transit node for data. It can have multiple lines.

End node—a node that originates and terminates data but cannot act as a transit node for data destined for other nodes: a single physical line. The difference between full-function nodes and end nodes is strictly in the DECnet software.

Router—a dedicated communications server that acts as a transit node for data destined for other nodes. A router server is a combination of hardware and software, and is not an originating or terminating node. To maintain routing performance, applications software should run on a router server.

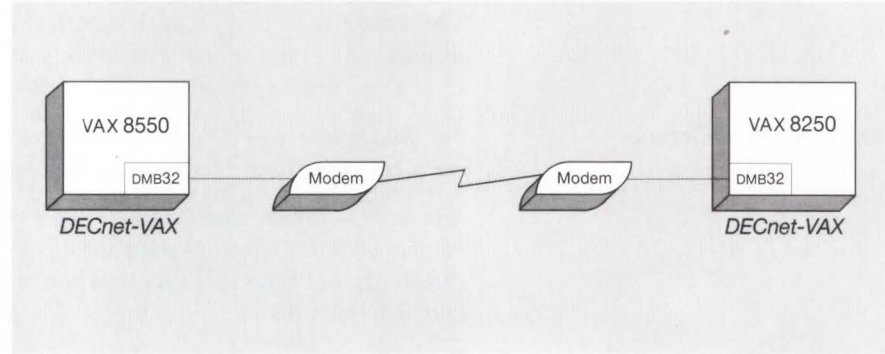
The number of full-function nodes and router servers in a network should be kept down because of the overhead associated with routing. The goal is to minimize the use of full-function (routing) nodes and maximize the use of end nodes. Although end nodes cannot act as transit nodes, they require less memory, have a single physical link, can spend more time running user applications, and require very little network management.

The following table shows architectural limits, aggressive limits, and conservative limits for router servers in one local area network. Architectural limits cannot be exceeded in any circumstances: While DNA Phase IV networks have fixed architectural limits, most configurations will not be affected by them. Aggressive limits are not fixed but represent the point where both performance and memory requirements should be analyzed: Exceeding these guidelines requires careful analysis by a network consultant or software specialist. Conservative limits represent a point that is easily achievable and where communications performance is acceptable.

Remote Multipoint Configurations and Guidelines

The conventional point-to-point method of connecting remote VAX systems is shown in the following figure.

Conventional Point-to-point Remote Configuration

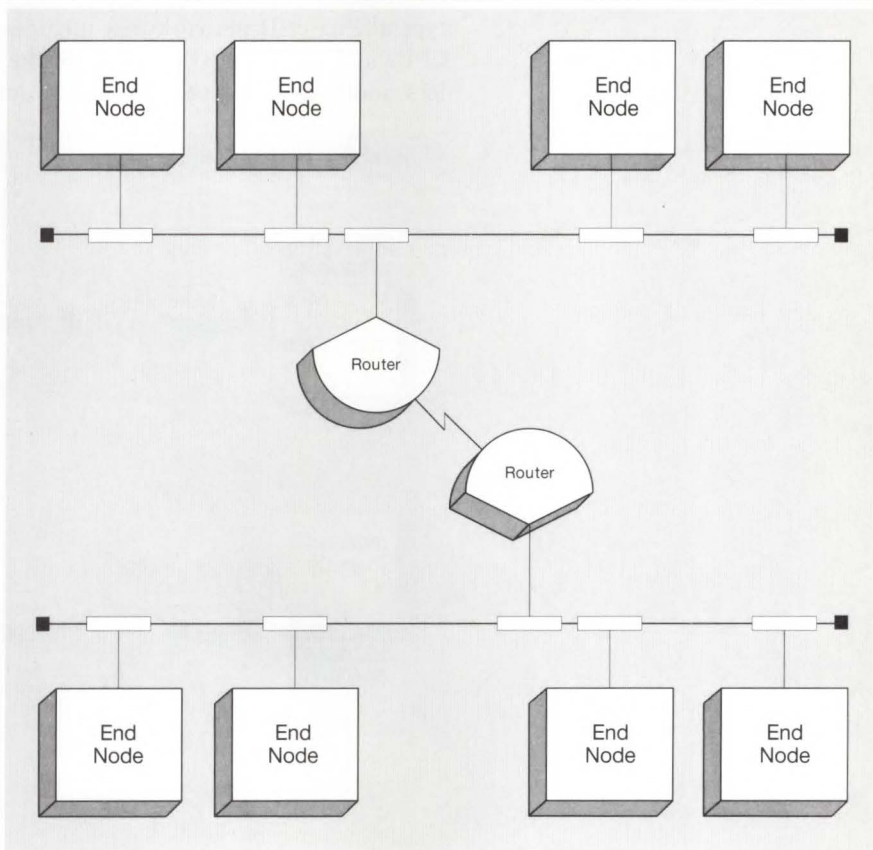


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The following guidelines apply only to remote multipoint configurations. Local multipoint links should use more cost-effective 802.3/Ethernet connections.

- Remote multipoint configurations reduce phone line costs in leased private-line networks. They offer a substantial amount of savings for large, geographically dispersed transaction-processing applications over the alternative dialup lines.
- No nested multipoint configurations should be used. This is not a technical limitation, but rather a proven rule for customer success. The following figure illustrates a non-nested configuration.
- Consult individual Software Product Descriptions for supported remote multipoint configurations (such as the number of tributaries per control node).

Remote Multipoint Non-nested Configurations

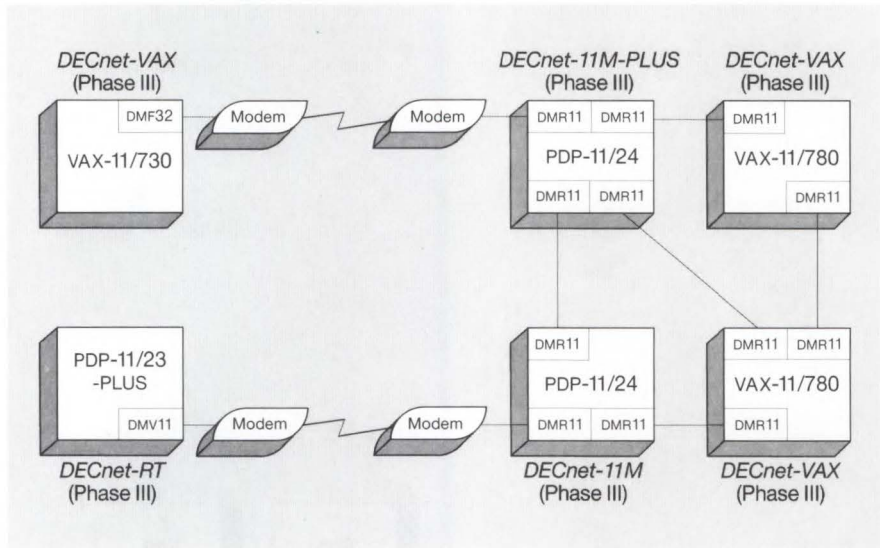


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Converting Networks from Phase III to Phase IV

This discussion is for customers who have Phase III networks and are interested in converting to Phase IV. The following figure illustrates a typical Phase III network that includes local and remote links and a mix of CPUs and operating systems. Note the number of communications controllers, modems, and lines required to implement this network.

Typical Phase III Network



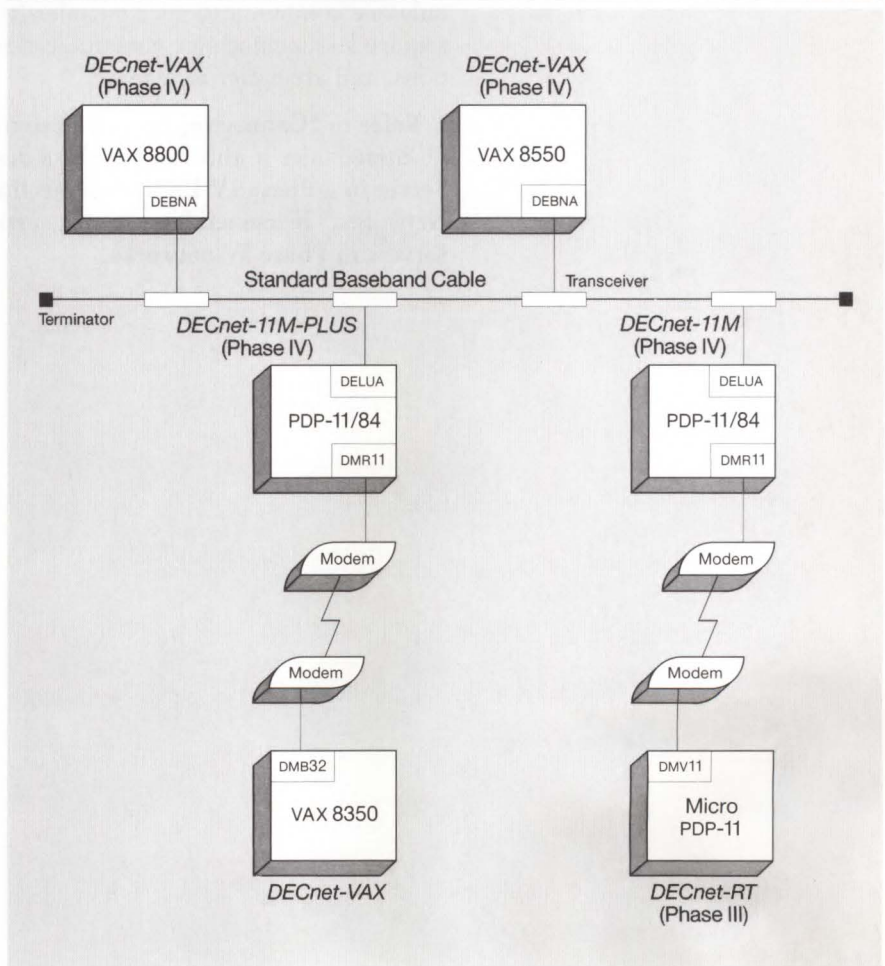
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802.3/Ethernet Configuration Guidelines

The following figure illustrates a Phase IV network with the same level of connectivity as the previously described Phase III network. Note that the Phase IV network uses a standard baseband 802.3/Ethernet cable and 802.3/Ethernet communications controllers rather than the traditional communications controllers shown in the Phase III network. In this example, all systems (except the DECnet-RT system) are running Phase IV software and are directly connected to the local area network.

The Phase IV network can have a maximum of 63 areas with up to 1,023 nodes per area for a total of 64,000 nodes. This total is especially important because of the number of personal computers now included in networks.

802.3/Ethernet-based Phase IV Network



NBG-196-00

802.3/Ethernet Configuration Guidelines

A comparison between the Phase III and Phase IV networks shows the following:

- There is a significant cost savings and performance improvement with the Phase IV network. For example, a transceiver plus the 802.3/Ethernet communications controller costs less and performs better than a synchronous DMR11.
- The Phase IV network increases configuration flexibility.
 - Transceivers can be easily relocated along the standard baseband cable.
 - 802.3/Ethernet technology eliminates the need for redundant lines within the local portion of the network.
 - A node can be added or removed from the LAN for maintenance without affecting the operation of the rest of the LAN.
- Many nodes can be designated as end nodes. This means that they need only one communications controller (the 802.3/Ethernet controller), they require less memory for communications, have more time to run applications, and are easier to manage.

▲ Refer to “Connecting Shared Resources to an 802.3/Ethernet LAN,” discussed later in this section, for a description of the use of the Terminal Server in a Phase IV LAN. “Connecting an 802.3/Ethernet LAN to Remote Networks,” discussed later in this section, describes the use of router servers in Phase IV networks.

802.3/Ethernet Configuration Guidelines

802.3/Ethernet-based Products

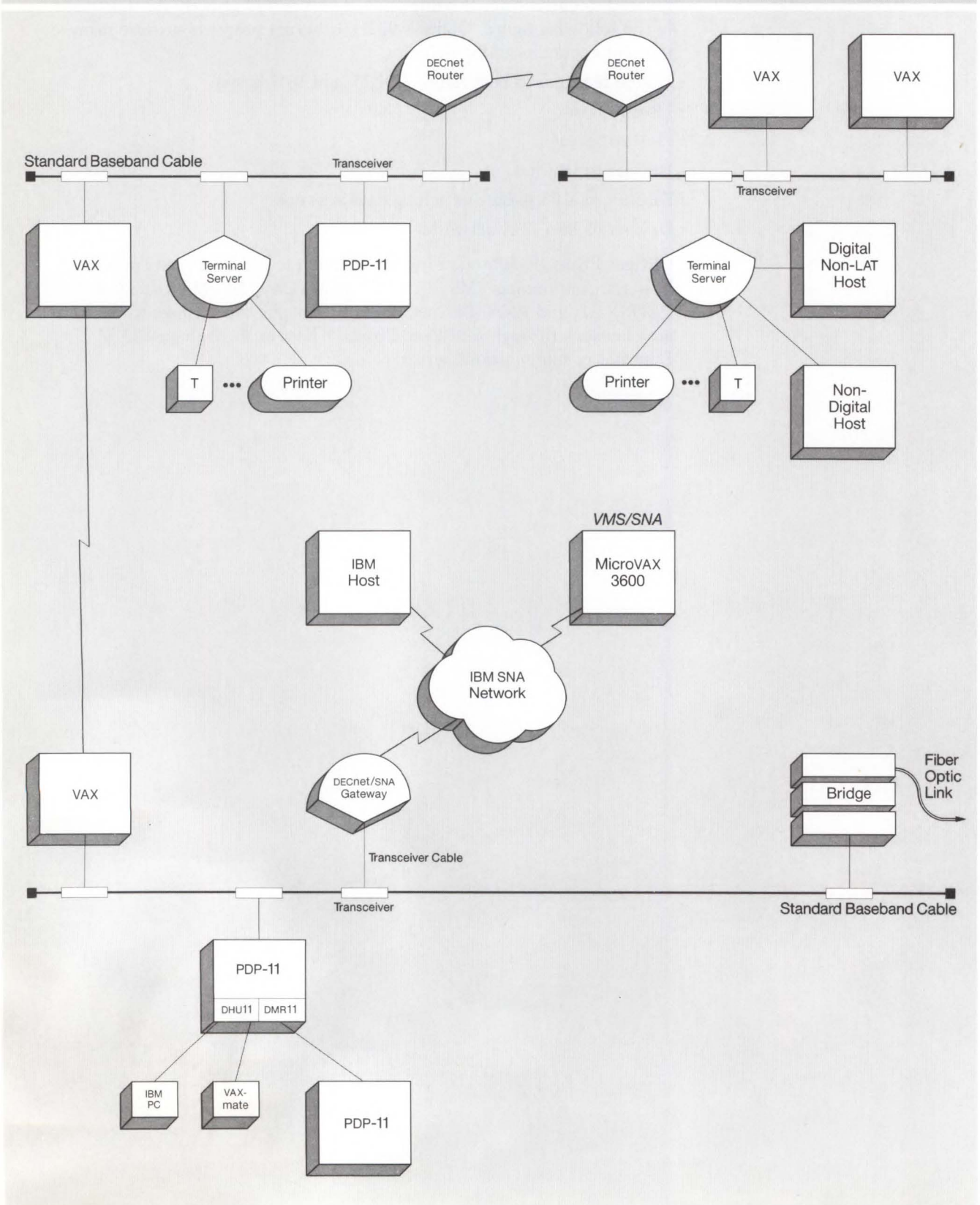
Digital's 802.3/Ethernet products allow a network configuration to be tailored to current needs while allowing for future growth. As illustrated in the following figure, Digital's 802.3/Ethernet products provide many types of communication, including

- Digital terminal to host (Digital, X.25, and IBM hosts).
- Host to host.
- Host to server.
- DECnet to DECnet.
- DECnet to X.25 packet-switching data network.
- DECnet to IBM SNA network.

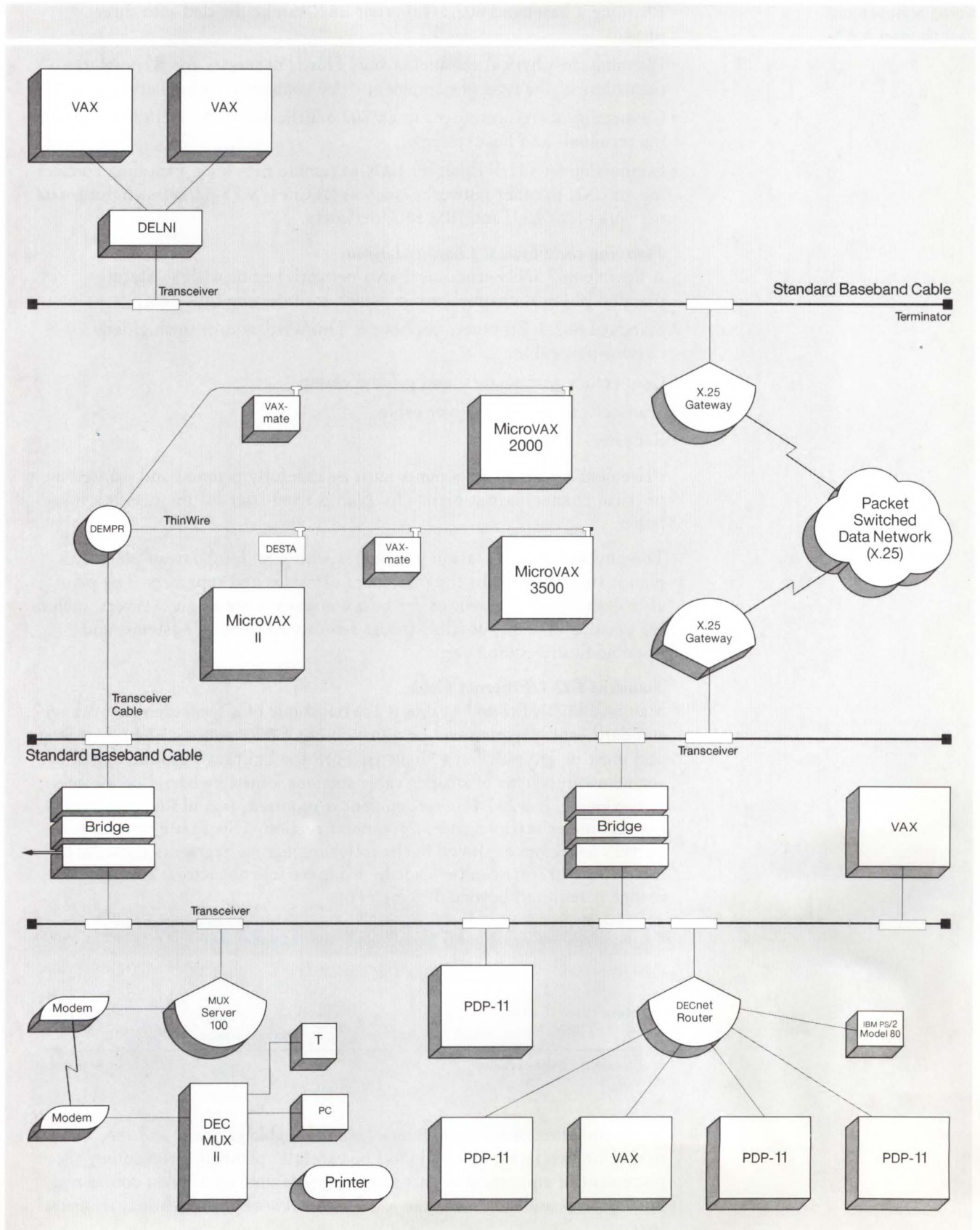
DECnet Phase IV supports direct connection to local area networks for host systems running VMS, RSX-11M, RSX-11M-PLUS, Micro/RSX, RSTS/E, ULTRIX-32, and P/OS. DECnet Phase III systems can connect to the local area network through a DECnet Phase IV host or through an 802.3/Ethernet communications server.

802.3/Ethernet Configuration Guidelines

DECnet Network with Many Segments



802.3/Ethernet Configuration Guidelines



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802.3/Ethernet Configuration Guidelines

Planning a Baseband 802.3/Ethernet LAN

Planning a baseband 802.3/Ethernet LAN can be divided into three phases:

- Planning the physical channel layout. This is necessary for all networks, regardless of the type of equipment to be connected to the network.
- Connecting shared resources to an 802.3/Ethernet LAN, including connecting terminals and host systems.
- Connecting an 802.3/Ethernet LAN to remote networks, including connecting an LAN to other networks, such as DECnet, X.25 packet-switching data networks (PSDNs), and IBM SNA networks.

Planning the Physical Channel Layout

A flexible 802.3/Ethernet local area network begins with a carefully planned physical channel layout, which includes the following:

- Standard 802.3/Ethernet, fiber optic, ThinWire, and/or unshielded twisted-pair cable
- Connectors, terminators, and ground clamp
- Transceivers and transceiver cable
- Repeaters

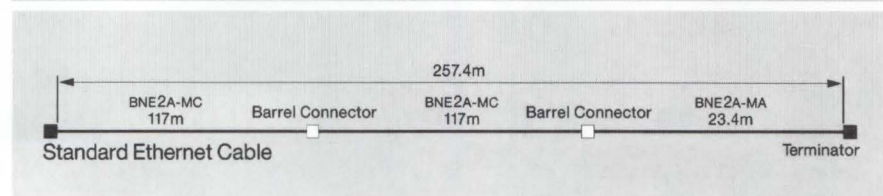
Placement of these components must be carefully planned and marked on a physical channel layout plan. This plan is used later for the network installation.

The physical channel layout plan starts with a building layout plan. This plan is then marked for the placement of cables and repeaters. The plan also shows the placement of the host computer systems and servers, including existing systems, possible future relocations of those systems, and possible future equipment.

Standard 802.3/Ethernet Cable

Standard 802.3/Ethernet cable is the backbone of a local area network. A standard cable segment can be a maximum of 500 meters (1,640 feet) long and must be grounded at a single point to the building's ground system. A segment can consist of smaller cable sections joined by barrel connectors. For example, if a 257.4-meter segment is required, it could be made up of two 117-meter sections and a 23.4-meter section. This would require two barrel connectors as shown in the following figure. Segments up to 500 meters (1,640 feet) can be made by using barrel connectors; a repeater or bridge is required beyond 500 meters.

Standard 802.3/Ethernet Cable Segment using Barrel Connectors



NBG-198-00

The installation of the main 802.3/Ethernet cable segment and the connection of branching segments should be carefully planned. Preplanning the placement of equipment at this stage can save time later when connecting host systems and servers to the local area network (even while it is operating).

Connectors and Terminators

Barrel connectors connect two standard baseband cable sections, creating a segment up to a maximum length of 500 meters (1,640 feet).

Terminators (50 ohms) electronically terminate the ends of a standard baseband cable segment. Each end of the cable section must have either a terminator or a connector.

Fiber Optic Cable

Digital offers general purpose fiber optic cable. ▲ Refer to “Baseband 802.3/Ethernet Products” in Section 2 for further details. Plenum fiber optic cable (used where the cable path is through air plenums) and aerial fiber optic cable (for connecting buildings through the air or in conduit underground) are available through other vendors. Installation requirements for all three types of fiber optic cable are given below.

The Digital fiber optic cable certification is needed to assess proper connectivity and determine if the installation meets acceptable attenuation limits. Certification is also required for Digital Field Service to support an installation. A Digital Field Service Network Planning Consultant or Digital-recommended installer (see Section 6) can provide this service.

The fiber optic cable and connectors used must meet the following requirements:

- The fiber should be a Corning 1508 type fiber or equivalent.
- Connectors on these cables must be Amphenol 906 type SMA or equivalent.
- Bandwidth must be greater than or equal to 300 MHz per kilometer at 850 nm.
- Cable attenuation must be less than or equal to 6 dB per kilometer at 850 nm over the operating temperature range.
- Total system loss must be less than 12.5 dB, to be verified after the installation.
- Operating temperature and humidity must be within the ranges listed in the following table.

Operating Temperature and Humidity Ranges for Fiber Optic Cable

Cable	Operating Temperature	Humidity
General Purpose	0°C–70°C	95%, noncondensing
Aerial	–30°C–60°C	95%, noncondensing
Plenum	0°C–70°C	95%, noncondensing

ThinWire 802.3/Ethernet Cable

ThinWire cable is recommended for offices and other local work areas to bring 802.3/Ethernet capability to personal computers, workstations and low-end systems. ▲ For more information, refer to “Planning a ThinWire 802.3/Ethernet LAN,” discussed later in this section.

Unshielded Twisted-pair Cable

Unshielded twisted-pair cable is recommended for those customers who have already installed telephone-type twisted-pair cabling, and want to minimize the cost and network disruption of installing new network cable. ▲ Refer to “Unshielded Twisted-pair Cable Guidelines,” described later in this section, for more information.

Transceivers and Transceiver Cable

Devices are connected to standard baseband cable via transceivers and transceiver drop cable. The transceiver transmits signals on the transceiver cable to the connected devices and detects message collisions. Transceivers mount on the standard baseband cable by means of a tap and can be easily installed using Digital's Ethernet Transceiver Installation Tool Kit.

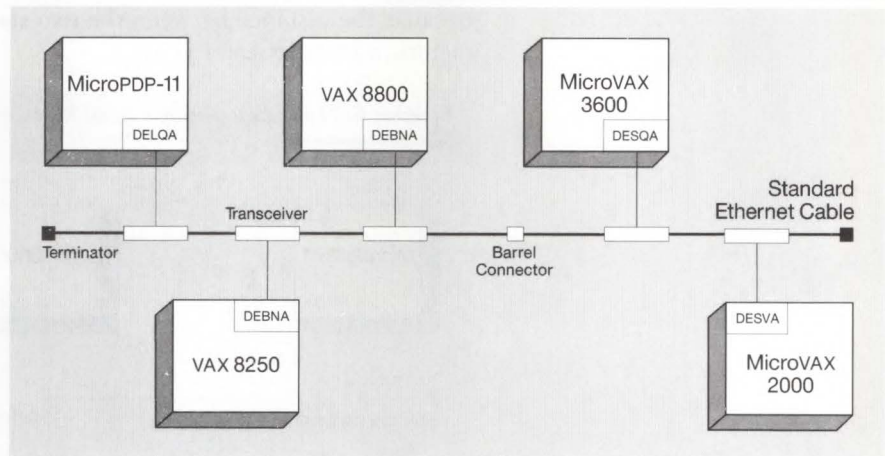
There is one general-purpose transceiver cable that supports both Ethernet and IEEE 802.3 hardware. This cable is available in standard and office types. Because office cables have a high signal loss, they are limited to a maximum distance of 12.5 meters. They are, however, thinner than standard cables and easier to run in an office environment.

Remember these rules when planning installation of transceivers and transceiver cable on the standard baseband cable:

- There is a maximum of 100 transceivers per standard 500-meter cable segment.
- Transceivers must be at least 2.5 meters (8.2 feet) apart. Standard 802.3/Ethernet baseband cable is premarked every 2.5 meters to ensure adequate spacing.
- Each transceiver needs a corresponding transceiver cable.
- Transceiver drop cable can be a maximum of 50 meters (165 feet) in length. Some devices have an internal cabling equivalency which must be subtracted from the 50-meter maximum. Consult the device's technical manual for the appropriate cable equivalency.

The following figure shows an 802.3/Ethernet network with each system attached to the standard baseband cable by means of a transceiver and transceiver cable. The systems communicate with the network through an 802.3/Ethernet communications controller.

802.3/Ethernet LAN with Connected Processors



NBG-199-01

Ethernet Repeaters

An Ethernet repeater allows network expansion beyond the 500-meter (1,640-foot) limit of one standard Ethernet cable segment. Two repeaters (the maximum allowed without an intervening bridge) can connect three standard Ethernet cable segments, making them function as if they were one cable by retiming, amplifying, and repeating all signals received from one segment, then passing the signals to the next segment.

Digital offers two repeaters for standard Ethernet cable:

- Local repeater—connects two standard Ethernet cable segments in the same building. The two cable segments can be a maximum of 100 meters (328 feet) apart.
- Fiber optic repeaters—connect two standard Ethernet cable segments at greater distance, such as between buildings, using fiber optic cable.

Repeaters can be used effectively in a multifloor building to expand a network. A backbone standard Ethernet cable segment can be installed vertically from the basement to the top floor of a building with repeaters and a branching segment installed on each floor.

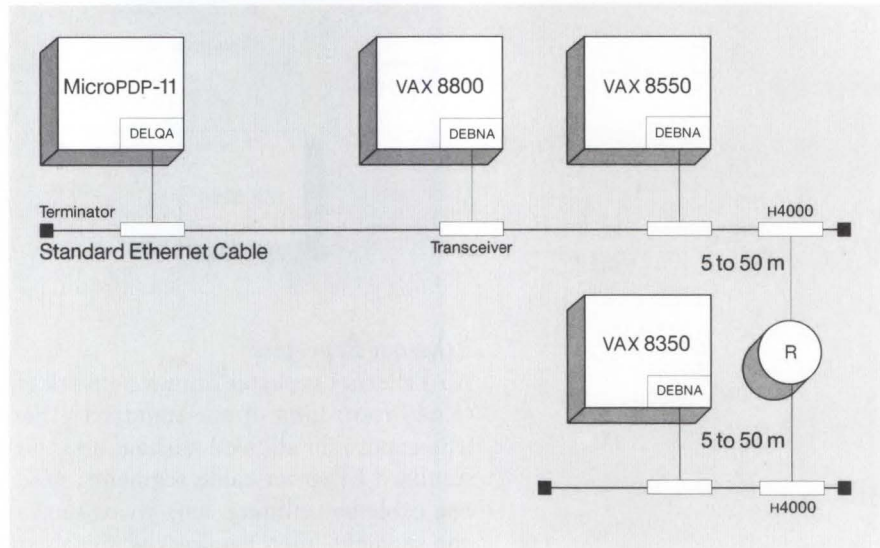
Consider these rules when planning LAN expansion using repeaters:

- A message transmitted on a local area network must pass through no more than two repeaters (DEREP, DEMPR, or DESPR) before either reaching its destination or passing through a LAN Bridge.
- Fiber optic repeaters may be used to connect multiple Ethernet segments. However, the total amount of fiber optic cable used in the path between any two nodes may not exceed 1000 meters (3,282 feet).
- Repeaters may be placed in parallel for backup purposes—one active and the other inactive. If one fails, the other activates.
- A repeater cannot be connected to a DELNI.
- Both local and fiber optic repeaters are connected to the standard Ethernet cable via H4000 Ethernet transceivers and Ethernet transceiver cables.

802.3/Ethernet Configuration Guidelines

The following figure illustrates an Ethernet LAN that has been expanded from one floor to another floor within the same building. In this example, because the distance between the two standard Ethernet cables is 100 meters, a local repeater is used.

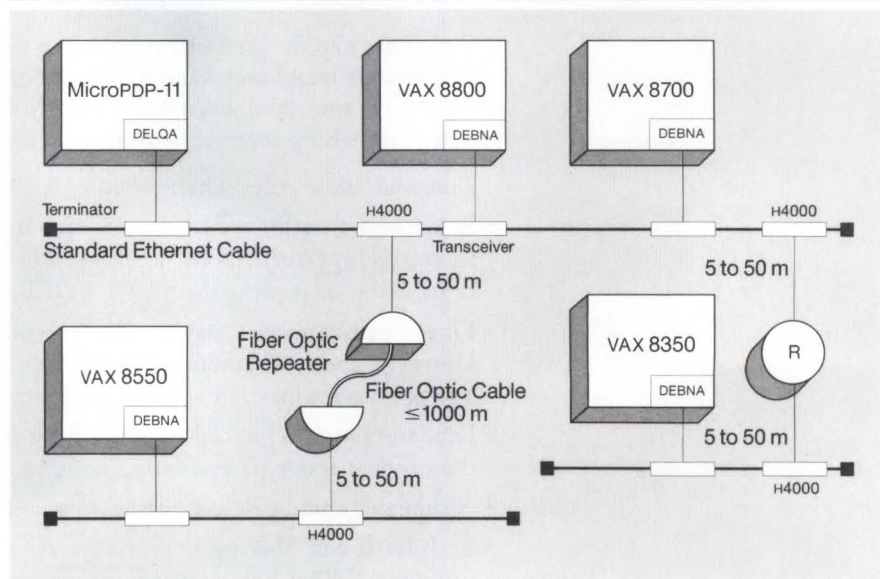
Ethernet LAN Expansion using a Local Repeater (100-m maximum separation between repeaters)



NBG-200-00

If it is necessary to expand the network to another building up to 1,000 meters (3,280 feet) away, a fiber optic repeater is necessary as shown in the following figure.

Ethernet LAN Expansion using a Fiber Optic Repeater (1000-m maximum separation between repeaters)



NBG-201-01

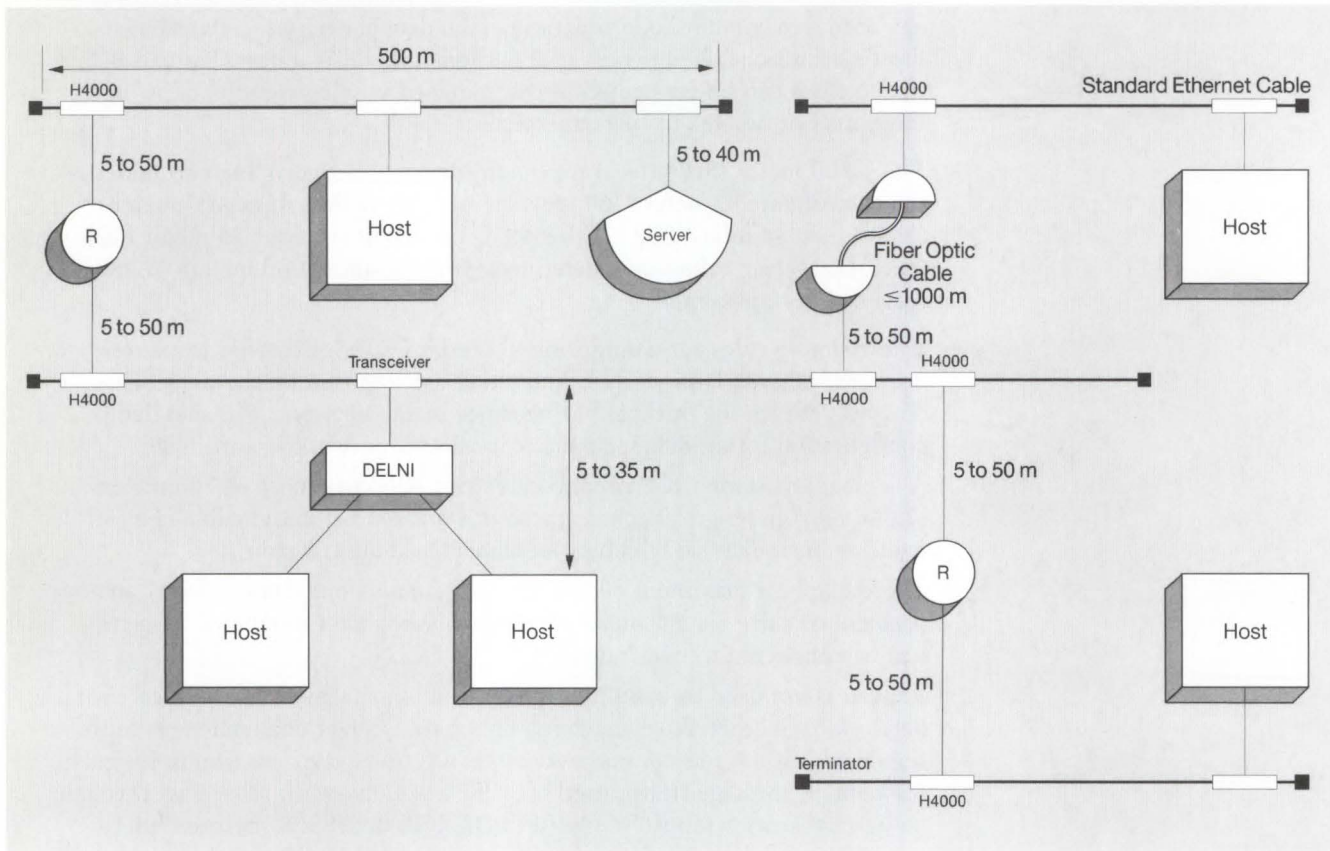
Standard Baseband Ethernet Distance Guidelines

Standard baseband 802.3/Ethernet is a branching, non-rooted tree topology with a maximum node separation (the distance between the two farthest systems on the network) of 2.8 kilometers (1.74 miles). Up to 1,023 transceivers can be connected to the standard baseband cable, allowing thousands of devices to be connected.

The 2,800 meter (9,194 feet) maximum distance between any two nodes is the sum of two 50-meter (164 feet) transceiver cables, three 500-meter (1,640 feet) standard 802.3/Ethernet cable segments, four 50-meter (164 feet) transceiver cables connected to repeaters, and 1,000 meters (3,280 feet) of fiber optic cable.

A few simple rules for configuring a standard 802.3/Ethernet local area network, derived from certain limits that are imposed on the physical channel, ensure the optimal performance of the network. The maximum configuration for an 802.3/Ethernet local area network is as follows:

- A segment of standard baseband cable can be a maximum of 500 meters (1,640 feet) in length. Each segment of standard baseband cable is terminated at both ends, at which point transmitted signals stop.
- There can be a maximum of 100 physical connections (transceivers) on any segment of cable (at 2.5 meter intervals). Note that a number of devices can be connected to one transceiver via a DELNI.
- Repeaters are used to continue signals from one segment of the local area network to another. A repeater requires a transceiver connection on both segments it joins and counts toward the 100 transceiver maximum for each segment. A message transmitted on a local area network must pass through no more than two repeaters (DEREP, DEMPR, or DESPR) before either reaching its destination or passing through a LAN Bridge.
- The maximum length of standard baseband cable between any two transceivers is 1,500 meters (4,920 feet).
- A total of 1,000 meters (3,280 feet) of fiber optic cable is allowed for expanding the network using fiber optic repeaters.
- A standalone DELNI configuration supports up to eight devices (systems, not terminals) using transceiver cables between 40 and 45 meters (131.2 and 147.6 feet) in length, depending on the communications controller.
- A hierarchical standalone DELNI configuration supports up to 64 devices using standard transceiver cables between 40 and 45 meters (131.2 and 147.6 feet) in length, depending on the communications device, and up to 50 meters (164 feet) for another DELNI which, in turn, can support devices between 40 and 45 meters (131.2 and 147.6 feet) in length, depending on the communications device. A hierarchical standalone DELNI LAN is not connected to the standard baseband cable.
- A connected DELNI configuration supports up to eight devices using standard transceiver cables between 35 and 40 meters (114.8 and 131.2 feet) in length, depending on the communications device.
- Transceiver cable length is limited to 50 meters (164 feet) for connection to host systems and communications servers.
- Some devices have internal cabling that may reduce the effective length of the transceiver cable.

Baseband 802.3/Ethernet Distance Guidelines

NBG-202-01

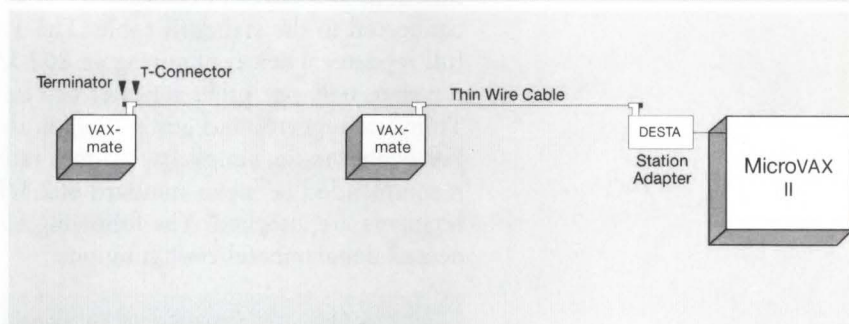
**Planning a ThinWire
802.3/Ethernet LAN**

While standard baseband 802.3/Ethernet is recommended for use between satellite equipment rooms, ThinWire is recommended for use within the floor areas of a facility. ThinWire 802.3/Ethernet cable is an alternative baseband cabling system that can be configured as a standalone network or connected to the backbone cable in local work areas. ThinWire 802.3/Ethernet products include ThinWire coaxial cable, multiport repeaters (DEMPR), singleport repeaters (DESPR), station adapters (DESTA), and connection components.

Three configurations are recommended for ThinWire installation: small work group, standalone departmental, and connected departmental.

Small Work Group Configuration

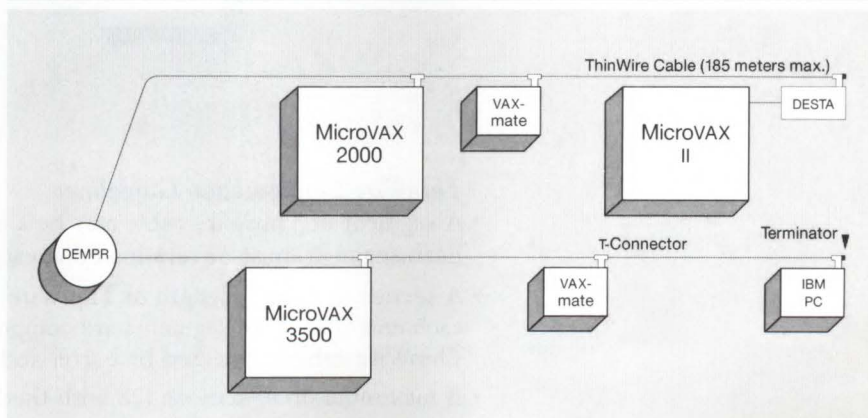
The small work group configuration allows users to connect personal computers, workstations, low-end systems, and 802.3/Ethernet communications servers using ThinWire cable and T-connectors. A segment of ThinWire cable is divided into sections. Two sections of cable are joined by a T-connector and the bottom of the "T" is inserted into a DESTA or ThinWire 802.3/Ethernet communications controller. The DESTA has a 15-pin D-connector for attachment to standard 802.3/Ethernet devices and a BNC connector for connection to ThinWire. Up to 30 devices can be connected to a 185-meter ThinWire segment.

ThinWire Small Work Group Configuration

NBG-203-00

Standalone Departmental Configurations

The standalone departmental configuration allows up to eight 185-meter ThinWire segments to connect to the Multiport Repeater (DEMPR). The DEMPR can be used in a radial topology to connect personal computers, workstations, and low-end systems in a work area or throughout the floor of a building. Each of the eight ThinWire cable segments that connect to the DEMPR can accommodate up to 29 stations. Therefore, one DEMPR can connect 232 stations. The DEMPR will isolate faults in a segment so that the rest of the network will stay in operation. The following figure illustrates the standalone departmental configuration.

ThinWire Standalone Departmental Configuration

NBG-204-00

Eight DEMPRs can also be connected to a DELNI in a standalone departmental configuration. In this configuration, the 802.3/Ethernet limit of 1,023 stations can be connected.

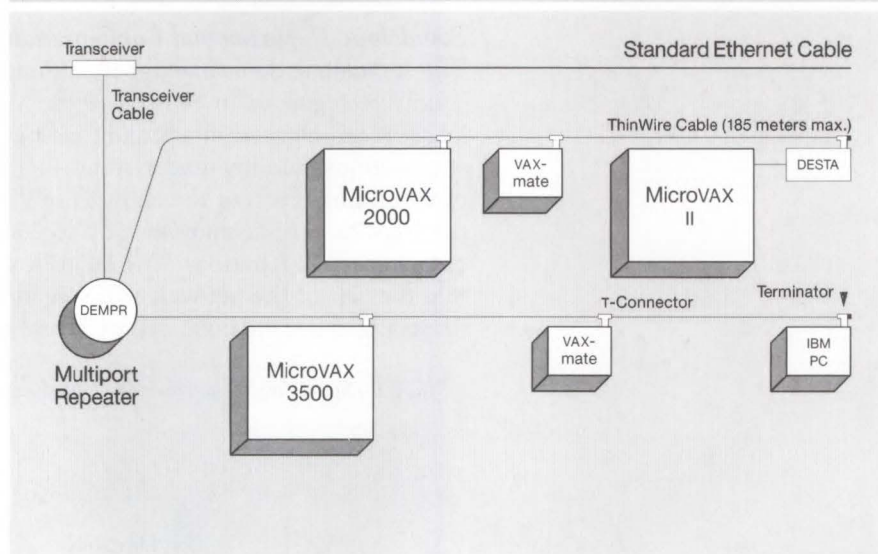
Connected Departmental Configurations

In connected departmental configurations, ThinWire segments connect to the backbone cable for access to more computing resources on the larger local area network. Up to eight ThinWire segments can connect to a DEMPR, which connects to the backbone cable via a baseband transceiver. In addition, up to eight DEMPRs can connect to a DELNI, which connects to the backbone standard baseband cable using an H4005 (or H4000-BA) transceiver.

802.3/Ethernet Configuration Guidelines

When connected to standard 802.3/Ethernet cable, the ThinWire repeater functions as a repeater between all stations attached to it and all devices connected to the standard cable. The ThinWire repeater must count as a full repeater when configuring an 802.3/Ethernet LAN. Since it counts as a repeater, only one other repeater can be configured in the path between the ThinWire repeater and any station on the rest of the local area network. For configuration simplicity, bridges rather than repeaters are recommended between standard 802.3/Ethernet segments where ThinWire repeaters are attached. The following figure illustrates a ThinWire connected departmental configuration.

ThinWire Connected Departmental Configuration



NBG-205-00

ThinWire Configuration Guidelines

- A segment of ThinWire cable may be a maximum of 185 meters in length. Each segment must be terminated at each end with 50-ohm terminators.
- A section is a single length of ThinWire cable with male BNC connectors at each end. ThinWire segments are composed of one or more sections of ThinWire cable connected by barrel and/or T-connectors.
- A maximum of 30 stations (28 with the DECconnect System) may be connected to a single ThinWire segment. The DECconnect faceplate, the ThinWire repeater, a BNC T-connector, or barrel connector counts as one station. There must be 0.5 meters (19 inches) between T-connectors.
- A ThinWire repeater provides internal cable termination and can therefore be placed only at the end of a segment.
- A message transmitted on a local area network must pass through no more than two repeaters (DEREP, DEMPR, or DESPR) before either reaching its destination or passing through a LAN Bridge.
- A ThinWire repeater must be connected to standard baseband cable using either a baseband transceiver or a DELNI. The DELNI in this configuration cannot be connected to another DELNI, and it must connect to the standard baseband cable with an H4005 transceiver (or H4000-BA). The standard 802.3/Ethernet segment to which a DELNI/DEMPR or DELNI/DESPR configuration is attached may not exceed 300 meters (984 feet).

802.3/Ethernet Configuration Guidelines

- A station requiring a DESTA must be connected directly to the DESTA with transceiver cable. The DESTA must connect directly to the BNC T-connector. No cable is allowed between the DESTA and the BNC T-connector. The DESTA cannot be connected to a DEREPE.
- There must be only one ground per cable segment. Ensure that no other connectors contact the ground. If the segment is attached to a ThinWire repeater, the repeater provides the ground and no other ground connections are allowed.
- ThinWire cable segments must never be configured in a loop.
- ThinWire cable segments must never have any branch segments. All T-connectors must attach directly to stations, not to other segments of ThinWire cable.

DECconnect ThinWire Configurations

ThinWire can be used to supply 802.3/Ethernet capability from a satellite equipment room to a faceplate in an office or other work area, as long as the 185-meter distance requirement is observed. ▲ **Refer to Section 2 for more information.**

Unshielded Twisted-pair Guidelines

The unshielded twisted-pair Ethernet adapter can attach to these types of unshielded twisted-pair cable:

- DECconnect unshielded twisted four-pair cable (H8245/H8246)
- AT&T Type C and D
- Northern Telecom 3-Pair
- IBM Type 3

Allowable distance over unshielded twisted-pair cable is 50 to 70 meters.

Each unshielded twisted-pair adapter supports a single device only. Twisted-pair installations are restricted to one station per twisted-pair segment.

A twisted-pair cable segment must be dedicated to 802.3/Ethernet services. No concurrent services, such as telephone or low-speed data, can be used within the same cable sheath as the 802.3/Ethernet cable.

When configuring 802.3/Ethernet twisted-pair products, the cable qualification is as important as the product itself. Customers planning to use existing wiring qualify for testing if they can answer yes to the following questions:

- Is your wire unshielded twisted-pair?
- Is it one of the following types: DECconnect unshielded twisted four-pair cable (H8245/H8246), AT&T Type C or D, Northern Telecom 3-Pair, or IBM Type 3?
- Is your wiring newer than two years old?
- Does each sheath contain a maximum of four pairs of wire?
- Is the cable currently unoccupied?
- Will the cable be used for 802.3/Ethernet communications only?

▲ **For more information on configuring unshielded twisted-pair cable, refer to the configuration manuals listed in Appendix D.**

Planning an Extended Baseband 802.3/Ethernet LAN

The extended LAN is an 802.3/Ethernet environment that uses bridges to connect several 802.3/Ethernet segments into one large network of up to 8,000 nodes. By using LAN Bridges in network configurations, it is possible to extend network size without diminishing network performance.

The LAN Bridge forwards packets destined for other segments of the extended LAN, filtering out the packets destined for a node within the same segment. This “packet filtering” allows the customer to configure a segment based on traffic flow, thereby making the best use of network bandwidth. For example, the bridge can be used to isolate a network segment with heavy traffic from the rest of the extended LAN.

The following configuration rules apply to standard, fiber optic, and microwave versions of the LAN Bridge 100.

Configuration and Distance Guidelines

- An extended LAN may have up to 8,000 stations.
- Digital recommends that an extended LAN have no more than seven bridges between stations. Protocols that have time-sensitive parameters may suffer performance loss if packets move through more than seven bridges, due to the accumulation of slight delays caused by the store-and-forward function.
- Bridges can be placed in parallel with other bridges to provide an auto-backup capability. Bridges causing loops in this situation automatically enter a backup state. A bridge that is in the backup state continues to monitor traffic on both LANs and, if the primary bridge fails, automatically activates and forwards messages.
- The LAN Bridge 100 can be used to connect network segments using any standard 802.3/Ethernet medium (i.e., baseband or broadband).
- Distance from the transceiver to bridge can be a maximum of 50 meters, a total of 100 meters between segments. Internal cabling may reduce the effective length of the transceiver cable.

Fiber Optic Links

Fiber optic links can be built using two fiber optic bridges, two fiber optic repeaters, or one fiber optic bridge and one fiber optic repeater. Two bridges connected by a fiber optic link count as two in the seven-bridge limitation.

- When building links with fiber optic repeaters, there must be no more than 1,000 meters of fiber between stations.
- Distance from the transceiver to bridge can be a maximum of 50 meters. Internal cabling may reduce the effective length of the transceiver cable.
- The fiber optic repeater must use an H4000 transceiver to attach to the standard Ethernet cable.
- When building links with the fiber optic bridge and fiber optic repeater combination, the length of the fiber optic link must be included as part of the configuration of the LAN to which the fiber optic repeater is attached. ▲ **For more information, refer to the topic on Ethernet repeaters in “Planning a Baseband 802.3/Ethernet LAN” in this section.**

802.3/Ethernet Configuration Guidelines

- When building a link with two fiber optic bridges, each link length is limited by the 12 dB system budget for signal loss. Therefore, with the present Digital 62.5/125 micron fiber cable, a link can be 3,000 meters long. Many 3,000-meter links can be built throughout the extended LAN.
- The fiber optic bridge and repeater are designed to operate with other size fibers including 100/140, 85/125, and 50/125. The following table lists the distance and power-budget specifications.

Optical Specifications for Fiber Optic Bridge (DEBET-RH/RJ) and Repeater (DEREP-RH/RJ)

Fiber (micrometers)	Power Budget* (dB)	Attainable Distance (km)*		
		DEBET to DEBET	DEREP to DEREP	DEBET to DEREP
50/125	08.0	2.0	1.0	1.5
62.5/125	12.0	3.0	1.0	1.5
85/125	13.5	3.0	1.0	1.5
100/140	16.0	3.0	1.0	1.5

*With less than a 1×10^{-10} bit error rate.

Microwave Link

Microwave links are implemented using the Digital METROWAVE Bridge and the M/A-COM, Inc., MA-23 LAN microwave radio equipment.

- 802.3/Ethernet LAN configuration rules for the METROWAVE Bridge are based on the same configuration rules that apply to a pair of fiber optic LAN Bridge 100s: microwave-based METROWAVE uses two LAN Bridge 100s and counts as two bridges in an extended LAN configuration. Digital advises a maximum of seven bridges between the two farthest nodes in an extended LAN when time-critical protocols such as LAT are used.
- Line-of-sight single-link distances up to 4.5 miles (bridge to bridge) are possible. Maximum path length is determined by 802.3/Ethernet propagation delay specifications, designed to detect signal collisions during simultaneous two-way transmissions.

As with coaxial or fiber optic cable, microwave has an associated latency that can be the same or less than a fully configured maximum-length 802.3/Ethernet LAN. The maximum allowable delay determines the 4.5-mile (7,240-meter) distance restriction for METROWAVE. (A standard 802.3/Ethernet LAN has a maximum distance limitation of 2,800 meters between its two farthest nodes. A single LAN Bridge 100 can join two such maximum LANs.)

The path length is also a function of the cable distance as measured along the path of the cables between the two links. The cable distance is determined by adding the following distances on both ends of the link:

- the distance from the LAN Bridge 100 to the microwave adapter, plus
- the distance from the microwave adapter to the receiver (RX) and transmitter (TX) controllers, plus
- the distance from the RX/TX controllers to the RF (radio frequency) units.

802.3/Ethernet Configuration Guidelines

The following table lists the resulting point-to-point antenna path given various total (both sides) cabling distances from the LAN Bridge to the antenna:

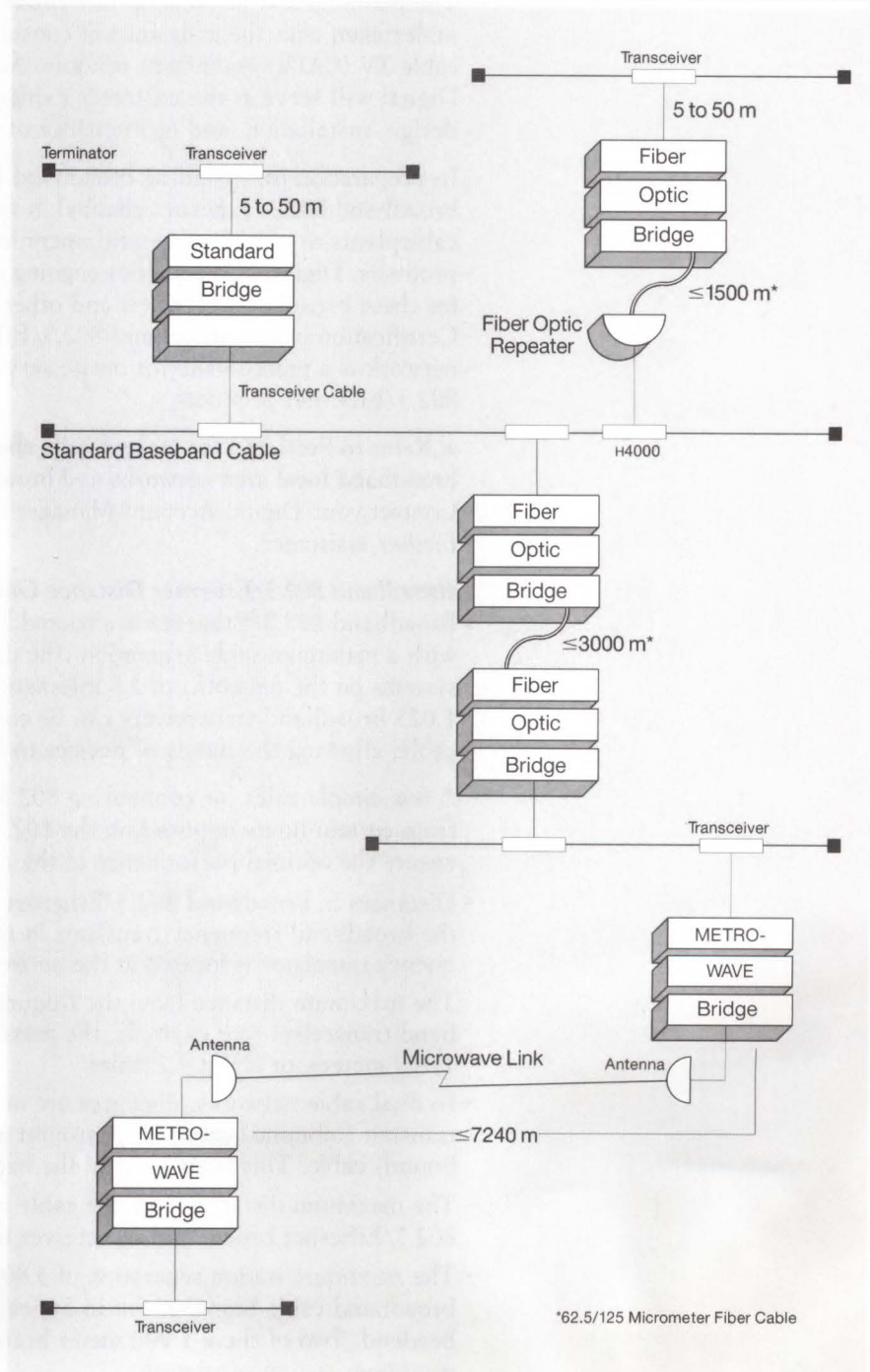
Total Cabling Distance (ft)	Antenna Path (miles)
100	4.48
200	4.45
600	4.33
1,000	4.21
2,000	3.91

- The microwave transmitter and receiver controllers may be up to 1,000 feet from the antenna.
- A METROWAVE Bridge must be located at each end of the microwave link and includes the following:
 - Standard baseband 802.3/Ethernet transceiver
 - LAN Bridge 100
 - BNE3M-20 cable connecting the standard baseband transceiver to the LAN Bridge 100
 - Microwave adapter
 - BNE4D-02 cable connecting the LAN Bridge 100 and microwave adapter
- The METROWAVE Bridge is available premounted in 31.5-inch high cabinets, or in non-cabinet configurations that make it suitable for rackmounting in satellite equipment room (SER) racks.
- Two METROWAVE Bridges connected by a microwave link count as two in the seven-bridge limitation.
- Although it is packaged with a baseband transceiver, the METROWAVE Bridge can also be attached to standard 802.3/Ethernet cable using a DELNI, to ThinWire cable using a DESTA, or to broadband cable using a broadband transceiver.

802.3/Ethernet Configuration Guidelines

The following figure illustrates the extended baseband LAN configuration and distance guidelines.

Extended Baseband LAN Configuration and Distance Guidelines (Standard, Fiber Optic, and METROWAVE Bridges)



NBG-206-00

802.3/Ethernet Configuration Guidelines

Planning a Broadband 802.3/Ethernet LAN

In broadband local area networks, a different cabling system is used than for baseband networks. The network cable, coaxial drop cables, and cable components (amplifiers, splitters, taps, etc.) necessary to construct broadband networks are the same as those used for cable TV.

The planning and installation of a broadband cable system is most often undertaken with the assistance of consultants, installation contractors, and cable TV (CATV) equipment vendors. As part of its Network Services, Digital will serve as the customer's single point of contact for the planning, design, installation, and maintenance of Digital broadband networks.

In preparation for installing broadband networks, Digital certifies the broadband 802.3/Ethernet channel in new and existing broadband cableplants to ensure successful operation of broadband 802.3/Ethernet products. Digital also provides ongoing and remedial maintenance services for these broadband products and other Digital-qualified vendor products. Certification of the broadband 802.3/Ethernet channel in the customer's network is a prerequisite for onsite service contracts for broadband 802.3/Ethernet products.

▲ Refer to Section 6 for more details about Digital's Network Services for broadband local area networks and broadband 802.3/Ethernet products.

Contact your Digital Account Manager or Local Field Service Office for further assistance.

Broadband 802.3/Ethernet Distance Guidelines and Configuration

Broadband 802.3/Ethernet is a rooted branching non-rooted tree topology with a maximum node separation (the distance between the two farthest systems on the network) of 3.8 kilometers (approximately 2.4 miles). Up to 1,023 broadband transceivers can be connected to the broadband network cable, allowing thousands of devices to be connected.

A few simple rules for configuring 802.3/Ethernet on broadband, derived from certain limits imposed on the 802.3/Ethernet physical channel, ensure the optimal performance of the network.

- Distances in broadband 802.3/Ethernet are measured from the location of the broadband frequency translator in single cable networks. The frequency translator is located at the network "headend."

The maximum distance from the frequency translator to the farthest broadband transceiver (for example, the maximum radius of the network) is 1,900 meters, or about 1.2 miles.

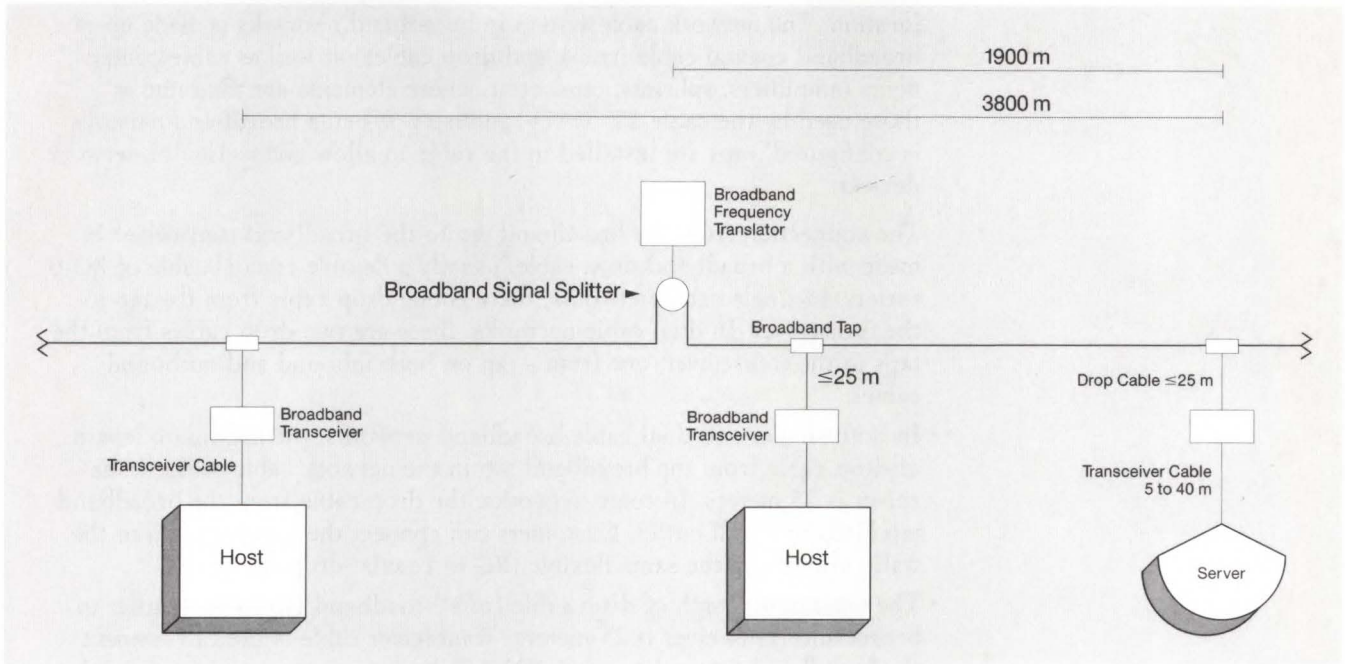
- In dual cable networks, distances are measured from the point at which the transmit (inbound) cable turns around and becomes the receive (outbound) cable. This is considered the headend of the dual cable network.

The maximum distance from the cable turnaround to the farthest 802.3/Ethernet broadband transceiver is 1,900 meters, or about 1.2 miles.

- The maximum station separation of 3,800 meters is achieved when the broadband cable branches out in opposite directions from the network headend. Two of these 1,900 meter branches add up to 3,800 meters of maximum station separation.

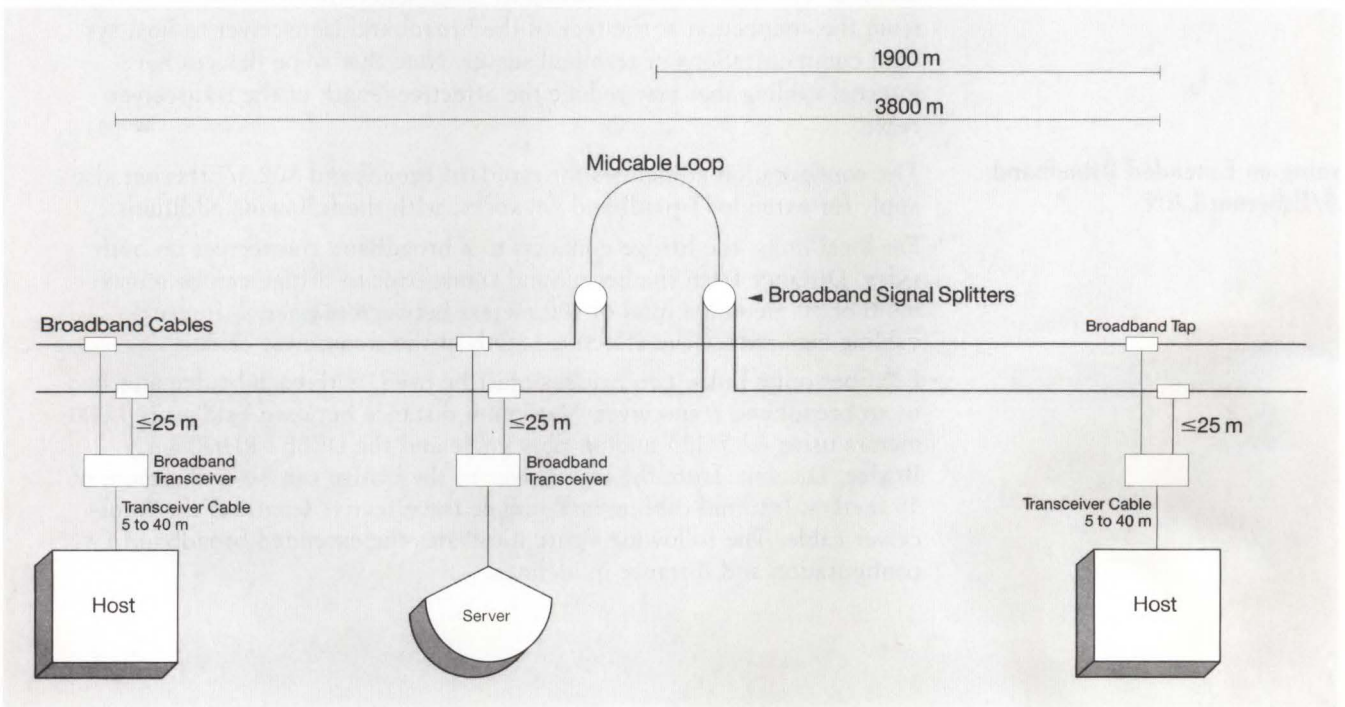
802.3/Ethernet Configuration Guidelines

Broadband 802.3/Ethernet Distance Guidelines: Single-cable Networks



NBG-207-00

Broadband 802.3/Ethernet Distance Guidelines: Dual-cable Networks



NBG-208-00

802.3/Ethernet Configuration Guidelines

Because the broadband cable can branch out in any direction, the network can consist of virtually unlimited numbers of “spokes” from the headend location. The network cable system in broadband networks is made up of broadband coaxial cable (trunk and drop cables) as well as cable components (amplifiers, splitters, taps, etc.). These elements are the same as those used by the cable TV (CATV) industry. When a broadband network is configured, taps are installed in the cable to allow connection of network devices.

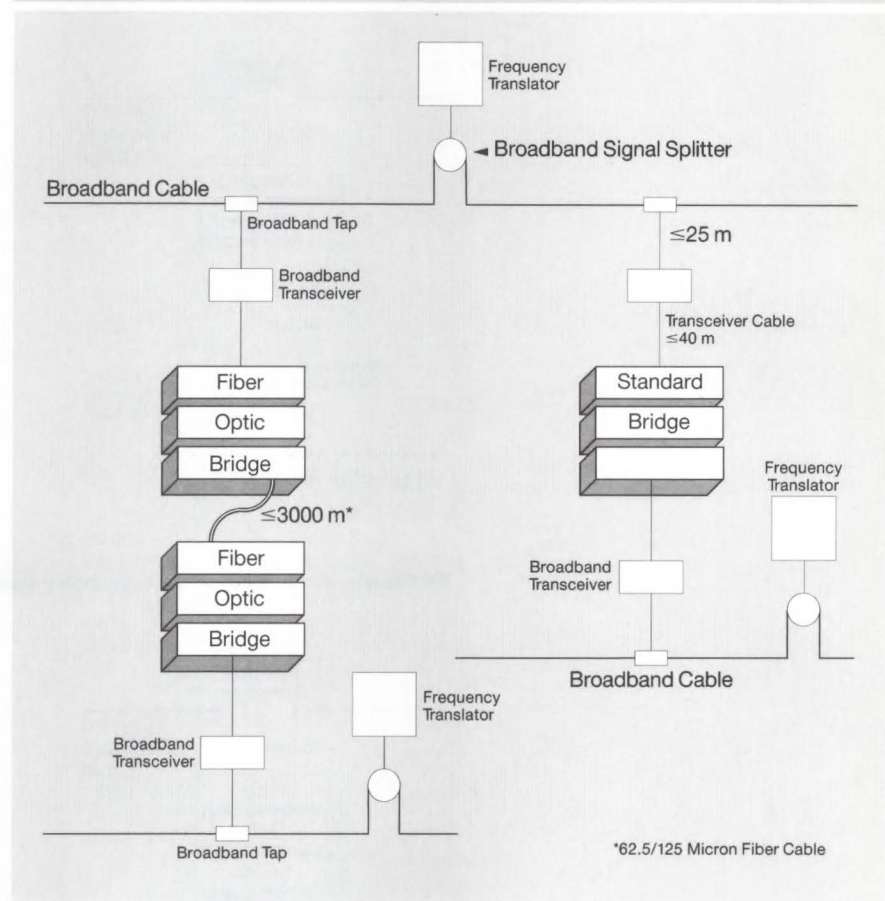
The connection from the broadband tap to the broadband transceiver is made with a broadband drop cable, usually a flexible coaxial cable of RG-6 variety. In single cable networks, there is one drop cable from the tap to the transceiver. In dual cable networks, there are two drop cables from the taps to the transceiver, one from a tap on both inbound and outbound cables.

- In both single- and dual-cable broadband networks, the maximum length of drop cable from the broadband tap in the network cable to the transceiver is 25 meters. In some networks, the drop cable from the broadband tap leads to a wall outlet. Customers can connect the Ethermodem to the wall outlet using the same flexible (RG-6) coaxial drop cable.
- The maximum length of drop cable from broadband tap to wall outlet to broadband transceiver is 25 meters. Transceiver cable is used to connect the broadband transceiver to an 802.3/Ethernet communications controller, LAN Bridge 100, communications server, or terminal server.
- Transceiver cable length is limited to 50 meters (164 feet), and is measured from the connection at the rear of the broadband transceiver to host system, communications or terminal server. Note that some devices have internal cabling that may reduce the effective length of the transceiver cable.

Planning an Extended Broadband 802.3/Ethernet LAN

The configuration guidelines for standard broadband 802.3/Ethernet also apply for extended broadband networks, with the following additions:

- For local links, the bridge connects to a broadband transceiver on both sides. Distance from the broadband transceiver to bridge can be a maximum of 50 meters, a total of 100 meters between segments. Internal cabling may reduce the effective length of the transceiver cable.
- For fiber optic links, two bridges must be used, with each bridge attached to an broadband transceiver. Maximum distance between bridges is 3,000 meters using 62.5/125 micron fiber cable and the DEBET-RH/RJ LAN Bridge. Distance from the transceiver to the bridge can be a maximum of 50 meters. Internal cabling may reduce the effective length of the transceiver cable. The following figure illustrates the extended broadband LAN configuration and distance guidelines.

Extended Broadband LAN Configuration and Distance Guidelines (Single Cable)

NBG-209-00

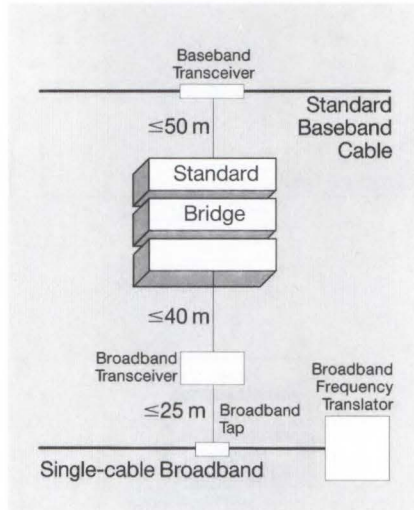
Connecting Baseband to Broadband LANs

Baseband and broadband LANs can be connected using the LAN Bridge 100. For local links, the bridge connects to a baseband 802.3/Ethernet transceiver on the baseband side of the link using transceiver cable with a maximum length of 50 meters. On the broadband side of the link, the bridge connects to a broadband transceiver using transceiver cable with a maximum length of 50 meters. Internal cabling may reduce the effective length of the transceiver cable on both sides of the bridge.

For fiber optic links, two bridges must be used. The bridge on the baseband side of the link is connected to a baseband transceiver. The bridge on the broadband side of the link is connected to a broadband transceiver. Maximum distance between bridges is 3,000 meters using 62.5/125 micron fiber cable and the DEBET-RH/RJ LAN Bridge. Distance from each transceiver to the bridge can be a maximum of 50 meters. Internal cabling may reduce the effective length of the transceiver cable.

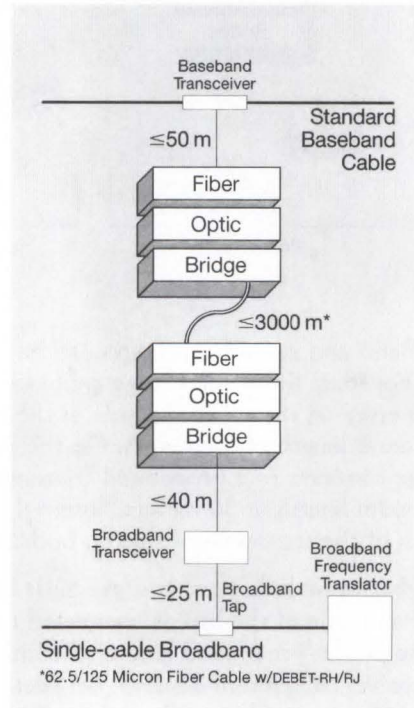
802.3/Ethernet Configuration Guidelines

Baseband-to-broadband LAN Configuration Guidelines (Standard Bridge)



NBG-210-01

Baseband-to-broadband LAN Configuration Guidelines (Fiber Optic Bridge)



*62.5/125 Micron Fiber Cable w/DEBET-RH/RJ

NBG-211-01

Connecting Shared Resources to an 802.3/Ethernet LAN

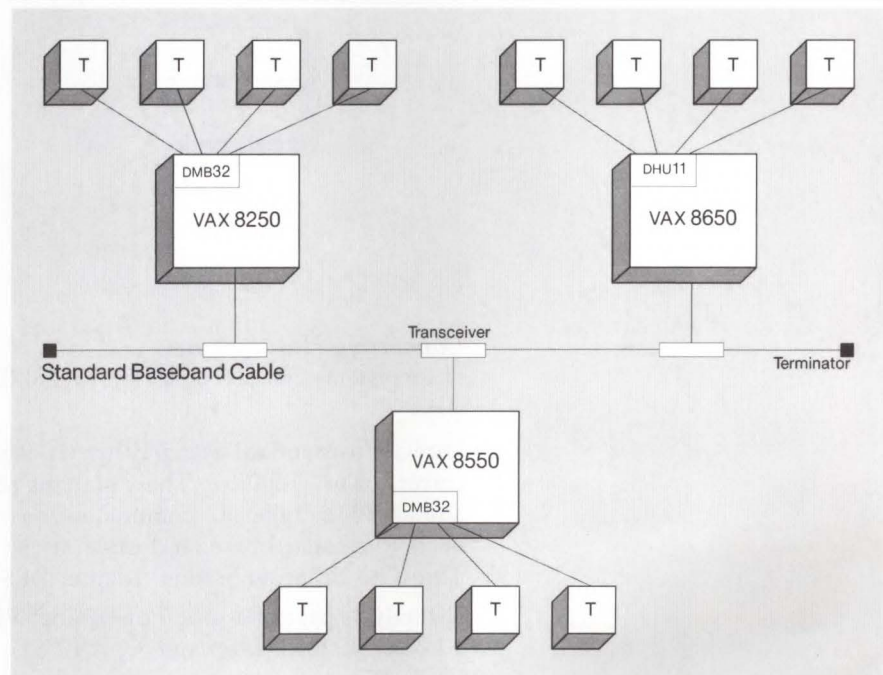
When planning a baseband or broadband 802.3/Ethernet LAN, alternatives for connecting shared resources (including terminals, host systems, and communications servers) should be explored.

Connecting Terminals

There are two ways to connect terminals to the 802.3/Ethernet LAN: direct connection to a host system on the LAN, and connection to a terminal server on the LAN.

Direct connection is the conventional method of connecting terminals to a host. Directly connected terminals can access any other host system in a network, then operate as if they were connected to the other host system. However, this connection scheme lacks flexibility because terminal controllers must be added to each host system; wiring must extend from each terminal to the directly connected host, which may be a long distance away; and directly connected terminals incur the overhead of passing through their direct host to connect to another host. The following figure illustrates a LAN configuration with directly connected terminals.

802.3/Ethernet LAN with Many Terminals Per Host



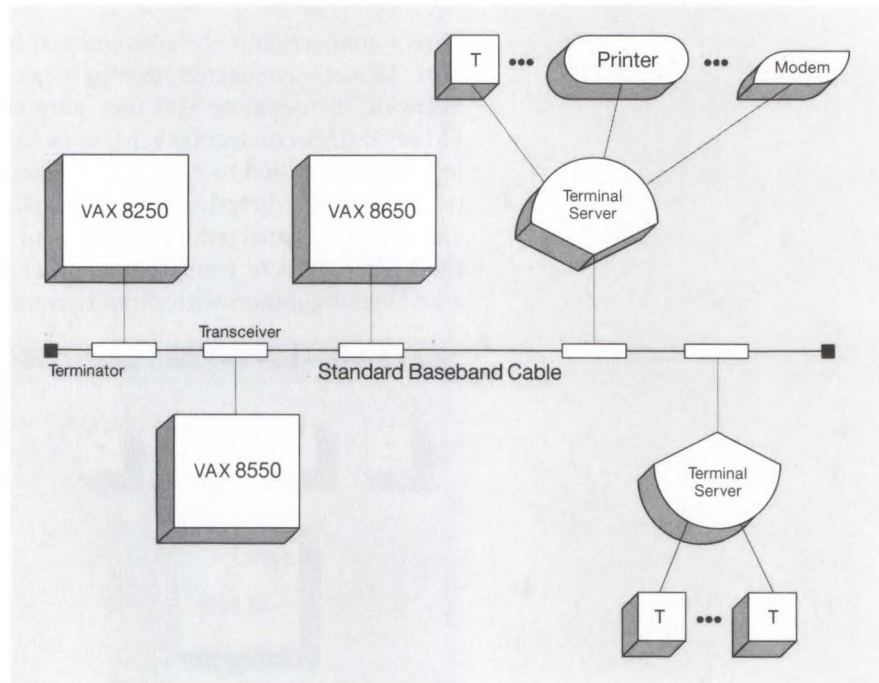
NBG-212-00

Terminal servers allow a more flexible connection scheme than direct connection. A group of terminals connect to a terminal server, which then connects directly to the LAN, allowing the terminals to access any host on the LAN. Printers and modems can also connect to a terminal server, allowing them to be shared by all host systems on the LAN. Terminal servers can be placed close to the users' workplace, thereby reducing the length of wire extending from each terminal.

802.3/Ethernet Configuration Guidelines

The following figure shows an 802.3/Ethernet configuration using terminal servers. Compared to the configuration shown in the previous figure, the terminal server configuration reduces the number of controllers for each host, reduces the length of wires extending from terminals, and offers greater flexibility in accessing host systems on the LAN.

802.3/Ethernet LAN Configuration Using Terminal Servers

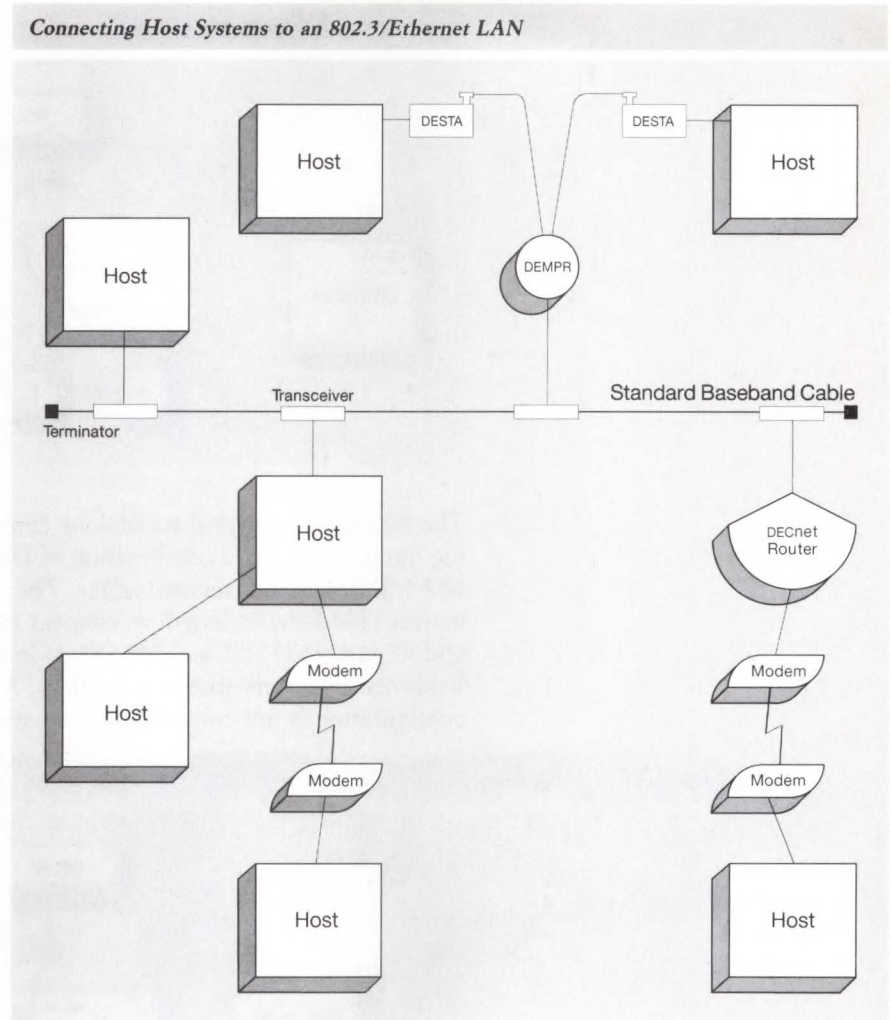


NBG-213-00

Connecting Host Systems

Host systems can be connected to an 802.3/Ethernet LAN in the following ways:

- Directly to standard 802.3/Ethernet cable (using an 802.3/Ethernet transceiver) or to ThinWire. These systems require DECnet Phase IV software and an 802.3/Ethernet communications controller. If the controller connects to standard baseband cable, it can connect to ThinWire via a ThinWire Ethernet Station Adapter (DESTA).
- Directly as part of a group of DECnet Phase IV host systems connected to a Local Network Interconnect (DELNI). Each host system requires DECnet Phase IV software and an 802.3/Ethernet communications controller.
- Indirectly via a DECnet Phase IV host system that is connected to the 802.3/Ethernet cable. Connected host systems can have DECnet Phase III or Phase IV software. Connections can be hardwired or through modems.
- Indirectly through a DECrouter 2000, a DECrouter 200, or X25router 2000. Connected host systems can have DECnet Phase III or Phase IV software. Connections can be hardwired or through modems.



NBG-214-00

DECnet Host System Software

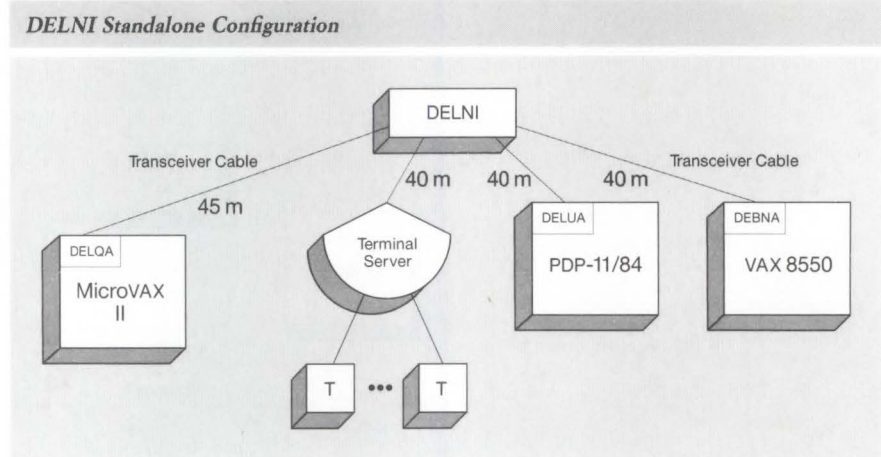
DECnet Phase IV software allows host systems to communicate with up to 64,000 addressable nodes in a local or wide area network environment. An addressable node is either a host system or communications server. ▲ Refer to Section 4 for detailed information on Digital's DECnet software products.

Local Network Interconnect (DELNI)

The Local Network Interconnect (DELNI) provides low-cost 802.3/Ethernet performance for a group of 802.3/Ethernet-compatible devices in a 50-meter area. The DELNI can be configured in three ways:

- Standalone
- Hierarchical standalone
- Connected

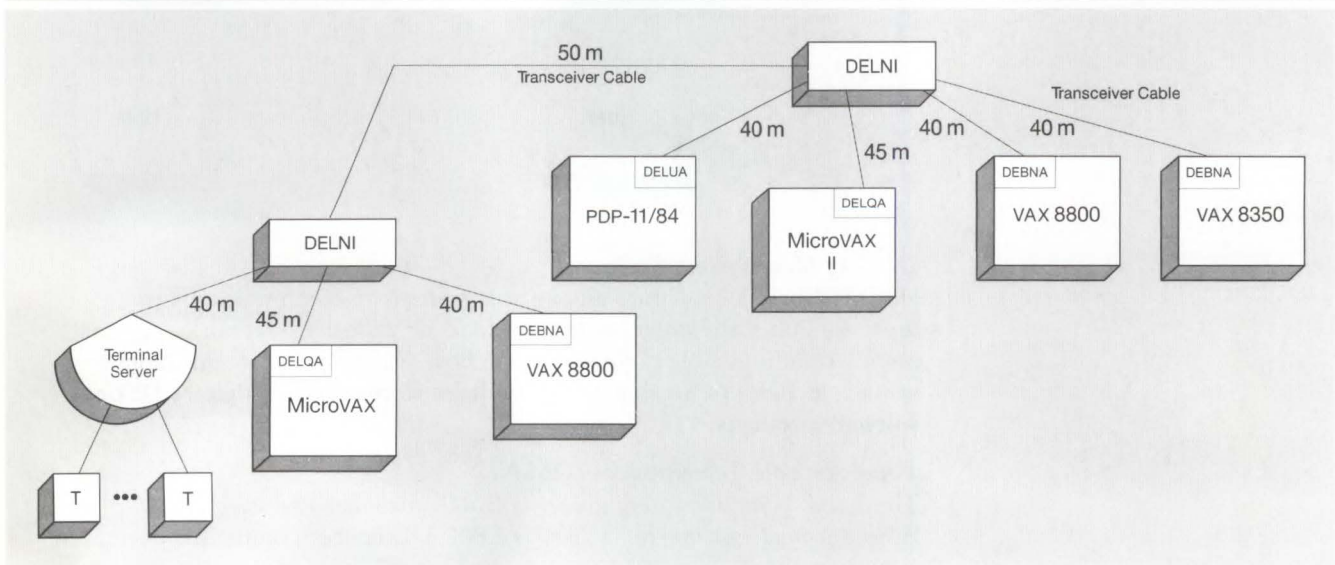
The DELNI standalone configuration, illustrated in the following figure, supports up to eight systems or system-based devices (not terminals) using standard 802.3/Ethernet transceiver cables up to 50 meters (164 feet) away.



NBG-135-01

The DELNI hierarchical standalone configuration, illustrated in the following figure, supports a combination of DELNIs and devices using standard 802.3/Ethernet transceiver cables. The transceiver cable can be up to 50 meters (164 feet) in length to connect to another DELNI, and between 40 and 45 meters (131.2 and 147.6 feet) in length to connect to 802.3/Ethernet communications controllers. A DELNI hierarchical standalone configuration is not connected to the standard baseband cable.

DELNI Hierarchical Standalone Configuration



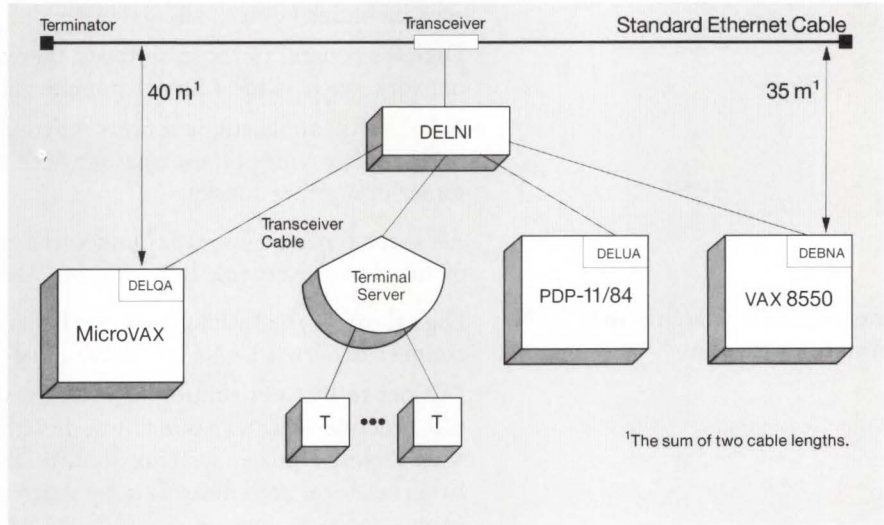
NBG-136-01

The DELNI connected baseband configuration, illustrated in the following figures, supports up to eight devices using standard transceiver cables. The total maximum length of transceiver cable is 40 meters (131.2 feet). In a baseband configuration without an Etherjack, this would be the sum of the length of the cables from the transceiver to the DELNI and from the DELNI to the host system or communications server. However, a particular controller may restrict this length. For example, the maximum cable length from the transceiver to the DELUA is 35 meters (115 feet).

802.3/Ethernet Configuration Guidelines

In broadband configurations, the Chipcom Ethermodem should not be used with a DELNI because this is an unsupported configuration.

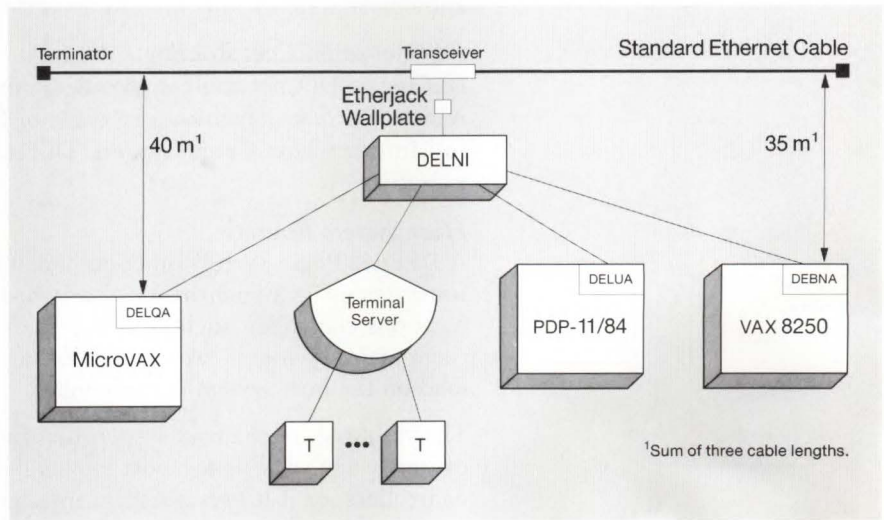
DELNI Connected Configuration



NBG-137-01

In configurations with an Etherjack (baseband only), the lengths to be considered are from the transceiver to the Etherjack, Etherjack to DELNI, and DELNI to the host system or communications server.

DELNI Connected Configuration Using an Etherjack



NBG-139-01

802.3/Ethernet Configuration Guidelines

Connecting Servers

Servers are specialized network nodes that act as shared resources. Three types of servers can be used on an 802.3/Ethernet LAN:

- Digital's 802.3/Ethernet communications server hardware/software packages including routers and gateways.
- Digital's general purpose software that provides server functions in the network, such as file transfer, remote job entry, and remote printing.
- Non-Digital applications servers written by users, for example, a computer node that provides typesetting services using software written by a customer or another vendor.

All three types of servers connect to a standard 802.3/Ethernet transceiver or to a Local Network Interconnect (DELNI).

Connecting an 802.3/Ethernet LAN to Remote Networks

Digital offers the following 802.3/Ethernet communications servers to connect Ethernet LANs to remote networks:

- DECnet-to-DECnet routing: The DECrouter 200, DECrouter 2000, or a full-function DECnet node allows host Ethernet systems to communicate with remote DECnet systems or with DECnet systems on other 802.3/Ethernet local area networks by means of point-to-point links.
- DECnet-to-X.25 communications: The X25router 2000, or a full-function DECnet node with a Packetnet software product, allows host systems to communicate with other DECnet systems as well as non-Digital systems over an X.25 Packet Switching Data Network. **▲ Refer to Section 4 for more information about Packetnet software products.**
- DECnet-to-IBM SNA communications: The DECnet/SNA Gateway products allow host systems to communicate with IBM systems in SNA networks.

DECnet-to-DECnet Routing

DECnet-to-DECnet routers provide communications between local and remote DECnet networks. The types of DECnet-to-DECnet routers are full-function host system routers, DECnet router servers, and DECnet gateways.

Host System Routers

A DECnet Phase IV full-function node can manage 802.3/Ethernet routing functions using asynchronous or synchronous lines connected to a communications controller, such as a DMF32 or a DMR11. This may be adequate if there are only one or two connections to remote nodes and if the routing load on the host system is fairly light.

The resources of the host system that functions as a routing node should be carefully analyzed. If the host system has more than two communications controllers, or if it uses a significant amount of CPU processing time for routing, a DECrouter 2000 or DECrouter 200 should be considered. These servers are dedicated to routing functions, while full-function nodes must also run applications. In addition, the physical line interfaces for the DECnet Router Server or DECrouter 200 are much less expensive than those provided by communications controllers.

DECrouter 2000

The DECrouter 2000 performs DECnet routing functions between Phase IV nodes on an 802.3/Ethernet LAN and remote DECnet nodes, and provides connections between independent 802.3/Ethernet networks.

For routing purposes, Phase IV DECnet networks consist of a number of linked areas. Each area is not limited to a specific geographic region, but is often localized, such as a LAN in a building. (Here LAN refers to any local area network that conforms to the Ethernet, IEEE 802.3, or the ISO 8802/3 standards.)

Packet routing is handled by specified routing nodes, which may have to do this task in addition to providing services to users. Routing works on two levels:

- Level 1—Among nodes within an area (called intra-area routing)
- Level 2—From one area to another (called inter-area routing)

The DECrouter 2000 is a dedicated routing system that can act as a Level 1 and/or Level 2 router. The system routes information over one LAN circuit and up to four synchronous DDCMP circuits. This gives other DECnet nodes on the LAN access to remote nodes, and also relieves them of the routing overhead.

An example application for the DECrouter 2000 might be as a Level 2 router for a LAN whose nodes are in a single DECnet area, connected to two remote nodes in the same DECnet area, and two other nodes in other areas. In this case it would act as both a Level 1 and Level 2 DECnet router.

Routing Capabilities

- Level 1 and/or Level 2 Phase IV DECnet routing
- Ability to route messages between 63 areas, each with up to 1023 nodes, the maximum permitted by the architecture. (Satisfactory operation in large networks requires proper network planning.)
- Adaptive routing over the synchronous links and to/from the LAN.
- Ability to communicate with remote Phase III nodes in the same DECnet area.
- Path splitting where there are two or more equal-cost paths between the DECrouter 2000 and the destination DECnet node. For this feature, all the destination nodes on the network must support out-of-order packet caching.

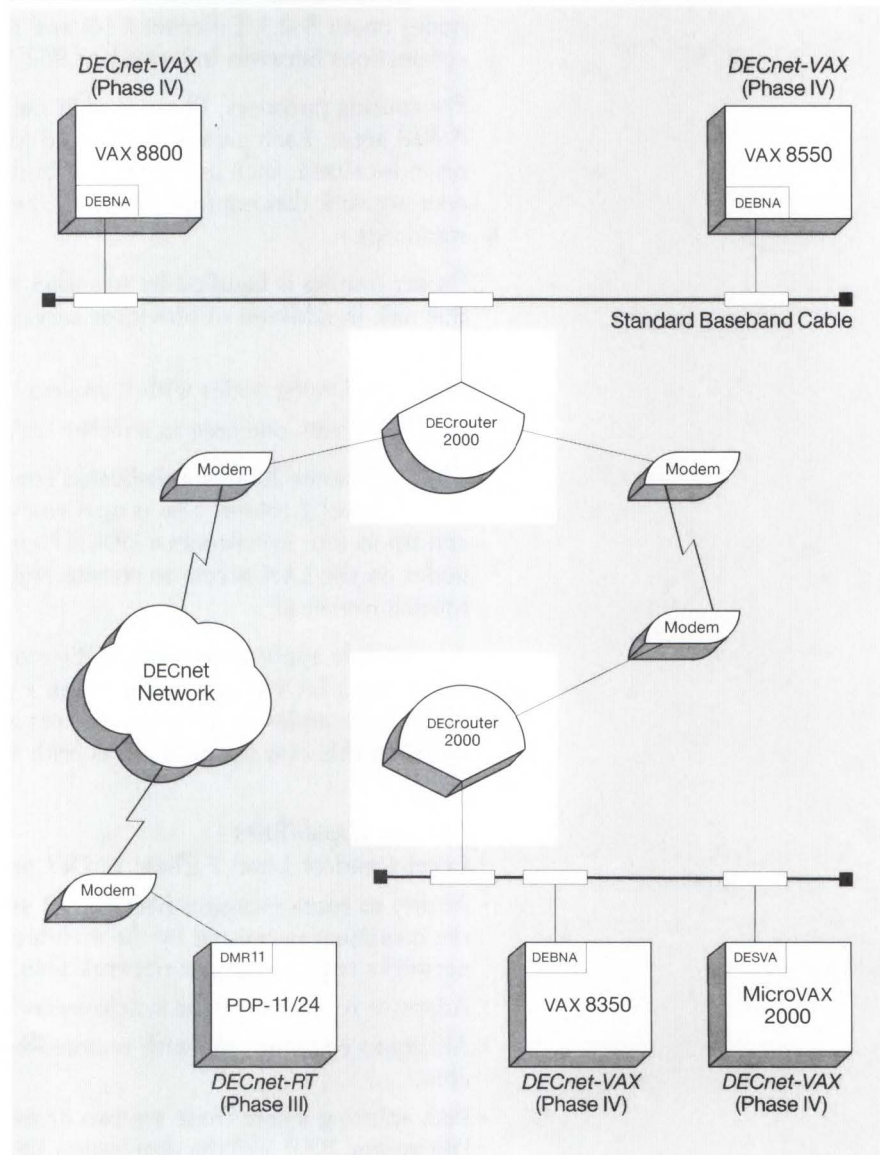
Synchronous Line Capabilities

- Data speeds of up to 256 Kb/s
- EIA-232-C, EIA-422, EIA-423, V.24, V.35 and X.21 electrical interfaces: X.21 is supported in leased-line mode only
- Full modem control on all synchronous lines

DDCMP Capabilities

- Communicates with all supported synchronous Digital DDCMP products, excluding the DMC11.
- Ability to work on point-to-point or multi-point links. However, on DDCMP multipoint links, the DECrouter 2000 can act only as a tributary.
- Full- or half-duplex communications.

802.3/Ethernet LAN Configuration Using a DECrouter 2000



NBG-219-01

Network and Configuration Management Capabilities

- Configuration using a downline-loaded image and a configuration utility.
- Remote management from any suitable DECnet node using the DECnet Network Control Program.
- Remote problem diagnosis (for example, using the TRACE tool).
- Automatic attempt to dump and reload following a system failure.
- Event logging to any Phase IV DECnet node.
- Dynamic reconfiguration while the system is running.

Network Management

The network manager controls the DECrouter 2000 by using the DECnet Network Control Program from any DECnet Phase IV node. For example, the manager can use the utility from one of the systems on the LAN.

The utility provides three basic functions:

- Display statistics and error information for the DECrouter 2000 (for example, statistics on line usage or errors).
- Control the DECrouter 2000 (for example, starting and stopping lines, setting parameters, and loading the software).
- Test the components of the network (for example, loopback messages of all or part of a communications path to isolate a defective component).

In addition, a separate utility available on VMS load hosts assists problem-solving by tracing information at various stages in its path through the DECrouter 2000.

Host Systems

The DECrouter 2000 has no file storage of its own, and so relies on host systems to

- Load the software.
- Log events.
- Receive any memory dumps.

The minimum requirement is for one host to load the DEC MicroServer, the hardware base for the DECrouter 2000. Event-logging and dump-reception facilities can be used at the discretion of the customer. Only a DECnet Phase IV DECnet-VAX or DECnet-ULTRIX node on the same LAN can be a load host or dump receiver.

The DECrouter 2000 software can be installed on a number of load hosts. This helps to protect against loss of service if a single load host is unavailable or unable to load the system for any reason. Each load host must be on the same LAN, but not necessarily in the same DECnet area as the DECrouter 2000.

DECnet-to-X.25 Communications

As networks grow and users require more network functions, nodes, and communications alternatives, the complexity of the network increases. Digital's communications over Packet Switched Data Networks (PSDNs) can be a cost-effective alternative for customers who want to transmit a low volume of data remotely. Public PSDNs charge primarily on the amount of data transmitted, and to a lesser extent, if at all, on distance and time factors.

If a customer requires only short, low-speed data transmissions, a dial-up line might be cost-effective because it avoids the PSDN connection charge. If high-volume continuous data transmission is required, the customer will want to avoid the PSDNs "data-sent" charge, making a leased line more appropriate. Somewhere in the middle (medium data rates and volume), X.25 PSDNs are cost-effective. Because most X.25 networks charge by the amount of data sent, customers may want to mix capabilities (leased line, dialup, and packet-switched), depending on the traffic patterns and line costs.

The CCITT X.25 specification defines the network protocols for communications among multivendor systems over X.25 packet-switching data networks (PSDNs). There are two ways of connecting 802.3/Ethernet nodes to an X.25 network: host-based system connections or the X25router 2000.

Host-Based System Connections to X.25 Networks

Individual VAX or RSX host systems can connect to an X.25 network using the VAX P.S.I. or RSX-11 P.S.I. products. During installation, customers can choose to allow the VAX P.S.I. system to act as a gateway to a PSDN. Other VAX systems in the DECnet network need only install VAX P.S.I. Access to take advantage of the facilities available through or from the X.25 PSDN. ▲ **For more detailed information, refer to the “Packetnet Communications Software” in Section 4.**

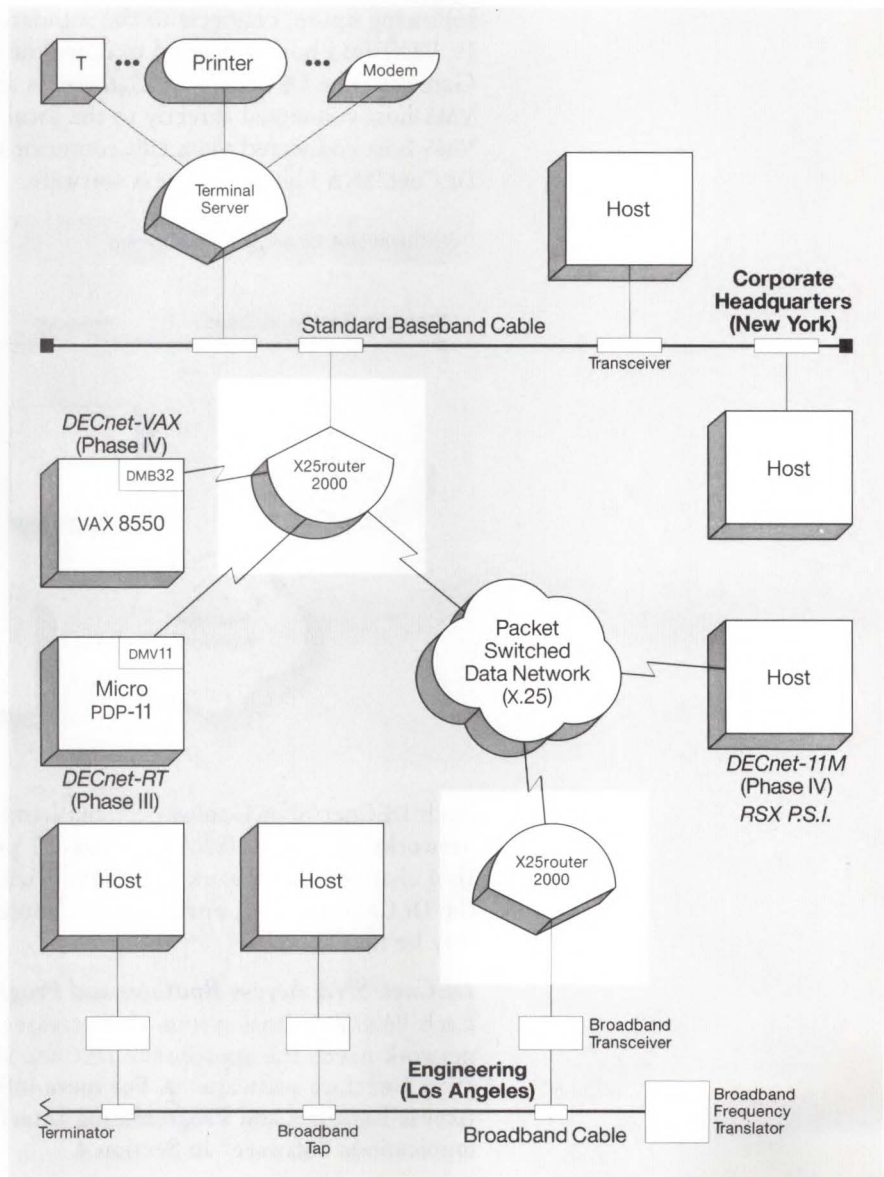
X25router 2000

The X25router 2000 is an addressable node on the network available for access by any host node on the network. The X25router 2000 connects host nodes to other DECnet nodes in an X.25 network using the Data Link Mapping (DLM) capability of the gateway software ▲ **Refer to “Packetnet Communications Software” in Section 4 for a description of the X25router 2000.**

In addition to acting as a Level 1 (local) router and supporting limited numbers of DDCMP synchronous lines, the X25router 2000 gives VAX P.S.I. Access systems access to all facilities offered by the connected X.25 network.

Most often the design of geographically dispersed networks is influenced by the expense of transferring data over telecommunications facilities owned by common carriers. Network implementations use either leased lines for high volume, continuous data transfer, or PSDN communications for low-to-medium volume data transfer. For customers with one or both of these requirements, the X25router 2000 offers a unique solution. Because the X25router 2000 supports both X.25 and DDCMP (leased) lines, it offers flexible configurations.

The X25router 2000 allows users to make traditional wide-area network DECnet connection using DDCMP to DECnet nodes on an 802.3/Ethernet local area network, and to DECnet nodes connected to an X.25 network, as illustrated in the following figure.

X25router 2000 Configuration (DECnet-to-DECnet)

NBG-220-01

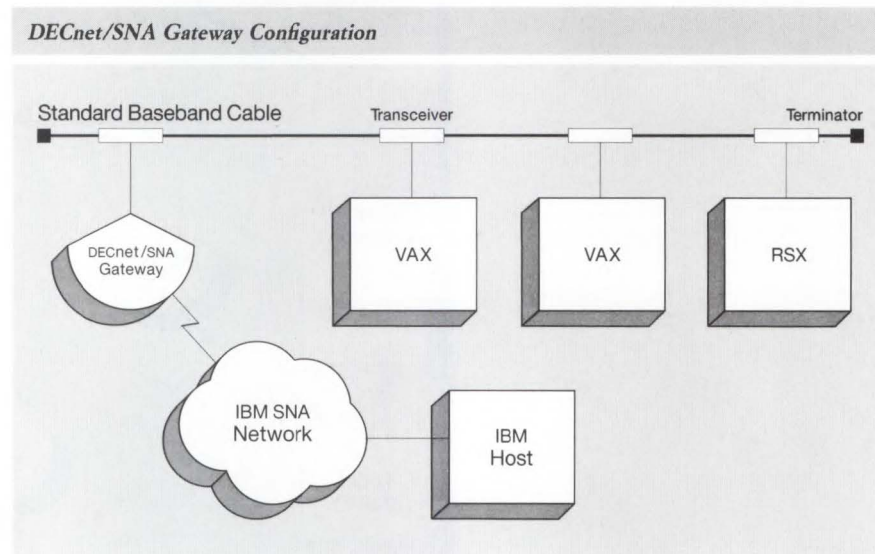
A VAX/VMS host system on the local area network must have a copy of the basic X25router 2000 software. This host system downline loads the software into the X25router 2000. Then the X25router 2000 is started and DECnet-to-DECnet communications are available to all other host systems on the LAN.

Digital-to-non-Digital Communications over X.25 Networks

▲ Refer to "Packetnet Communications Software" in Section 4 for a description of Digital's P.S.I. and P.S.I. Access products, which are used with the X25router 2000 to provide X.25 and X.29 communications capabilities. Section 4 also contains a table indicating the relative advantages and disadvantages of gateway versus direct X.25 connections, and the alternative use of VAX P.S.I. in multihost mode.

DECnet-to-IBM/SNA Communications

The DECnet/SNA Gateway products link Digital VAX/VMS nodes within a DECnet network to an IBM SNA network. The gateway, illustrated in the following figure, connects to the standard 802.3/Ethernet cable. A Phase IV VAX/VMS host is needed to downline-load software to the DECnet/SNA Gateway. The DECnet/SNA Gateway is accessible directly by any Phase IV VMS host connected directly to the local area network or any Phase III VMS host connected via a DECrouter or DECnet routing system with DECnet/SNA Gateway Access software.



NBG-221-00

Each DECnet/SNA Gateway-ST can handle up to four lines to remote SNA networks. A DECnet/SNA Gateway-CT provides one link directly to an IBM channel. In network applications with extremely heavy traffic between the DECnet and SNA environments, more than one DECnet/SNA Gateway may be necessary.

DECnet/SNA Access Routines and Programming Interfaces

Each VAX/VMS host system that accesses the IBM systems in the SNA network needs the appropriate DECnet/SNA Access Routine or Programming Interface software. ▲ For more information about DECnet/SNA Access Routines and Programming Interfaces, refer to "Digital/IBM Communications Software" in Section 4.

DECnet-VAX

▲ Refer to DECnet-VAX Software Product Description 25.03 load unit tables for guidelines.

DECnet-RSX

This topic provides performance guidelines for file transfer and task-to-task communication for DECnet-11M-PLUS V4.0.

The performance of a network can be affected by several factors. One major consideration is the type of processor used. The CPU can be a limiting factor in terms of performance.

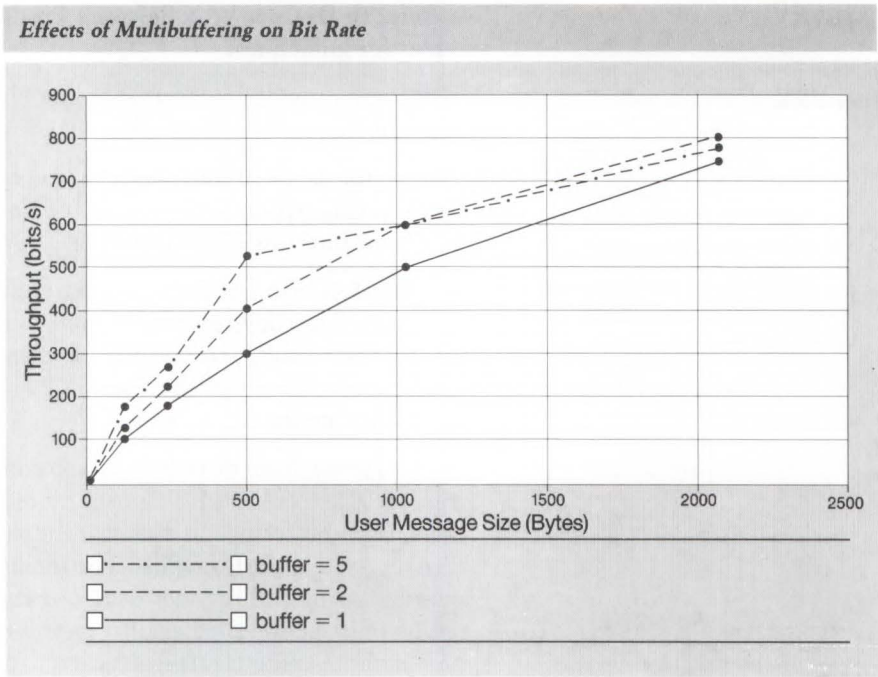
Another factor to consider in determining network performance is the communication devices used. Because those with a low line speed can bottleneck a configuration, it is important to choose a line that meets the user's needs. Note that the user bit transfer rate should not be expected to equal the line speed.

The buffering level of task-to-task communication has an impact on the bit transfer rate. Multibuffering uses more of the available network buffers than single buffering. In a small memory machine, multibuffering could degrade system performance. The increased difficulty in programming with multibuffering and the increased possibility of system performance degradation must be weighed against improved network performance. With this performance trade-off, it is necessary to evaluate and determine how the user's needs will be best satisfied.

Throughput Data

When writing programs for task-to-task communications, there are trade-offs to consider. It is much more difficult to develop software that uses multibuffering than software that uses single-buffering. Also, when tasks use multibuffering, it may be necessary to increase the number of network buffers. A program's buffering level may actually slow down execution time and increase user response time on the system. Each configuration and application has an "optimal" buffering level. It is important to consider at what point the small increase in performance is no longer worth the additional buffering required to extract the extra throughput.

The following figure illustrates how an increase in the buffering rate improves the bit rate and throughput as the buffering level increases from one to two. In a typical situation, expected results can range from 150 Kb/s to 600 Kb/s for multibuffering.



NBG-224-00

Transmission of a large message will generally have a higher throughput than that of a small message. All messages have an associated CPU overhead, independent of the message size. If the CPU is a limiting factor, the transmission of a long message will push more bits through than a small one will. In other words, holding the CPU utilization constant, a higher bit transfer rate will be realized with a longer message.

Large user message sizes are more demanding on a system than small ones. With a limited capacity, an increase in throughput may not be worth the degradation of the total system. However, it is also not advisable to have a system buffer size smaller than normal user message size. In that situation, each message would have to be segmented.

The user should never expect to reach a bit rate equal to the line speed because there will always be some protocol overhead to consider. For a given level of buffering, throughput depends on processor speed, message size, and line speed. For single-buffering situations, one might typically expect rates of 50 Kb/s to 500 Kb/s.

CPU utilization generally decreases as message size increases primarily because of the fixed costs associated with transmission of each message. A large message has a lower CPU cost per byte and CPU cost per second because the fixed cost is distributed over a larger message and a longer transmission time period.

The following table lists the typical CPU utilizations for task-to-task communications over an 802.3/Ethernet local area network.

CPU Utilization for Task-to-task Communications over 802.3/Ethernet

PDP Systems	CPU Utilization	Communication Device	Operating System
11/44 to 11/44	63% to 75%	DEUNA	RSX-11M-PLUS
11/53 to 11/53	85% to 97%	DEQNA	Micro/RSX*
11/83 to 11/83	85% to 95%	DEQNA	Micro/RSX

*The throughput can increase for PDP-11/53 systems by loading the network into lower memory space. This lower memory space is located on the CPU board.

File Transfers

The time required to transfer a file can be divided into two categories, either connection time or transfer time. There is a fixed amount of connection time required to execute startup functions such as opening files and creating logical links. The transfer time is a function of the number of bits per unit of time that can be transmitted over the network by NFT/FAL and the file size.

In an actual case, an RMS FAL was installed on the remote node. ASCII files of different lengths were transferred from a local node to a remote node over the 802.3/Ethernet. The results from the NFT task are shown in the following table.

Network File Transfer Over 802.3/Ethernet

Configuration	Connection Time (secs)	Blocks/second Transferred
11/44 to 11/44	2.5	60.24
11/44 to 11/750	2.7	34.36
11/53 to 11/53 (Network loaded by default)	2.9	45.45
11/83 to 11/83 (Micro/RSX)	2.2	82.64
11/83 to 11/83 (RSX-11M-PLUS)	2.2	84.75

Routing Nodes

Information regarding the amount of routing done by a system can be gathered by using NCP circuit counters. This tells how many packets have been routed through each circuit since the counters were zeroed.

Routing nodes are affected by many factors, including the amount of traffic on the network, the stability of the nodes in the network, the topology of the network, and the amount of work (other than routing) done by the routing node.

Performance Guidelines

In a study of the packet throughput performance of two DECnet routing nodes, the following measurements resulted:

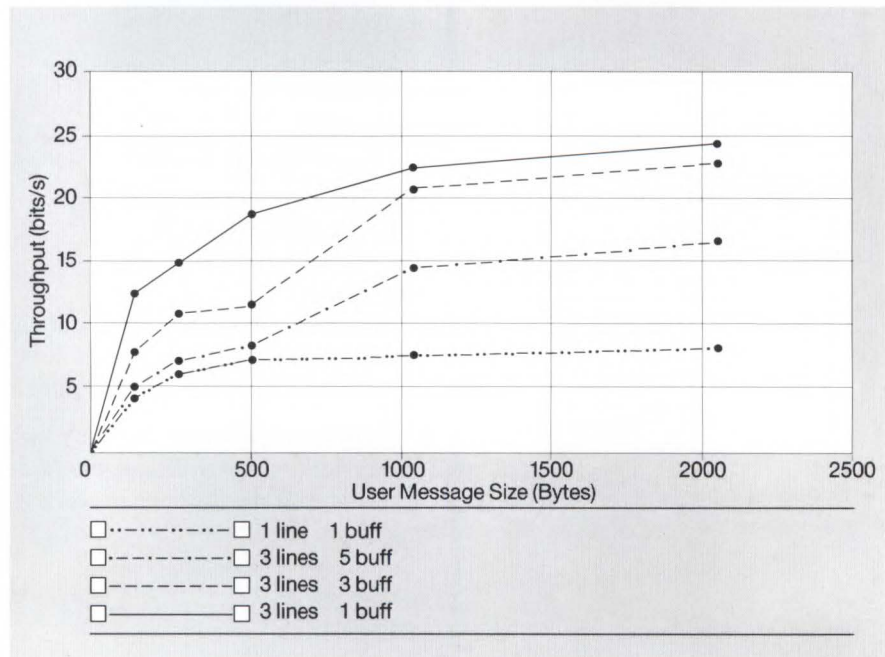
- The highest number of transit packets a PDP-11/44 node can route each second is 306. Note that this number decreases if routing updates are required, or system and network activity increases.
- The number of milliseconds required to transmit a packet through a VAX-11/750 and PDP-11/44 is 3.9 and 3.3, respectively. Note that this number increases if routing updates are required, or system and network activity increases.

Equal-cost Load Splitting

DECnet-RSX/11M-PLUS V4.0 supports a feature called equal-cost load splitting. A routing node can split its network load over communication paths of equal cost. Using this feature, the aggregate throughput for multiple paths is significantly higher than that of a single path.

The following figure compares the aggregate throughput for PDP-11/83-to-PDP-11/83 communications over three 9.6 Kb/s lines to that of one 9.6 Kb/s line. The buffering level for three line tests varies from one to five. In this figure, the aggregate throughput for three lines is about three times that for one line provided there is enough load to saturate all the lines (using large message sizes and high buffering levels). Using small packet sizes and low buffering levels results in less aggregate throughput, but is always higher than the single-line throughput. Users are able to take advantage of equal-cost load splitting when the line is the bottleneck.

Throughput with Equal-cost Load Splitting



NBG-225-00

DECnet-DOS and DECnet-VAXmate

Software testing for DECnet-DOS and DECnet-VAXmate V2.0 performance was conducted on standalone systems connected by unshared transmission media. Only those machines under test were on the network at the time of the tests, and the remote node was running no other processes except those required to carry out the experiments. In general, the user cannot expect to see the same throughput and response times, because most hosts and networks have multiple users contending for available resources.

File Transfer

The total transfer time of a file is composed of two parts. The first is a fixed overhead to initialize the process. This is referred to as the startup cost. The second is the time to transfer the file. The transfer time is expressed in seconds per block.

With the asynchronous line, the line speed is the bottleneck of the system and the transfer time for all the machines is approximately the same. The difference in throughput is a result of the difference in startup time. Because the IBM PC/AT is a faster processor than the IBM PC/XT and PS/2 Model 30, it has a shorter startup time, faster overall response time, and higher throughput.

With 802.3/Ethernet local area networks, the line speed is not the limiting factor; therefore, the speed of the processor is a factor in both the startup cost and the block transfer cost.

DECnet-DOS and DECnet-VAXmate Startup Times and Transfer Costs

Processor	Startup Time	Transfer Cost per Block
9.6 Kb/s line		
VAXmate→MicroVAX	3.60	0.60
PC/XT→MicroVAX	6.50	0.76
PC/AT→MicroVAX (6 MHz)	3.60	0.61
PC/AT→MicroVAX (8 MHz)	3.30	0.60
PS/2 Model 30→MicroVAX	4.50	0.97
PS/2 Model 50→MicroVAX	3.30	0.60
19.2 Kb/s line		
PS/2 Model 50→MicroVAX	3.30	0.31
802.3/Ethernet line		
VAXmate→MicroVAX	3.00	0.036
PC/XT→MicroVAX	5.60	0.117
PC/AT→MicroVAX (6 MHz)	3.60	0.046
PC/AT→MicroVAX (8 MHz)	3.40	0.037
PS/2 Model 30→MicroVAX	3.40	0.059

Performance Guidelines

To calculate an approximate response time, multiply the transfer time by the number of blocks of the file and add the startup cost.

For example, to transfer a 1000-block file from an IBM/XT to a MicroVAX II over a 9.6 Kb/s line:

$(\text{Blocks} \times \text{transfer cost per block}) + \text{startup time} = \text{response time}$

$(1000 * 0.76) + 6.5 = 766.5 \text{ seconds}$

802.3/Ethernet File-transfer Performance

In an 802.3/Ethernet configuration, maximum throughput using DECnet-VAXmate for file transfer on the VAXmate is 98 Kb/s, using DECnet-DOS on the 8 MHz IBM PC/AT is 94 Kb/s, while the maximum using DECnet-DOS on the PC/XT is 32 Kb/s. These measurements are the same for both of the supported third-party interfaces. With the greater speed of the IBM PC/AT, there is a greater load on the remote node. This is negligible with small files of less than 50 blocks, but when transferring larger files this could effect network performance if the remote node is multitasking and highly utilized.

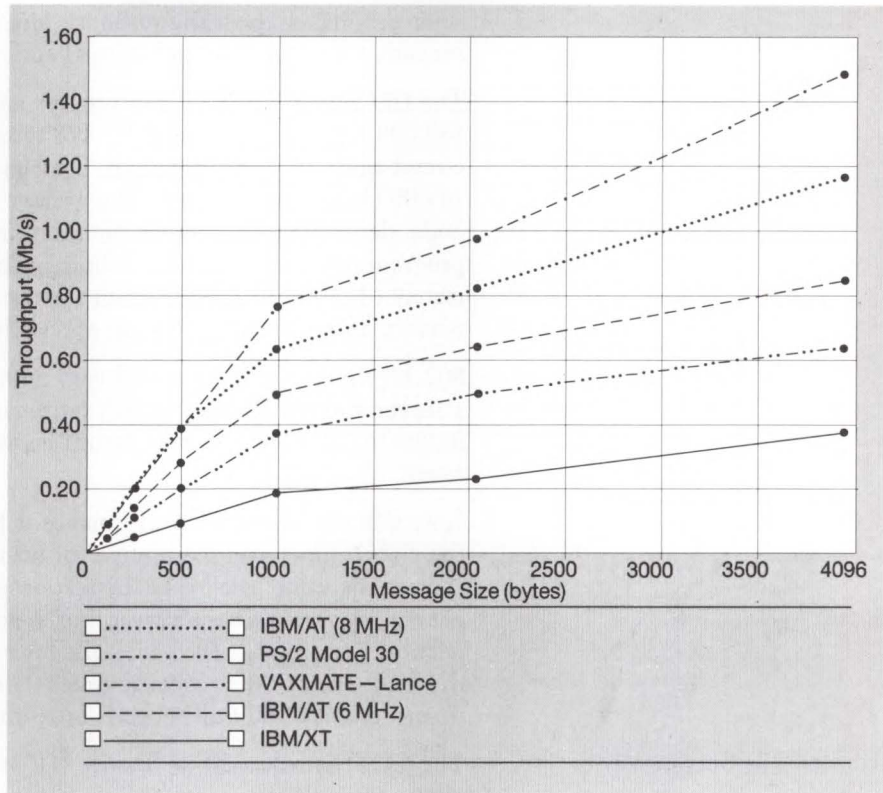
Task-to-task Communications

When using task-to-task communications, segment buffer size for all communications was set at the system default of 557 bytes, which includes the user-message and protocol overhead. For the most efficient use of the network, the user should use these sizes as a guideline when programming intertask communications.

When using task-to-task communications on the local area network, the throughput increases with message size. The maximum throughput for DECnet-DOS on the IBM PC/AT with 8 MHz is 1.16 Mb/s; for DECnet-VAXmate on the VAXmate, it is 1.5 Mb/s. The remote CPU utilization is correspondingly higher on the remote node when using a VAXmate.

The following chart shows the throughput for messages of various sizes. All nodes were on the 802.3/Ethernet local area network. Single-buffered task-to-task communication was measured.

Message Throughput



NBG-226-01

Terminal Servers

Terminal Server performance is characterized best by the following metrics:

- Host CPU interrupt load (for protocol messages)
- Server system throughput
- Average response time
- 802.3/Ethernet utilization

The metrics are constrained by the terminal workload on the host. For example, a large number of users running an editor will generate a greater load than users running VMS MAIL. For the information presented below, an average workload is defined as a mix of terminal users running applications such as MAIL or doing program development with editing.

The LAT protocol is an 802.3/Ethernet-based virtual-circuit protocol. Since LAT buffers characters from many terminals into shared LAT messages, the interrupt load (protocol message processing) on the host can be greatly reduced. Testing indicates that the host load for LAT terminals is comparable for that of the terminals connected directly through a DMF32 device. LAT terminals may provide some savings in the character interrupt load of DZ11 terminals. In fact, the larger the number of users with a common destination on one terminal server, the less overhead.

The DECserver 200, V2.0, can process an aggregate output throughput of over 14,000 characters per second, and an aggregate input throughput of over 11,900 characters per second for eight terminals running at 19.2 Kb/s.

Performance Guidelines

The average response time is 43–125 milliseconds, depending on whether the terminal driver or the applications program on the host performs character echoing. Expect the response time to be approximately 45–50 milliseconds when the terminal driver handles echoing.

The DECserver 550 V1.1 can process and aggregate output throughput of 160,000 characters a second for 128 terminals running at 19.2 Kb/s with a circuit timer of 20 milliseconds. The aggregate input throughput is over 14,000 characters a second. The average response time is 63–145 milliseconds, depending on whether the terminal driver or the host application program performs character echoing. The average response time is approximately 63–70 milliseconds when the terminal driver handles echoing. (All performance measurements are application-dependent.)

802.3/Ethernet utilization will vary with the number of hosts connected to a server and the speed at which terminals are transmitting data. Estimates indicate that this utilization should be well below one percent in most cases.

Note that overall server performance is highly dependent on the value of the circuit timer and the number of hosts connected to the server. The shorter the value, the lower the response time. However, this increases the general overhead on the server, hosts, and the 802.3/Ethernet local area network. The higher the value, the lower this overhead becomes. However, this will increase the response times. For the information above, the circuit timer default of 80 milliseconds is assumed.

Distributed File Service V1.0

The VAX Distributed File Service (DFS) is a VMS-layered product that allows transparent access of remote files over a DECnet network. Using the VAX Distributed Name Service, DFS provides location-independent directory specifications.

In determining performance guidelines, throughput of up to 2.6 Mbit/sec was measured on a MicroVAX server, and up to 3.8 Mbit/sec on a VAX 8700 server. Two groups of functions were tested:

- Control functions—file create, file open/close, and file delete.
- Access functions—file copy, read virtual block, sequential read, sequential write, indexed read, and indexed write.

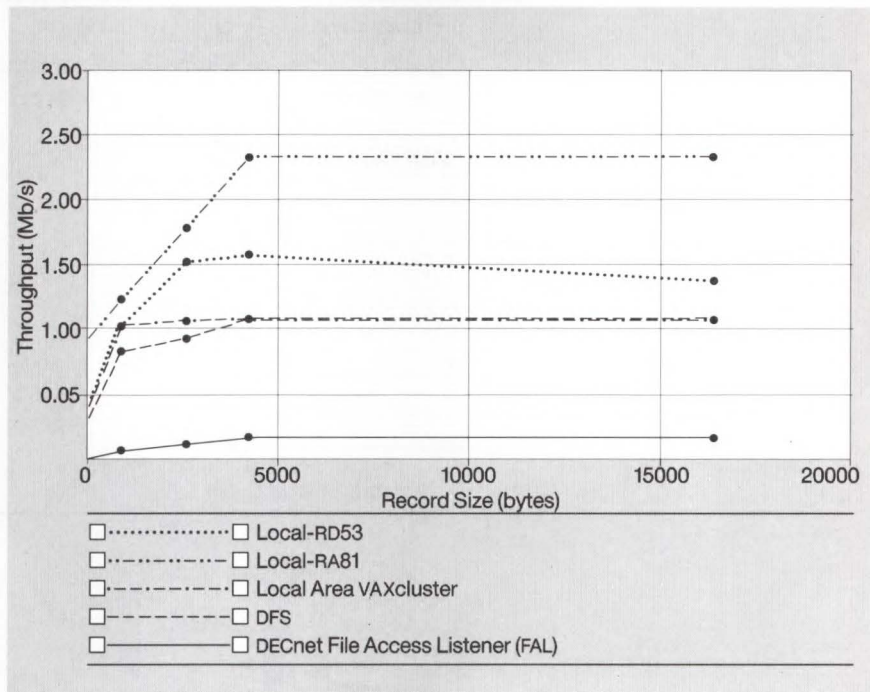
In a DFS environment, a DFS client system can access disk directories and files located on a DFS server as if they were local to the client. Thus a list of local devices on a DFS client can include DFS remote disks. This allows several clients with limited disk space to access a server that acts as a storage center. The approach is particularly beneficial when there is extensive sharing of files that might otherwise have to be duplicated on each system.

The primary objective of the DFS performance testing was to measure the response time and CPU load on both client and server when accessing files on a remote node. Another objective was to ascertain the rate at which a DFS server can process transactions, which should help in determining the number of clients a DFS server can support. These are dealt with using measurement and analysis techniques.

Performance Guidelines

The following figure shows the throughput of sequentially accessed records of various sizes. The figure compares DFS throughput to other methods of accessing records. ▲ Refer to “Comparison with Other Communication Products” in this description for more information.

Comparison of Throughput for Various Access Methods



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Factors Affecting DFS Performance

When considering DFS performance, remember that DFS transmission uses virtual blocks, and the DFS server uses caching to reduce the number of disk accesses.

Because the typical DFS environment comprises a large number of clients accessing a single server, the performance largely depends on the following characteristics of the server:

- CPU performance—affected by the amount of data transferred, the overhead of processing a disk access when the data is not in cache, and the speed of the processor.
- Probability of cache hit/miss—depends on the method of file access. For example, a sequentially accessed file has a predictable cache hit ratio that depends on how much data is accessed at one time; a randomly accessed indexed file has a cache hit ratio that depends on such factors as the bucket size, the size of the file, and the size of the key and data portions of each record. The cache hit ratio can improve when several users access the same files, which increases the chance the data is already in cache.
- Disk performance—determined by access time and transfer rate.
- Speed of the 802.3/Ethernet controller—can determine the maximum throughput for high-speed CPUs and a high cache hit ratio.

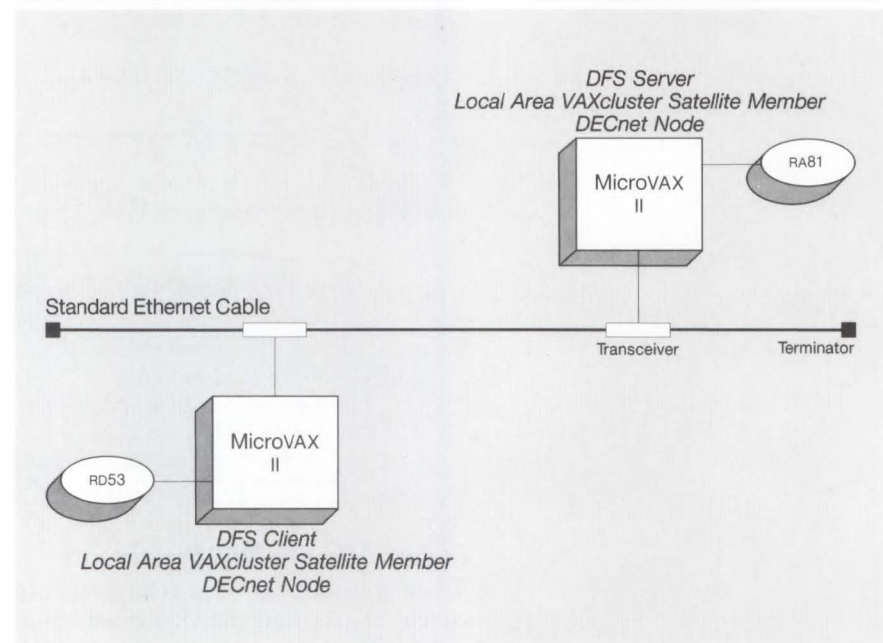
Performance Guidelines

Comparison with Other Communications Products

DFS performance was compared to the following alternatives for accessing files:

- On a system where the files reside on a local disk—both the RD53 and RA81 disks were measured.
- On a local area VAXcluster satellite where the files reside on the boot-member disk.
- On a DECnet node where the files reside on another DECnet node and are accessed via a DECnet remote-file-access (FAL/DAP) application.

DFS Test Configurations



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DFS is more loosely coupled than a local area VAXcluster in that DFS allows participating systems to run different versions of software, and can work among a large number of systems. Because it is more tightly coupled than the DECnet File Access Listener (FAL), DFS should show better performance.

Performance Guidelines

The following table shows performance measurements taken when reading a file sequentially via RMS. Records sizes of 4096 bytes were used, and the server and client processors were both MicroVAX IIs. The disk used in the local access method was an RD53; other measurements used an RA81.

Comparison of Access Methods with Sequential Read

Access Method	Response Time (ms)	Server CPU Time (ms)	Client CPU Time (ms)
Local	21.51	N/A	5.79
Local Area VAXcluster	30.90	11.79	12.68
DFS	31.52	12.84	15.77
DECnet FAL	157.58	70.82	75.91

DFS is more likely to be used where independent systems need to access shared data on a regular basis. Because the remote data can be accessed as if it were local, most programs need no modification. (The only restriction is that write-sharing is not currently allowed.)

When DFS was compared to a local area VAXcluster and DECnet FAL, it was noted that the local area VAXcluster tends to have a slightly higher throughput and uses 30-45 percent less CPU time than DFS. DFS showed better throughput and CPU utilization than DECnet FAL which, due to a high degree of flexibility and functionality, had a higher set-up, overhead, and transfer time per block of data.

When a remote RA81 via DFS was compared with a local RD53 on a MicroVAX II, the higher speed and capacity of the RA81 compensated for much of the DFS overhead and network access. For file control operations (create, open/close, and delete), DFS performed up to 85 percent as fast as the local access; for data accesses, DFS performed from 33 percent slower to twice as fast (for cache hits on small requests).

Server Throughput Characteristics

The maximum throughput of the DFS server was calculated using the service times of each component, namely, the server CPU, the client CPU, the 802.3/Ethernet controller, and the disk. The service times are represented in the following table.

Service Times of DFS Components

Resource	Service time (in milliseconds)
Client CPU: MicroVAX II	6.22 ms + 1.26 ms/block × # blocks
Client CPU: VAX 8700	1.42 ms + 0.28 ms/block × # blocks
Server CPU: MicroVAX II	4.88 ms + 1.26 ms/block × # blocks
Server CPU: VAX 8700	1.39 ms + 0.28 ms/block × # blocks
Disk rotation time for RA81	16.67 ms
Average seek time for RA81	28 ms
Minimum seek time for RA81	2 ms
802.3/Ethernet controller (approximate figure for DFS packet-size distribution)	1.08 ms/block

Performance Guidelines

Considering the delays imposed by the disk subsystem, note that, in the case of a single contiguous file being accessed, the seek time is minimum (2 milliseconds), whereas in the more general multi-user case, the access time tends to be randomly distributed and the seek time should be approximately 20 milliseconds. The total time (seek + scan + transfer) is approximately 40 milliseconds.

Using bottleneck analysis, the maximum throughput can be calculated:

$$T = 1/\max \text{ time}$$

where *max time* is the longest of the following times:

- Server CPU time
- Client CPU time divided by the number of clients
- Cache miss ratio multiplied by the disk time
- 802.3/Ethernet controller transmit time

This equation gives the maximum throughput in transactions per second. To translate this into bits/sec, multiply *T* by the average size (in bits) of DFS requests.

The following example shows the maximum throughput of 25 MicroVAX II clients, a VAX 8700 server, two RA81 disks equally accessed, a cache hit ratio of 0.4, and an average request size of 12 blocks. The throughput *T* is determined by

$$T = 1/\max [1.29 + 0.28 \times 12, (6.22 + 1.26 \times 12)/25, 0.6 \times 40/2, 1.08 \times 12]$$

$$T = 77.2 \text{ requests/second} = 3.8 \text{ Mbit/sec}$$

In this case, the 802.3/Ethernet controller is the bottleneck. In another situation the values of the parameters might change, making other components the bottleneck.

Using this equation, the system manager can identify the bottleneck and improve performance by reducing the load on the bottleneck component.

In other tests, the CPU times on a MicroVAX server, when broken into component driver execution times, revealed that disk access overhead was only 500 milliseconds in CPU time (DUDRIVER and PUDRIVER), the NETDRIVER consumed 1.62 milliseconds (1 block request) to 8.29 milliseconds (16 blocks), and the XQDRIVER consumed 1.22–5.59 milliseconds. The overhead of the DFS driver remained relatively invariant at 2.23–2.77 milliseconds for the DFSSDRIVER (DFS server), and 1.27–1.77 milliseconds for the DFSRRDRIVER (DFS communications). This indicates the relative efficiency and low impact of DFS, and the predominance of the NETDRIVER and XQDRIVER loads on the CPU.

Performance Metrics

The following are test results of running DFS on a MicroVAX II with a DEQNA Ethernet controller and an RAXx server disk.

- Maximum throughput measured with request sizes of 16 blocks and a cache hit ratio of unity: 2.6 Mbit/sec
- Server response time to a single request of size 16 blocks: 21.9 milliseconds
- Average overhead of disk access when there is a cache miss (dependent on data distribution on the disk): 23.5 milliseconds

For a VAX 8700 server with a DEBNA 802.3/Ethernet controller and an RA81 disk, the maximum throughput measured with request sizes of 16 blocks and a cache hit ratio of unity was 3.6 Mbit/second.

VAX File Transfer, Access, and Management (FTAM) is a file-access protocol defined by the International Standards Organization (ISO) that specifies how files are transferred and manipulated across heterogeneous environments. VAX FTAM, which implements this protocol on VMS, uses VOTS to provide the transport over which the data is communicated.

VAX FTAM implements three functions, accessible at the DCL level: COPY/OSI, DELETE/OSI, and DIRECTORY/OSI. These are possible for three OSI-defined file types: stream files (FTAM-1), variable record length files (FTAM-2), and unspecified files such as binary-image files (FTAM-3).

Taking into account the functions of VAX FTAM, the primary performance metrics for a particular configuration are the maximum throughput, the CPU load on each processor, and the elapsed time for an operation. This is desirable for each file type as well as for different file sizes, and on different CPUs.

Elapsed Time Measurements

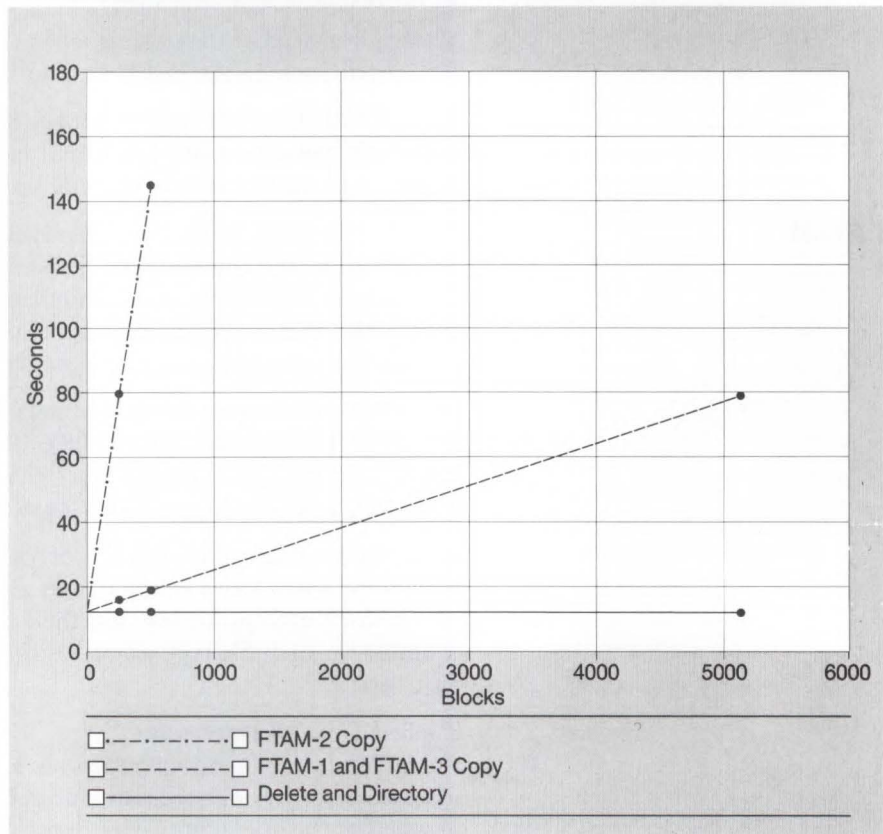
The elapsed time for an operation has a fixed part consisting of the time taken to set up various regimes, and sometimes a variable part depending on whether the operation is size-dependent. In the case of DELETE and DIRECTORY operations the time taken is independent of file size; COPY operations depend on the size of the file. Due to the heterogeneous nature of VAX FTAM operations—where sender and receiver can be from different environments and can have different capabilities—the set-up involved is high. Consequently DELETE and DIRECTORY set-up take about the same amount of time as the set-up for a file copy.

VAX FTAM

Performance Guidelines

The following figure gives the elapsed time for all three types of files. Most noticeably FTAM-2 files are transferred record by record and the speed is heavily dependent on the size of the record in the file.

Elapsed Time for VAX FTAM Operations Using MicroVAX II and Files with 80-byte Records

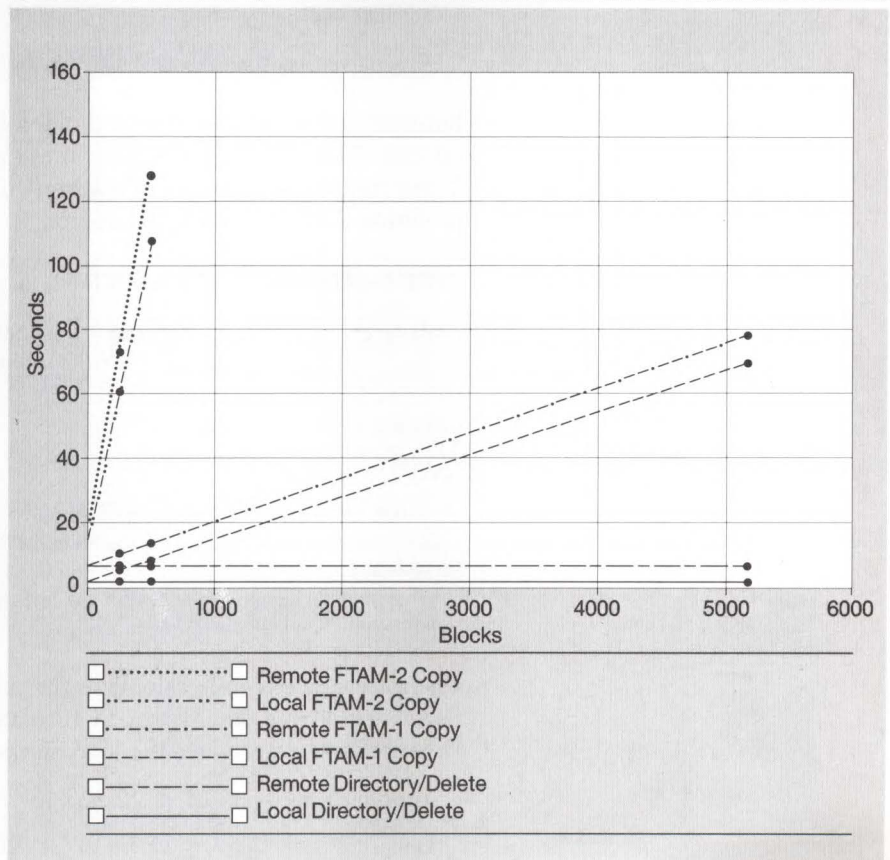


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CPU Time Measurements

An important metric of performance is the CPU load imposed on the systems running FTAM. As for the elapsed time measurements, the CPU cost for DELETE, DIRECTORY and the set-up time for COPY are comparable because the common functions executed in setting up each regime outweigh the differences between the actual operations performed. The following figure gives the CPU load for all three functions on both nodes.

CPU Time for VAX FTAM Operations Using MicroVAX IIs and Files with 80-byte Records



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In the figure, "Remote" denotes the CPU time consumed on the Responder, and "Local" on the initiator.

Calculating Elapsed Time and CPU Load For Any File

Using curve-fitting methods one can arrive at a set of equations to describe the behavior of the system, which would allow one to determine the expected elapsed time and CPU load for any file transfer between two systems. The following table gives the elapsed time as a set-up time and a time per block for FTAM-1 and FTAM-3 files, and the set-up time and time per record for FTAM-2 files. The example at the end of this section illustrates how this can be used.

Performance Guidelines

Elapsed Time for VAX FTAM

Processor/Disk	File Type*	Set-up Time (seconds)	Incremental Cost (milliseconds/block)
MicroVAX II/RA60	FTAM-1	13.03	12.22
MicroVAX II/RA60	FTAM-2	12.68	262.40
VAX 8800/RA81	FTAM-1	7.44	3.58
VAX 8800/RA81	FTAM-2	7.30	38.00

*FTAM-3 files behave similarly to FTAM-1 files.

Similarly, the CPU load can be divided into a set-up time and an incremental cost. The following table lists these values for the same operations. These figures are averages of transfers in both directions and are accurate to within 20% for individual copies.

CPU Load Imposed on a MicroVAX II

File Type ¹	Local Set-up (secs)	Local Incr Cost (msecs/blk)	Remote Set-up (secs)	Remote Incr Cost (msecs/blk)
FTAM-1	2.69	11.5 ²	6.69	11.8 ³
FTAM-2	2.93	205.6	6.67	237.2

¹FTAM-3 files behave similarly to FTAM-1 files.

²This figure is an approximation based on 94% CPU utilization for the maximum file transfer.

³This figure is an approximation for the responder incremental CPU cost based on an average CPU utilization of 97%.

The following example calculates the time it takes to transfer a 200-block FTAM-1 file from one MicroVAX II to another MicroVAX II over the Ethernet and determines the load on the two CPUs.

$$\text{Transfer time} = 13.03 + 12.22 \times 10^{-3} \times 200 = 15.5 \text{ seconds}$$

$$\text{Local CPU} = (2.69 + 11.5 \times 10^{-3} \times 200) \times 100 / 15.5 = 32\%$$

$$\text{Remote CPU} = (6.69 + 11.8 \times 10^{-3} \times 200) \times 100 / 15.5 = 58\%$$

Bottleneck Analysis

Bottleneck analysis gives an approximation of maximum throughput when different components are combined using simple arithmetic. The assumption is that the slowest component is always busy and effectively determines the throughput. The resources in this case are the initiator CPU, responder CPU, communications line, and disk. The throughput is then defined by

$$T = 1/ \max(\text{CPU init, CPU resp, Xfer time, disk time}) \text{ blocks/sec}$$

$$T = 4096/ \max(\text{CPU init, CPU resp, Xfer time, disk time}) \text{ bits/sec}$$

where CPU init is the CPU time on the initiator; CPU resp, the CPU time on the responder; Xfer time, the time to actually transmit the data over the communications medium; and disk time, the average time to read/write a block on the disk. Thus, with MicroVAX IIs, an IEEE 802.3 line and the assumption that on average an RA-series disk takes 1.1 seconds per block when contiguously reading a file, the maximum throughput would be

$$4096/ \max(11.5, 11.6, 1.08, 1.1) = 347 \text{ Kb/s}$$

Overview of Performance Metrics

The following metrics effectively characterize the performance of VAX FTAM:

- The overhead of setting up all the regimes conforming to the ISO FTAM standard was measured at only 13 seconds between MicroVAX IIs.
- Between MicroVAX IIs, an FTAM-1 file could be transferred at a maximum of 335 Kb/s over an IEEE 802.3 line. Between VAX 8800s, the maximum throughput was much higher at 1.14 Mbps.
- The maximum throughput was reached when copying large FTAM-1 or FTAM-3 files. The steady-state throughput for an FTAM-2 file containing 80-byte records is 16 Kb/s; however, for very large records the throughput of FTAM-2 files increases dramatically due to the low incremental cost. For 1024-byte records, for example, the measured throughput was 107 Mb/s.
- Between machines other than those mentioned, the maximum throughput through the system can be estimated using bottleneck analysis.

The process of properly configuring the DECrouter 200 is based on an understanding of the desired performance characteristics of the network as well as the desired network topology. The DECrouter 200 does not trade off configuration characteristics against memory requirements. The DECrouter 200 has sufficient memory to accommodate a maximally configured network, and sufficient memory allocated for a large number of large buffers. Even with all eight asynchronous lines fully active, the DECrouter 200 can support the maximum of 1,023 nodes within the area, the maximum of 32 other routing nodes in the same area and on the same local area network, and a network buffer size of up to 1,482 bytes.

Communication Line Characteristics

Note that the rate at which user data can be transmitted over a communications line may approach, but will never reach, the actual line speed. The actual throughput is a function of many factors including the line quality, protocol overhead, topology, and network applications.

Performance Guidelines

The DECrouter 200 supports all eight asynchronous lines simultaneously active at line speeds of up to 19.2 Kb/s. The DECrouter 200 operates these lines in full duplex point-to-point mode only. The DECrouter 200 does not support multipoint lines.

System Throughput Characteristics

In addition to the asynchronous line characteristics, the processing power of the DECrouter 200 must be taken into consideration. Assuming equal distribution of 802.3/Ethernet-to-asynchronous and asynchronous-to-802.3/Ethernet traffic in an office environment, the respective maximum values can be averaged to a value of 175 packets a second. Thus on average, the DECrouter 200 can route a maximum of 175 packets per second when all eight asynchronous lines are running at speeds of 19.2 Kb/s each.

The DECrouter 200 can support all eight asynchronous lines, each running at 19.2 Kb/s (full-duplex), in all types of communications except asynchronous to asynchronous.

The following table lists the maximum throughput for different types of communications.

Maximum Packets per Second

Type of Communication	100 data bytes/packet	1500 data bytes
Ethernet to Ethernet	786.3	786.3
Ethernet to asynchronous	205.2	20.5
Asynchronous to Ethernet	144.8	15.6
Asynchronous to asynchronous	100.7	9.0

Care must be taken when designing a valid configuration that the average route-through packet-per-second rate does not exceed 170 packets-per-second. Determining the average packet-per-second rate requires an understanding of the applications that will generate data routed by the DECrouter 200 in the overall network. **▲ For more detailed information on configuring the DECrouter 200, refer to Software Product Description 27.72.**

In order to achieve a viable configuration, the user and/or a Digital software specialist should perform a level of application analysis which addresses both communication-line characteristics and system-throughput characteristics.

Many factors affect network performance, especially in wide area networking where public-network and communication-services characteristics need also be considered. Primarily, the performance of a DECrouter 2000 node is a function of the expected network traffic and normal workload. Thus, router performance depends on the following factors:

- Communication line characteristics
- System throughput characteristics

Communication Line Characteristics

The DECrouter 2000 can be set up in a number of ways. The number of synchronous links supported on the system depends on the maximum line speed in use and on the electrical interface used. The following table shows the number of lines supported for each combination of line speed and electrical interface.

<i>Number of Synchronous Lines Supported</i>			
Electrical Interface	Maximum Line Speed (Kb/s)		
	19.2	64	256
EIA-232-C	4	—	—
EIA-422	4	4	2
EIA-423	4	4	2
V.24	4	—	—
V.35	4	4	2
X.21 Leased Line	4	4	2

The actual packet rate will be less than that indicated by the aggregate synchronous line speed, and is determined by such factors as:

- Type of traffic (routing expolates or data packets) and data rates.
- The path of messages through the DECrouter 2000 system (LAN-to-LAN, synchronous-to-LAN, or synchronous-to-synchronous).
- Communications line characteristics.
- Frequency and type of errors on the synchronous links.
- Network topology.
- Protocol overhead.

System Throughput Characteristics

The performance of the DECrouter 2000 is measured in packets per second. The line utilization depends on the average size of packets routed. Actual performance may not reach the maximum if line-speed is the limiting factor; conversely, line saturation may not be achieved on high-speed lines with small packet sizes.

Performance depends on whether traffic is routed predominantly between the synchronous lines and the Ethernet or from one synchronous line to another. For synchronous-to-synchronous routing, the expected performance is 340 packets per second. For Ethernet traffic, the performance is 480 packets per second.

To achieve a viable configuration, the user and/or a Digital software specialist should perform a level of application analysis which addresses both communications-line characteristics and system-throughput characteristics.

Configuring the X25router 2000 is influenced primarily by trade-offs of cost and performance while satisfying the user's application requirements. Network applications typically range from low-speed, low-cost situations (that is, connecting a few remote lines over low-speed communications lines) to those of relatively high performance (that is, connecting two local area networks). The addition of X.25 packet switching considerations to those associated with point-to-point DECnet communications necessarily makes arriving at the optimum configuration more difficult.

Note that the rate at which user data can be transmitted (throughput) over a communications line approaches, but never reaches, the actual line speed. The actual throughput is a function of many factors, including the line quality, protocol overhead, topology, and network application.

X25router 2000

Performance Guidelines

The X25router 2000 supports four lines at 64.0 Kb/s, or two lines at 256.0 Kb/s. The X25router 2000 offers superior price/performance especially in the area of routing DECnet packets over an X.25 network. This is because the implementation of Data Link Mapping (DLM) has been optimized with considerable performance benefits.

Traditionally many customers have implemented host-based X.25 routing. The cost of this solution is not just the cost of the communications controller but also of the CPU cycles it consumes. The amount of the CPU utilized varies considerably with the network size and application, but whenever routing requires more than a standalone system, an X25router solution will generally be more cost-effective. Indeed, in the case of the mid-range to high-performance systems, a dedicated X25router 2000 can usually be more cost-effective even for standalone situations.

The following table compares X25router 2000 performance against MicroVAX II and VAX 3500 systems with DSV11s that were dedicated as a communications server. Two scenarios were examined:

- Routing DECnet packets over an X.25 packet switched network
- Routing native X.25 packets over a packet switched network as an X.25 Gateway

In these performance figures, "packets per second" refers to packets received from the 802.3/Ethernet local area networks and routed onto the synchronous lines or vice versa.

Performance for DEC MicroServer Compared with MicroVAX II and VAX 3500 using DSV11s

Processor	DECnet over X.25 (packets per second)	Native X.25 (packets per second)
X25router 2000	170	120
MicroVAX II with two DSV11s	90	95
VAX 3500 with two DSV11s	160	170

To achieve a viable configuration, the user or a Digital software specialist should perform a level of application analysis which addresses these factors.

Performance Considerations

The following information is useful in evaluating the performance of the DECnet/SNA Gateway products. However, performance is dependent on specific conditions in hardware, software, and procedure.

All tests were performed in a standalone environment: The only processes running on the various VAX systems and IBM mainframe were dedicated to the performance testing. The performance results for similar configurations may differ with additional users and tasks.

DECnet/SNA Gateway for Channel Transport

Test Conditions

The DECnet/SNA Gateway for Channel Transport connects an IBM S/370 (using one of the channel interfaces) to VAX systems through a DECnet link. The performance of the Gateway-CT was tested using file transfer via the DECnet/SNA Data Transport Facility (DTF)—either the byte, block, or selector-channel interface.

DTF allows the transfer of text and data files into (inbound) and out of (outbound) the IBM system. The DTF software used in the test had three components. A DTF “client” process initiates a data transfer to be performed by a DTF server process that is based on either the same system as the client or on another system on the local area network. The DTF server accesses the DTF module in the IBM mainframe (MVS DTF). (In this discussion, a client is a process that requests a data transfer.)

Both the client and server DTF processes for each test session ran on a single VAX 8800 system. The record sizes were 80, 132, 500, 1000, 4000, 8000, and 8192 bytes. The Network Block Count on the VAX 8800 was between 4, 8, and 12. Character translation was not used, resulting in lower CPU utilization of the VAX 8800. Measurements included the “steady-state” throughput and the VAX 8800 CPU utilization. (Steady-state performance is a measurement of the throughput during the actual data transfer, disregarding time for connections, sessions startup, and shutdown.) The following table presents the model and version numbers of the hardware and software used in the test configurations.

Hardware and Software Components Used in DECnet/SNA Gateway-CT Tests

Digital Hardware

- VAX 8800 with RA81 disk
- Both processors active
- DEBNA 802.3/Ethernet communications controller
- DEC ChannelServer (DESNA) with 4 MB memory Block multiplexer channel
- DELQA 802.3/Ethernet communications controller

Digital Software

- | | |
|-----------------------|------|
| VMS | V4.6 |
| DECnet/SNA Gateway-CT | V1.0 |
| DECnet/SNA DTF | V1.0 |

IBM Hardware

- | | |
|------|----------------------|
| 4381 | Q13 CPU |
| 3880 | 003, disk controller |
| 3380 | AA4, disk drive |

IBM Software

- | | |
|----------|-----------------|
| MVS/SP | V2.2 |
| MVS/DTF | V1.0 |
| ACT/VTAM | V3, release 1.1 |

Performance Guidelines

Performance Results

The following table summarizes the test results. (Other configurations may produce different results.)

All testing used a single session through the DECnet/SNA Gateway-CT (a single file transfer). The RU size is the 'Request/Response Unit' size, the message size for the IBM SNA network. The 'Pacing Window' is the amount of RUs that can be pipelined.

Throughput and CPU Utilization for Inbound DTF (VAX to IBM)

RU Size (bytes)	Pacing Window Size	Throughput (Kb/s)	VAX 8800 CPU Utilization (%)
2048	4	389.4-534.3	11.63-19.47
	8		
	16		
4096	4	554.7-634.4	11.87-16.00
	8		
	16		
8192	4	590.3-641.0	11.94-14.02
	8	577.1-670.0	13.32-13.82
	16	603.2-668.6	11.43-14.15

Throughput and CPU Utilization for Outbound DTF (IBM to VAX)

RU Size (bytes)	Pacing Window Size	Throughput (Kb/s)	VAX 8800 CPU Utilization (%)
2048	4	723.8-976.7	7.48-21.72
	8		
	16		
4096	4	837.9-1238.6	5.42-13.33
	8		
	16		
8192	4	599.1-1042.3	13.42-18.51
	8	843.9-1200.9	13.75-18.66
	16	879.4-1241.0	6.33-14.61

DECnet/SNA Gateway for Synchronous Transport

Test Conclusions

- In this particular test a single DTF session on the VAX 8800 was sufficient to saturate the Gateway-CT. (It would be expected that the Gateway-CT CPU would be at maximum use before the more powerful VAX 8800 CPU.) In actual applications, with the VAX 8800 performing other tasks (time-sharing, batch processing), this would not necessarily be the case.
- The variation in VAX CPU utilization is based on record size (from smaller to larger). In other words, the most significant variables in the test were the record size of the file and the message size in the SNA network.
- The difference between the maximum inbound and outbound throughput is due to a VTAM buffer management parameter. (Virtual Telecommunication Access Method, the RMS network equivalent.) The DECnet/SNA Gateway-CT CPU utilization is very high on inbound transfers because the large RU sizes must be broken up in the Gateway-CT into VTAM 128-byte buffers (for file creation). Outbound transfers use the RU size exclusively, allowing the Gateway to move to maximum CPU utilization. (Note that the VTAM parameter is user-defined; a larger-size buffer should help the Gateway-CT CPU utilization.)

Performance Considerations

The following information is useful in evaluating the performance of the DECnet/SNA Gateway products. However, performance is dependent on specific conditions in hardware, software, and procedure.

All tests were performed in a standalone environment: The only processes running on the various VAX systems and IBM mainframe were dedicated to the performance testing. The performance results for similar configurations may differ with additional users and tasks.

Test Conditions

The DECnet/SNA Gateway for Synchronous Transport (Gateway-ST) allows network-to-network connections between an IBM S/370 (using a Front End Processor as the physical link) and VAX systems through DECnet. The performance of the Gateway-ST was tested using three access methods:

- DECnet/SNA Data Transfer Facility
- DECnet/SNA VMS Remote Job Entry
- DECnet/SNA VMS 3270 Terminal Emulator

DTF Performance

For DECnet/SNA Data Transfer Facility (DTF) testing, the client and server processes ran on separate MicroVAX II systems. Fixed values were record size for the files to be transferred (80 characters) and DAP buffer size (4096 bytes). Variable limits were used for the message size in the SNA network, called the Request/Response Unit or RU. The values used were 512, 1024, 2048, and 4096 bytes. Character translation was not used, resulting in lower CPU utilization on the MicroVAX. Measurements included the CPU utilization for the Gateway-ST and the MicroVAX, the "steady-state" throughput, the synchronous line utilization and connect times.

Performance Guidelines

The following table lists the model and version numbers of the hardware and software used in the test configurations.

Hardware and Software Components used in DECnet/SNA Gateway-ST Tests

Digital

Hardware

MicroVAX II with RD53 disk drive and DEQNA Ethernet controller

DEC MicroServer (DEMSA) with 2 MB memory

Digital Software

VMS V4.6

DECnet/SNA V1.0

Gateway-ST

DECnet/SNA V1.0

DTF

DECnet/SNA V1.2

RJE

IBM Hardware

4381 Q13 CPU

3725 001, communications controller

3880 003, disk controller

3380 AA4, disk drive

IBM Software

MVS/SP V2.2

MVS/DTF V1.0

JES2/SP V2 release 3.7

ACF/VTAM V3 release 1.1

ACF/NCP V4 release 2.0

CICS/VS V1 release 6.1

The following table summarizes steady-state throughput results. Configurations with bigger RU sizes, bigger record sizes, bigger pacing window and bigger network-block counts may result in higher throughputs.

The line utilization is calculated as the ratio between steady-state throughput and maximum line speed. (Steady state divided by maximum speed.)

Throughput and CPU Utilization for Inbound DTF (VAX to IBM)

Line Speed (Kb/s)	Number of Sessions	Throughput (Kb/s)	Gateway CPU Utilization (%)
9.6	1	9.3-9.4	1.59-2.24
56	1	34.4-55.3	4.38-5.87
	2	54.4-55.5	5.68-6.29
	4	55.1-55.2	6.28-6.48
128	1	67.6-104.7	7.88-11.22
	2	123.9	8.16-11.22
	4	123.9	8.23-11.24
256	1	52.3-101.7	8.55-12.24
	2	97.0-139.5	14.02-18.30
	4	193.5-249.2	22.72-37.22

Throughput and CPU Utilization for Outbound DTF (IBM to VAX)

Line Speed (Kb/s)	Number of Sessions	Throughput (Kb/s)	Gateway CPU Utilization (%)
9.6	1	9.2-9.3	1.76-2.41
56	1	42.0-54.4	4.10-6.32
	2	53.9-54.4	5.12-6.72
	4	54.0	6.39-6.70
128	1	54.0-76.2	5.88-7.41
	2	105.7-127.1	8.25-11.26
	4	127.1	8.23-11.24
256	1	56.0-78.8	4.64-12.71
	2	108.9-138.8	10.13-13.67
	4	199.2-227.5	15.19-34.14

Test Conclusions

- In general, the MicroVAX CPU became the bottleneck when data rates of approximately 100 Kb/s were achieved with DTF transfers.
- The time taken by the Gateway-ST CPU to process each RU was between 5.13 RU/second to 62.74 RU/second depending on the line speed and RU size. (The smaller number occurs with larger RUs and faster line speeds; the larger number uses smaller RUs and slower line speeds.)

Remote Job Entry Performance

The DECnet/SNA VMS Remote Job Entry (RJE) access routine was used in conjunction with JES2 software on the IBM mainframe. RJE allows the VAX system to function as an SNA/RJE workstation. The VAX system submits batch jobs to the IBM host and receives job output.

For the RJE test, a JCL file (Job Control Language) was submitted to the IBM host with commands to transfer a file back to the VAX system. The file was transferred to either a print or punch stream. (The print stream produces 132-column printed output; the punch stream produces RMS data files.) Performance measurements of the Gateway-ST included steady-state throughput, Gateway CPU utilization, and local host CPU utilization (on a MicroVAX II). The RU size was set to 512 bytes. Compression was turned on for the RJE data streams. (Compression produces fewer bytes through the test link.)

Test Results

The results of the testing showed the Gateway-ST CPU to be fully utilized at line speeds above 56 Kb/s. (The Gateway-ST can have a maximum line speed of 256 Kb/s.) This saturation is due to the functional translation performed in the Gateway-ST CPU by the RJE server software. The maximum throughput observed through the Gateway-ST was approximately 55 Kb/s.

Terminal Emulator Performance

The DECnet/SNA VMS 3270 Terminal Emulator (TE) allows VAX users with Digital's VT terminals to run interactive programs and applications on IBM host systems.

Performance Guidelines

Because traffic generated by TE sessions occurs in bursts, it is difficult to characterize "steady-state performance" in the Gateway. However, two performance metrics of primary interest were measured: the minimum number of TE sessions needed to saturate the Gateway-ST CPU, and the response time per TE transaction.

Both DTF and TE utilize the same server in the Gateway-ST: Gateway Access Server (GAS) is one of three servers in the Gateway; the others are exclusively for RJE and DHCF. This means that the time to serve an RU through the Gateway for TE traffic should be the same as the time needed for an RU generated by DTF (assuming the RUs are the same size). By using the DTF results earlier we can calculate the time taken to serve a TE-generated RU. Inverting this number (1 divided by the service time for 1 RU) gives the minimum sessions needed to saturate the Gateway CPU.

In reality, TE sessions have two components: a service time for the RU, and "think time" that is usually some order of magnitude higher than service time in the Gateway (a human interpreting the screen takes some amount of seconds as opposed to milliseconds). Looking at both components reveals that many more TE sessions are needed to saturate the Gateway than the minimum number derived from RU processing.

Example

Consider a 505-byte transaction. The session for this transaction is out-bound on a 128 Kb/s line, using an RU of 512 bytes (the closest RU for the size of the transaction). Using the DTF results from above, the time needed to serve this RU would be 7.2 milliseconds. (This is based on 12.92 RUs per second in the Gateway. The equation is CPU utilization over average number of RUs per second). The result should also be the time needed to service a TE RU. By inverting this number (1 divided by 7.2 milliseconds), 139 transactions can be serviced by the Gateway per second. This is the minimum number of sessions needed to saturate the Gateway-ST. (The Gateway-ST will support only 128 sessions.)

In the above example the "think time" is 0 seconds. If the "think time" is set to a more realistic five seconds, the Gateway-ST then theoretically supports 139×5 , or 695 sessions.

This example clearly shows that the Gateway CPU is never the bottleneck for TE since the maximum number of sessions is higher than 128 (the number of sessions the Gateway-ST device is emulating). The major source of TE utilization is still the VAX doing the character translation. It has been shown that the VAX CPU will become a bottleneck with only a few TE sessions, depending on the size of the transaction and the power of the VAX processor.

This example for number of sessions should also hold true for the MS-DOS and ULTRIX 3270 TE products, though neither of these configurations were tested.

The other performance-metric measured for TE was response time. Response time in general is composed of the aggregate delay imposed by several network components:

- Between the terminal line and the VAX
- In the VAX host
- In the Ethernet between the VAX and the Gateway

- In the Gateway
- In the synchronous line to the IBM network component
- In the IBM host process

Delays are encountered on the return trip also. The line delays are composed of transmission time and queuing waits. Delays in processors are composed of processing time and queuing waits. The most significant delay is the one in the VAX host, followed by the time between the terminal and the VAX processor. (Most of the testing was done without terminal servers.)

Using the test configuration as an example, the response time was measured to be approximately 3.5 seconds for a transaction size of 1890 bytes, both inbound and outbound. (This was using one TE user on a MicroVAX II through the Gateway-ST; a larger VAX and the use of Terminal Servers would decrease this number).

Performance Results for the DECnet/SNA Gateway-CT and DECnet/SNA Gateway-ST

File Transfer

RJE throughput is the same with both Gateway-CT and -ST (under 56 Kb/s) regardless of the line speed. DTF remains the product of choice for high speed data transfer. With DTF, line utilization averages 96% in Gateway-ST, for example, 249 Kb/s on a 256 Kb/s-line.

The Gateway-CT approaches transfer rates of between 640 Kb/s and 1.2 Mb/s using DTF.

Interactive Access

Terminal-emulation throughput is more a function of the VAX CPU (processing terminal screen I/O) than either Gateway CPU. In real-world conditions, both Gateway-ST (with 128-session capability) and Gateway-CT (with 255-session capability) will provide TE users with more than adequate performance.

VMS/SNA

These guidelines describe the performance of VMS/SNA V1.1 software when transferring files and messages from an IBM host to a VAX system. The following VMS/SNA products were tested:

- DECnet/SNA VMS DISOSS Document Exchange Facility (DDXF)
- DECnet/SNA VMS Remote Job Entry (RJE)
- DECnet/SNA VMS 3270 Terminal Emulator

The testing showed that DDXF takes 30 to 50 seconds to transfer a file from the IBM system to the VAX system. For short files the transfer time is the same regardless of the line speed (4.8, 9.6, or 56.0 Kb/s). Files longer than 20 or 30 blocks take a longer time to transfer at low line speeds. With the 56.0 Kb/s line, DDXF transfers most files in less than a minute.

RJE transfers a file at the rate of one block/sec with a 4.8 Kb/s line and four blocks/sec with a 56.0 Kb/s line.

The 3270 Terminal Emulator allows VAX users to connect to an IBM host and run applications designed for the IBM 3270 terminal. After the IBM application has generated a screen of data, the terminal emulator displays it on the terminal in one to five seconds, depending on the amount of data and the line speed.

Performance Guidelines

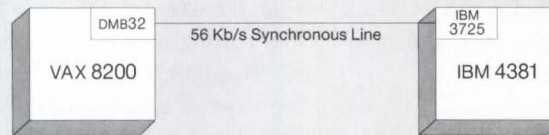
Test Configurations and Conditions

The CPU utilization of the VAX machines was measured by running a low-priority background process that counts its own CPU usage. It is presumed that the remaining CPU time was used to transfer the files and messages.

All the tests were performed in a standalone environment with the processors and communication lines idle except for the tests being run. Note that performance of a similar configuration with multiple users and tasks may not equal the results discussed here.

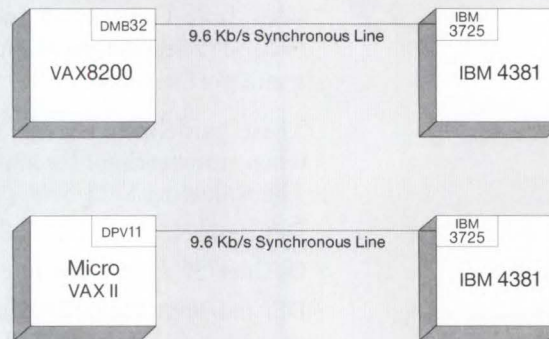
The following figures show the hardware configurations used in the tests.

VMS/SNA Configuration with 56.0 Kb/s Synchronous Line



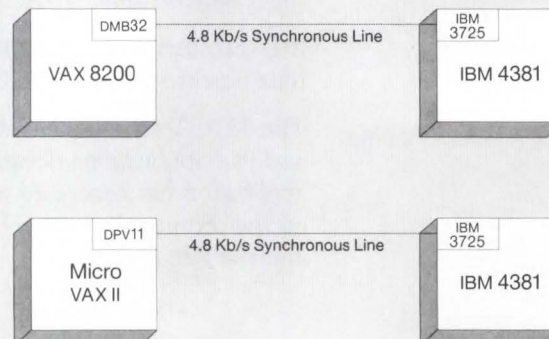
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Configurations with 9.6 Kb/s Synchronous Line



NBG-228-01

Configurations with 4.8 Kb/s Synchronous Line



NBG-229-01

Performance Guidelines

The following list shows some of the model and version numbers of the hardware and software used in the test configurations.

Hardware and Software Components Used In Test

Digital Hardware

MicroVAX II
with RD53 disk
drive

VAX 8200 with
RA60 disk drive

Digital Software

VMS V4.4

DECnet-VAX V4.4 (used for the RJE testing)

IBM Hardware

4381 P13, CPU (3.2 Mips with 16-Mbyte memory)

3725 001, Communications controller (with 1.5-Mbyte memory)

3880 003, Disk controller

3380 AA4, Disk drive (2.5 Gbytes per controller)

IBM Software

MVS/SP Release 3.8

JE2/SP V2, release 3.7

ACF/VTAM V3, release 3.7

ACF/NCP V4, release 2.0

CICS/VS V1, release 6.1

DISOSS/370 V3, release 2.0

IBM Network Parameters

Secondary 4

Pacing count:

MAXOUT: 7

MAXDATA 521 for the 4.8- and 9.6-Kb/s lines;
(segment size): 1,033 for the 56.0-Kb/s line

DECnet/SNA VMS DDXF

The DDXF software accesses the Distributed Office Support System/370 (DISOSS) software on the IBM system. DDXF transfers DISOSS text files called documents. The following DDXF functions were tested:

- The FILE function, which copies a document from the VAX system to DISOSS on the IBM system.
- The RETRIEVE function, which copies a document from DISOSS to the VAX system.
- The SEND function, an electronic mail function that sends a document to a list of DISOSS users.
- OBTAIN function, an electronic mail function that allows a user to check what mail is on the DISOSS account.

Performance Guidelines

DISOSS has two document types: simple and complex. Simple documents are straightforward text documents; complex documents have special formatting features such as italic and bold fonts, lists, and tables. Complex files generally require more CPU time than simple files on the VAX system to translate to DISOSS format.

The Request Unit/Response Unit (RU), which is the message size on the SNA network, was set to 512, 1024, and 2048 bytes.

For the test system, the following formula gives the approximate response time for DDXF to transfer a document of a given size:

$$\text{Response time (sec)} = \text{connect time} + (\text{number of blocks} \times \text{time per block})$$

A block is 512 bytes of user data.

In most test cases, the connect time was 30 to 45 seconds, and was unaffected by the line speed, RU size, or file type. The connect time for the OBTAIN operation was a little longer at 40 to 50 seconds. The connect time would probably be faster with a larger, more powerful IBM system.

The time per block is shown in the following table, which also shows throughput and line utilization while the document data is actually being transferred (without including the connect time).

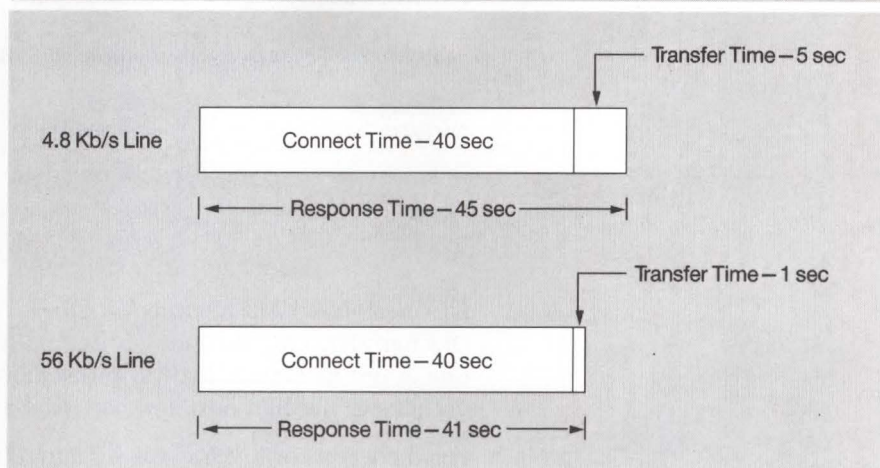
<i>DDXF Performance</i>			
Line Speed (Kb/s)	Time per Block (sec)	Throughput (Kb/s)	Line Utilization
4.8	0.91 to 0.98	4.2 to 4.5	92 to 99%
9.6	0.45 to 0.53	7.7 to 9.0	84 to 99%
56.0	0.10 to 0.22	19 to 40	35 to 75%

Part of the connect time is due to the fact that DDXF logs into and out of the IBM system for each command. DISOSS allows only one user to log into an account. If a new user logs in, the previous user is interrupted and logged out. To reduce the possibility of being logged out unexpectedly, DDXF logs out after each command.

With these connect times, the line speed does not affect the response time very much for small files. For example, transferring a five-block file would take 30 to 45 seconds connect time plus the time to transfer the data blocks. As shown in the figure "File Transfer with Five-block File," the response time is 45 seconds with the 4.8 Kb/s line and 41 seconds with the 56.0 Kb/s line. The user would not notice any improvement in the response time with the 56 Kb/s line. With a 30-block file, as shown in the figure "File Transfer Time with 30-block File," the user would start to notice an improvement in response time.

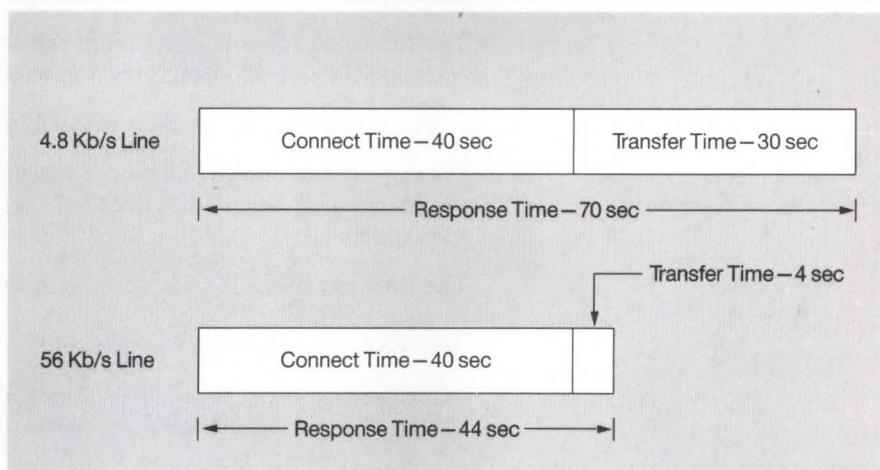
Performance Guidelines

File Transfer Time with Five-block File



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File Transfer Time with 30-block File



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For the 4.8 and 9.6 Kb/s lines, line speed is the limiting factor. Varying the RU size, the file type, the type of operation, or the hardware device makes no significant difference in response time or throughput.

For the 56.0 Kb/s line, line speed is not as much a limiting factor, and other factors start to influence performance. The RU size has a considerable effect on the throughput. Transfers with a 2048-byte RU have a greater throughput than a 512-byte RU. Transfers with the 2048-byte RU size may have 0 to 50 percent greater throughput. Simple files may have 0 to 20 percent greater throughput than complex files. The FILE and RETRIEVE operations have perhaps 5 to 15 percent greater throughput than the SEND and OBTAIN operations for the 56.0 Kb/s line.

Performance Guidelines

The following table shows the CPU utilization of the VAX system while it is actually transferring the document data, not during the connect time.

CPU Utilization for Document Transfers with DDXF

Line speed (Kb/s)	VAX 8200 with DMB32	MicroVAX II with DPV11
4.8	11%	14%
9.6	20%	29%
56.0	98%	—

DECnet/SNA VMS Remote Job Entry

DECnet/SNA VMS Remote Job Entry (RJE) allows a VAX system to function as one or more SNA/RJE workstations. The VAX system can thus transmit jobs to the IBM host and receive the job output.

For these tests, a JCL file was submitted to the IBM host with commands to transfer a file back to the VAX system. The time it took to transfer the file back to the VAX system was measured. The file was transferred as an output printer stream. The RU was 512 bytes.

The following formula determines the actual transfer time of a file, not counting the time to submit the job to the IBM system.

$$\text{Transfer Time (sec)} = \text{Number of Blocks} \times \text{Time per Block}$$

For testing, the number of blocks was calculated at 512 bytes of user data per block. This calculation does not include any extra bytes associated with RMS overhead.

The time per block is shown in the following table:

RJE Performance with Data Compression

Line Speed (Kb/s)	Record Size (bytes)	Time per block (sec)	Throughput (Kb/s)	Line Utilization
4.8	40 to 160	0.65	6.3	130%
9.6	40 to 160	0.34	12.0	130%
56.0	40	0.20	20.0	36%
56.0	80 to 160	0.16	26.0	46%

The measurements shown in the table were measured using data compression, where the IBM system replaces strings of the same character with one or two bytes of data. In the test files, 50 percent of the data was compressible. The resultant compressed data was 60 percent as long as the original data. (With the 56.0 Kb/s line, the greater throughput with data compression is usually not worth the extra CPU cost to compress and decompress the data.)

Record sizes of 40, 80, 120, and 160 bytes were tested. The record size made little difference for the 4.8 and 9.6 Kb/s lines: throughput was a few percent greater with the larger records. With the 56.0 Kb/s line, the throughput was about the same for the 80, 120, and 160 bytes records. However, the throughput for the 40 byte records was about 25 percent slower.

Performance Guidelines

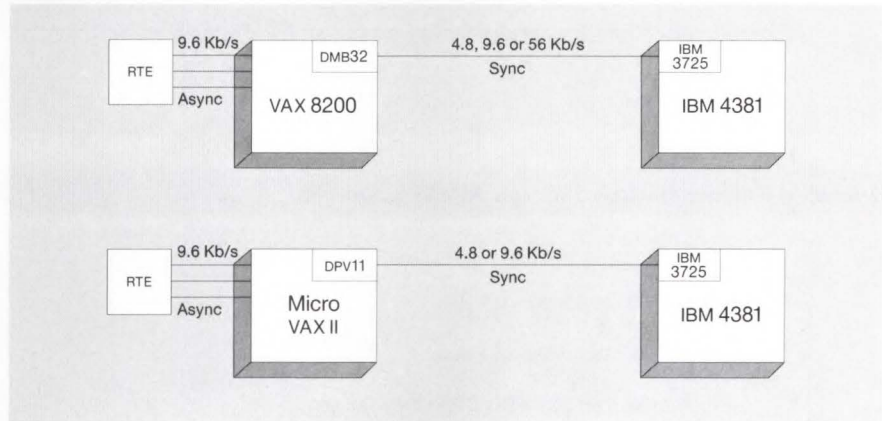
The testing showed that, when the IBM host sends more than one data stream simultaneously, the overall throughput is the same as sending one stream. For example, if data is sent in three streams, each stream goes one third the speed of a single stream.

DECnet/SNA VMS 3270 Terminal Emulator

The 3270 Terminal Emulator is a software product that allows VAX users with VT100 and VT200 series terminals to emulate IBM 3270 terminals. This allows VAX users to connect to an IBM host over the network and run IBM-based application programs.

For testing, a remote terminal emulator (RTE) system was connected to three 9.6 Kb/s terminal lines on the VAX system, as shown in the following figure. This RTE system requested a screen of data as would a terminal user, then measured the time it took to receive the screen of data.

Configurations for Testing the 3270 Terminal Emulator



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The following table shows the results of the testing.

3270 Terminal Emulator Performance

Data Size (bytes)	Line Speed (Kb/s)	Response Time (sec)	Line Utilization	CPU Utilization
256	4.8	1.9	11%	12%
256	9.6	1.6	6%	15%
256	56.0	1.3	1%	14%
1536	4.8	6.1	28%	9%
1536	9.6	4.7	17%	13%
1536	56.0	3.4	4%	13%

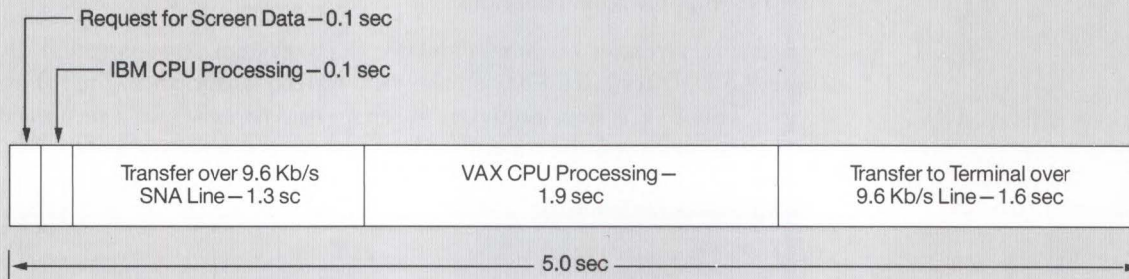
Tests were run with RU sizes of 256, 1536, and 2048. The performance was not significantly affected by varying the RU size.

When the user presses a key to request a screen of data, the VAX sends a message to the IBM system over the SNA line. The application program on the IBM system generates the screen of data, then transmits the screen of data over the SNA line to the VAX. The VAX system translates the data to VT100/200 format, then transmits the data over a 9.6 Kb/s asynchronous line to the terminal.

Performance Guidelines

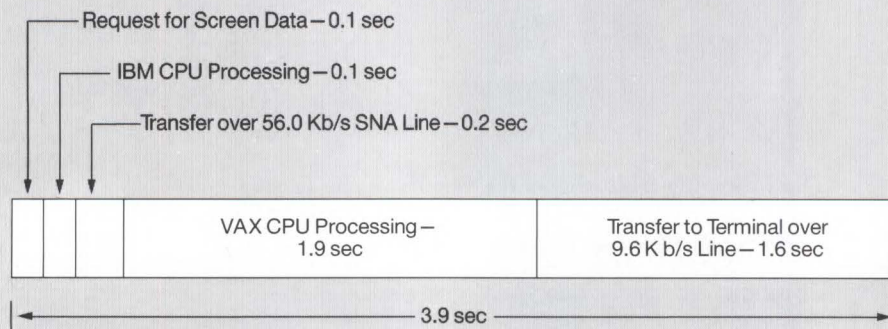
The following figure shows the approximate time for each step of a 1536-byte transfer under the test conditions. The request for screen data includes VAX processing of request and transmission over the SNA line. The IBM CPU processing includes IBM-communications-controller and application-program processing.

3270 Terminal Emulator Response Time over 9.6 Kb/s Line



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3270 Terminal Emulator Response Time over 56.0 Kb/s Line



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Increasing the SNA line speed from 9.6 to 56.0 Kb/s does not significantly increase the response time. At 9.6 Kb/s the transfer time over the SNA line is 1.3 seconds out of the total response time of 5.0 seconds. Increasing the line speed to 56.0 Kb/s nearly eliminates the transfer time over the SNA line, but improves the overall response time by only 3.9 seconds.

Note that in this test the IBM system generated the screen of data in only 0.1 second. Under normal conditions the IBM application program often takes considerably more time to generate a screen of data.

Using a 19.2 Kb/s line to the terminal instead of the 9.6 Kb/s line improves the response time further, saving about 0.8 second on a 1536-byte transfer. Using a VAXstation II for the VAX processor virtually eliminates the terminal transfer time.

DECnet/SNA Data Transfer Facility

These tests ran with one, two, and three users. The response time with three users is the same as with one user. The only exception is when the VAX processor translates data for two users simultaneously, at which time each user has to wait an extra one to two seconds.

The number of users that a MicroVAX II can support depends on how often each user requests a screen of data and the size of the data transfers. A 1536-byte data transfer takes about two seconds of VAX CPU time. If each user waits five seconds to receive a screen of data, studies it for five seconds, then requests another screen, the MicroVAX II capacity would be consumed by five users.

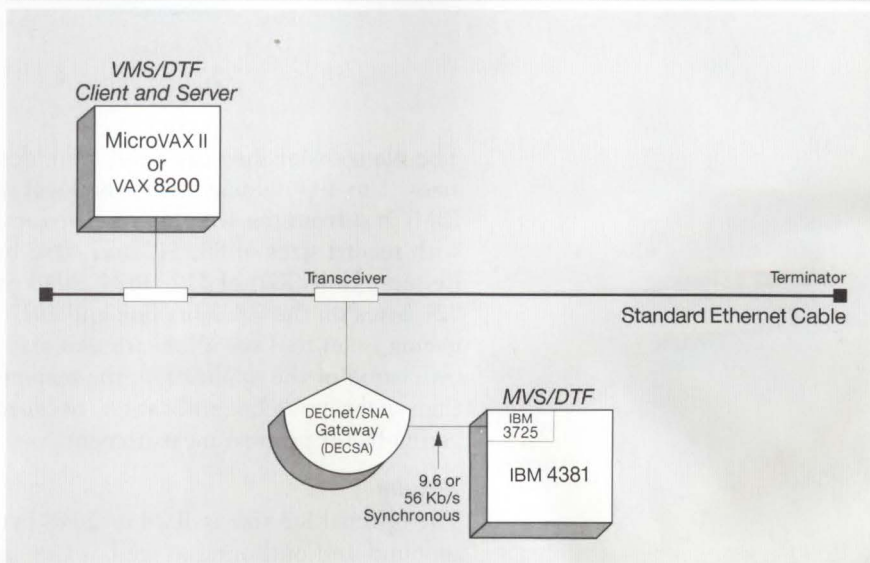
With most hardware configurations and IBM application programs, it takes more than five seconds to receive a screen of data. Also, most users study the screen for more than five seconds before requesting a new screen of data. Therefore, a MicroVAX II system can usually support considerably more than five users.

Configurations and Methods

In testing the DECnet/SNA Data Transfer Facility, all measurements were conducted on standalone systems. Only the tasks necessary for measuring were running on the VMS V4.5 system. All unnecessary applications on the IBM system were stopped during testing. Although this method yields benchmarks for the product, users in a timesharing environment may not see the same response time and throughput as observed in a test environment. However, the percentage of CPU used by the application will be consistent.

The following three figures illustrate the configurations used for testing.

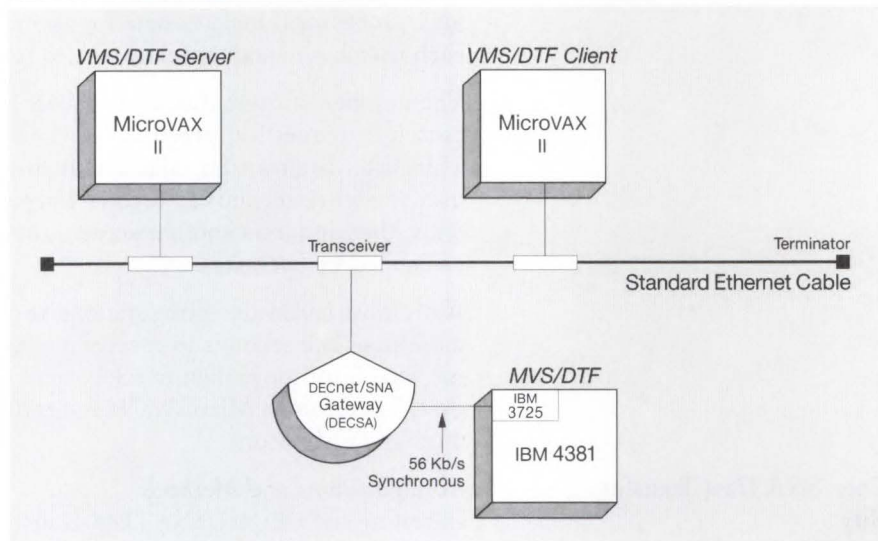
Figure A.1 Test Configuration Using MicroVAX II or VAX 8200 as Server and Client



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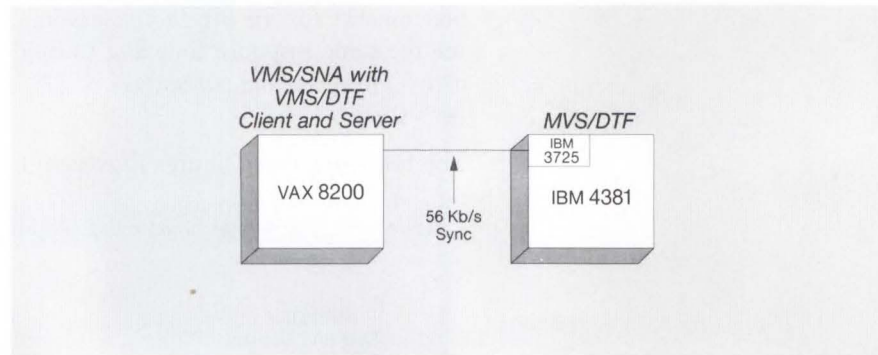
Performance Guidelines

Figure A.2 Test Configuration Using One MicroVAX II as Server and One as Client



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Figure A.3 Test Configuration Using VMS/SNA on VAX 8200



NBG-236-00

The file transfer measurements were designed to transfer a variety of file sizes, 1 to 1000 blocks, from the local node to the IBM host (inbound to IBM) and from the IBM host to the local node (outbound from IBM). Files with record sizes of 80, 512 and 4096 bytes were transferred using a Request Unit (RU) of 512, 1024, 2048 or 4096 bytes. The frame sizes were 521 bytes on the 9.6 Kb/s line and 1417 bytes on the 56 Kb/s line. The pacing is set to 4 for all measurements. Measurements included the CPU utilization of the application, the response time for transferring the file, and the synchronous line utilization, because the synchronous line was the gating factor in most measurements.

Results

The optimal RU size is 1024 or 2048 bytes considering response time inbound and outbound as well as CPU and line utilization. This is true for all configurations studied.

Performance Guidelines

Note: The operating system used for all VMS nodes is VMS V4.5. Increased functionality in subsequent versions of VMS may impact performance. VMS V4.6 handles the establishment of logical links between nodes differently. With increased functionality, this leads to longer connect times.

When using the configuration in Figure A.1 with the MicroVAX II as the local node, the maximum throughput is 45.3 Kb/s (11.1 blocks/second) with a line utilization of 80.97 percent of the 56 Kb/s line. The following table gives the maximum observed throughput for varying RU and record sizes over the 56 Kb/s line (outbound, 1000 blocks).

Maximum Throughput with MicroVAX II Local Node over 56 Kb/s Line

RU	Record Size (bytes)	Response Time (sec, V4.5)	Throughput bits/sec	blocks/sec	MB/hr
512	80	92.7	44201	10.8	19.9
	512	98.7	41513	10.1	18.9
	4096	103.0	39766	9.7	17.9
1024	80	96.3	42519	10.4	19.1
	512	94.3	43420	10.6	19.5
	4096	93.0	44043	10.8	19.8
2048	80	93.0	44043	10.8	19.8
	512	90.3	45343	11.1	20.4
	4096	90.7	45176	11.0	20.3
4096	80	100.0	40960	10.0	18.4

The throughput on the 9.6 Kb/s line is limited by the line speed. The maximum observed throughput was 8.5 Kb/s for an 89 percent line utilization. This is true also for 1000 blocks outbound with RU 1024 bytes and record size of 512.

Some of the measurements were taken when transferring files without data translation. It was observed that the response time was 13 percent longer on the average if data translation takes place.

When a VAX 8200 is used as the local node, as shown in Figure A.1, the throughput is increased about 12 percent. The following is a list of maximum throughputs observed with RU set to 1024 bytes over a 56 Kb/s line.

Maximum Throughput with VAX 8200 Local Node over 56 Kb/s Line

RU	Record Size (bytes)	Response Time (sec, V4.5)	Throughput bits/sec	blocks/sec	MB/hr
1024	80	94.0	43574	19.6	15.6
	512	90.7	45176	20.3	16.2
	4096	90.3	45343	20.4	16.3

In the configurations shown in Figures A.1 and A.3, using the MicroVAX II or VAX 8200, the DTF/VMS client and server software are resident in the same node. In the configuration shown in Figure A.2, the client and server are in separate MicroVAX IIs, each running VMS V4.5 operating system. The test file was sent from the client node to the server node to the DECnet/SNA Gateway, then over the synchronous line to the IBM system.

Performance Guidelines

The following table compares the CPU utilization when transferring a file on a single DTF/VMS client/server node to the utilization on separate client and server nodes. The measurements were taken using an RU of 2048 bytes, a file size of 1000 blocks, and a record size of 80 bytes.

CPU Utilization on Single and Separate Client/Server Nodes

	Single Node	Separate Client/Server
Response time	93.0 sec	96.3 sec
Throughput	44.0 Kb/s	42.5 Kb/s
CPU utilization (%)	55.9%	client: 18.2% server: 34.8%

The client CPU utilization is record-size dependent: the larger the record size, the less CPU time used per block.

The configuration shown in Figure A.3 uses VMS/SNA V1.1 software as a connection to the IBM system rather than the DECnet/SNA Gateway. The CPU utilization on the VAX 8200 node generally increases 22 percent when transferring files of 50 blocks or fewer when using VMS/SNA V1.1 as a gateway. The user may see an increase of 30 percent in the CPU utilization when transferring files with small (80-byte) records. The increase in CPU load is due to the VMS/SNA software residing on the sending node. The maximum throughput in this configuration is 45.2 Kb/s observed when transferring 1000 blocks outbound from IBM with the RU size set to 2048 bytes and a file record of 512 bytes. The outbound throughput will be similar to throughput using the DECnet/SNA Gateway V1.3 for large files (over 100 blocks). When transferring inbound files or small outbound files, the throughput is an average of 30 percent less using VMS/SNA V1.1 than DECnet/SNA Gateway V1.3.

Bisync Emulators

These performance measurements show test results for several bisync emulators. The purpose of these tests was to produce a set of results on a typical configuration for each of these bisync emulators. These results can then be extrapolated to other systems to allow the user to estimate the capabilities of these emulators on different configurations.

Bisync terminal emulators have traditionally been positioned as low performance and high functionality; that is, performance was not an issue.

3270 Terminal Emulation

Issues for 3270 Terminal Emulation are

- Number of terminals supported on a single system.
- Incremental response time.
- Line speed.
- CPU load.

Performance Guidelines

The following configuration was used to test the VAX 3271 protocol emulator: VAX-11/780, VMS V3.4, and a 9.6 Kb/s synchronous line using a modem eliminator. Note that 9.6 Kb/s is the highest line speed that offers the greatest throughput, but also has the highest impact (CPU cycles) on the VAX system. Two rates of data entry were used: a typical software engineering environment and a "worst-case" simulation using the autorepeat feature of the VT100. For the typical software engineering environment, the protocol emulator and the first terminal used 10 percent of the CPU. Each subsequent terminal used an additional 2 percent of the CPU. When the autorepeat mode of the VT100 was used for simulating "worst-case" data entry, the protocol emulator and one terminal required 25 percent of the CPU. (Each additional terminal required another 6 percent.)

As far as response time is concerned, the test results do not add significant incremental delay to what the IBM host system imposes.

These figures can be extrapolated to other configurations to give a general idea of typical performance capabilities—that is, a VAX-11/750 increases the VAX-11/780 figures by a factor of approximately 1.5, and the VAX-11/730 increases the VAX-11/780 figures by a factor of approximately three.

The following configuration was used to test the RSX 3271 Protocol Emulator: PDP-11/70, RSX-11M (no extended memory support), and a 9.6 Kb/s synchronous line using a modem eliminator.

Two rates of data entry were used: a typical software engineering environment and a "worst-case" simulation using the autorepeat feature of the VT100.

For the typical software engineering environment, the protocol emulator and the first terminal used 10 percent of the CPU. Each subsequent terminal used an additional 5 percent of the CPU. When the autorepeat mode of the VT100 was used for simulating "worst-case" data entry, the protocol emulator and one terminal required 15 percent of the CPU. (Each additional terminal required another 10 percent.)

The CPU use on the RSX-11M configuration is somewhat lower than on the VAX configuration because the VAX terminal emulation utility runs in compatibility mode.

Performance Guidelines

2780/3780 Protocol Emulation

Issues for 2780/3780 protocol emulation are

- Throughput (number of records transferred per unit of time).
- CPU load.
- Line speed.

The 2780/3780 protocol emulator includes many different options for translating and manipulating records: use of space compression, transparency or nontransparency, 2780 or 3780, fixed or variable length records, and so on. Because of the variety of options for record translation and manipulation, it is difficult to present any conclusive results.

Typically, a 9.6-Kb/s line on a VAX-11/750 with a DUP11 device uses about 10 percent of the CPU. Lower line speeds will result in decreased CPU use. In addition, using a DMF32 device on a VAX instead of the DUP11 decreases the CPU use by about one-half.

Typically, a 9,600-bits-per-second line using a modem eliminator on a PDP-11/70 also uses about 10 percent of the CPU. As is to be expected, CPU use will increase on processors smaller than those tested.

For example, the results for the VAX-11/750 configuration (10 percent CPU usage) can be extrapolated to 20 percent CPU use for the VAX-11/730. The results for the PDP-11/70 configuration (10 percent CPU use) can be extrapolated to 20 percent CPU use for the PDP-11/34 and 14 percent for the PDP-11/44.

On the other hand, CPU use will decrease on processors larger than those tested. For example, the results for the VAX-11/750 configuration (10 percent CPU use) can be extrapolated to 7 percent CPU use for the VAX-11/780.

LAN Bridge 100

The LAN Bridge 100 is a high-performance device which connects two 802.3/Ethernet segments. The bridge receives frames from both 802.3/Ethernet segments, determining which segment contains the destination node. If the destination for the frame is not on the same segment as the source, the bridge transmits the frame to the other segment; If the destination node is on the same segment, the bridge discards the frame.

Factors affecting the performance of the LAN Bridge 100 include the latency the bridge adds to the transmission of a frame and the maximum throughput of the bridge. The latency of the bridge is the amount of time the frame spends in the bridge, that is, time to process and transmit an incoming 802.3/Ethernet frame. Maximum throughput is the rate at which the bridge can receive frames on one segment and forward them to the other segment.

The latency introduced by the bridge is very small: approximately 107 microseconds for minimum length (64-byte) frames.

Packet Processing Rates

The LAN Bridge 100 has high-throughput capability. Under test conditions, the bridge can forward bursts of frames at full 802.3/Ethernet bandwidth. At "steady state" (continuous steady stream), the bridge can forward 13,404 minimum-size packets and can filter 24,200 minimum-size packets. (Minimum-size packets are the worst-case condition for a bridge.)

Performance Guidelines

Fiber Optic Bridge

The Fiber Optic Bridge interfaces one transceiver cable and a fiber optic link. It contains high-performance optics, allowing communication over longer distances. The other end of the fiber optic cable can connect to another fiber optic bridge or to a fiber optic repeater.

The relationship between achievable distance and power budget involves several factors that influence distance gained as power budget increases:

- Cable length, type, loss characteristics, and overall quality
- Number of splices and connections in the fiber

Because each network environment is unique, actual obtainable distance may vary by cableplant.

The following table summarizes the power budget and distance specifications for the fiber optic LAN Bridge 100 (DEBET-RH/RJ) and the fiber optic DEREPEATER (DEREP-RH/RJ). These specifications are based on the four major multimode fiber types generally in use today. Distances shown are worst-case conditions with best-case fiber.

Power Budget and Distance Specifications for Fiber Optic Bridge (DEBET-RH/RJ) and Fiber Optic Repeater (DEREP-RH/RJ)

Fiber Type (micron diameter)	Power Budget ¹ (decibels)	Attainable Distance (km) ¹	
		Bridge to Bridge ²	Bridge to Repeater ²
50/125	08.0	2.0	1.5
62.5/125	12.0	3.0	1.5
85/125	13.5	3.0	1.5
100/140	16.0	3.0	1.5

¹With less than a 1×10^{-10} bit error rate.

²DEBET-RH/RJ and DEREP-RH/RJ versions are compatible with the previous fiber optic bridge and repeater (-RC/RD), but are limited to the performance specified by the -RC/RD.



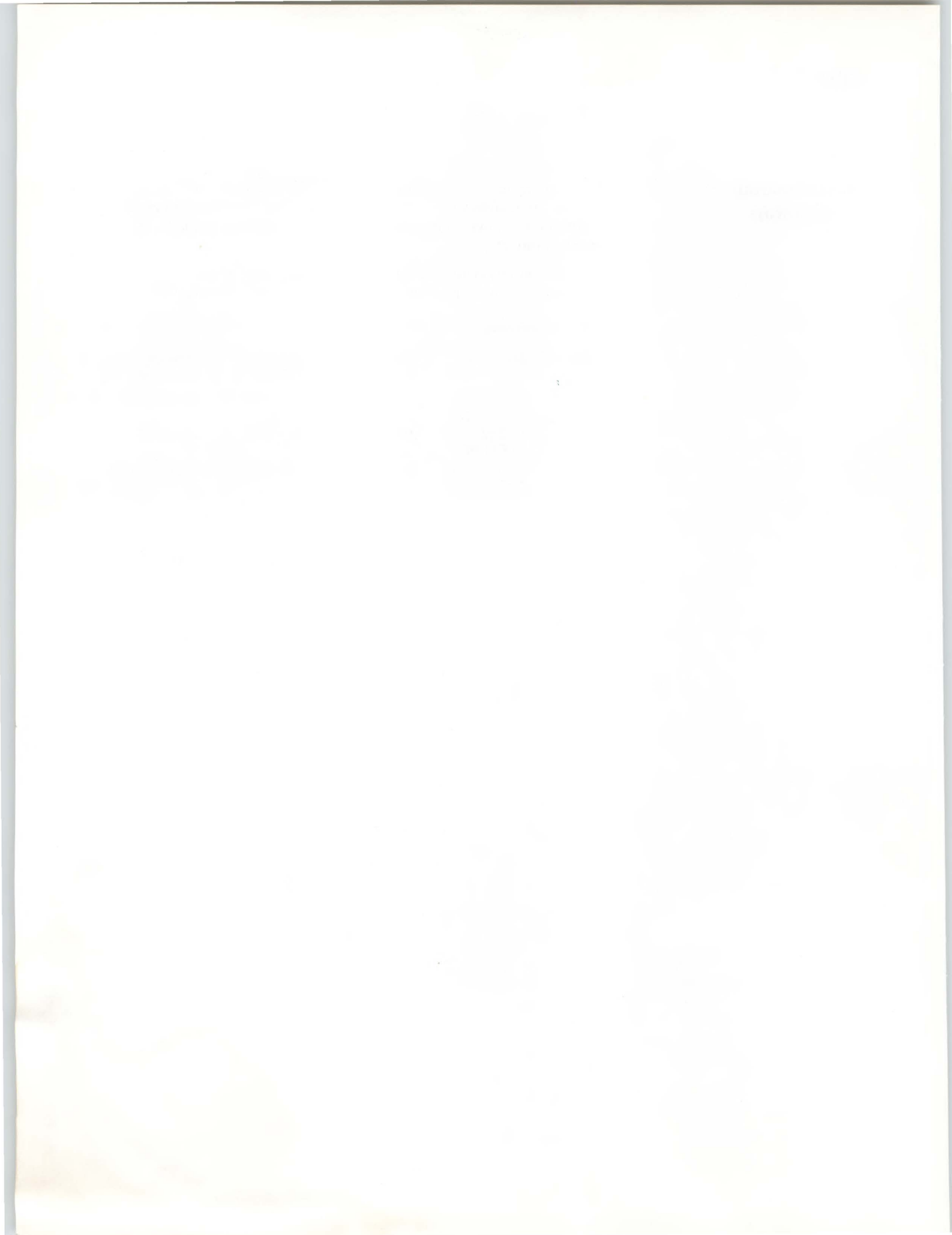
Appendix B

Environmental Specifications

The environmental information provided in this appendix will help you plan for installation when ordering products. Detailed site preparation information is provided in the individual site preparation guide for the specific products.

Hardware products are classified and tested according to one of the classes of temperature/humidity environments shown in the following table.

<i>Environment Classes</i>				
Class	Temperature	Relative Humidity	Maximum Wet Bulb	Minimum Dew Point
A	15°C (59°F) to 32°C (90°F)	20–80%	25°C (77°F)	2°C (36°F)
B	10°C (50°F) to 40°C (104°F)	10–90%	28°C (82°F)	2°C (36°F)
C	5°C (41°F) to 50°C (122°F)	10–95%	32°C (90°F)	2°C (36°F)



Appendix C

Software Product Description List

Software Product	SPD	Version
DECnet-11M	10.75.xx	4.3
DECnet-11M-PLUS	10.66.xx	4.0
DECnet-11S	10.74.xx	4.3
DECnet-DOS	50.15.xx	2.1
DECnet-Micro/RSX	18.27.xx	4.0
DECnet-RT	10.72.xx	2.1
DECnet-ULTRIX	26.83.xx	3.0
DECnet-VAX	25.03.xx	5.0
DECnet-VAXmate	55.05.xx	2.1
DECnet/E	10.73.xx	4.0
DECnet/PCSA Client: PC	55.07.xx	2.0
DECnet/PCSA Client: VAXmate	55.10.xx	2.0
DECnet/SNA MS-DOS 3270 Terminal Emulator	30.63.xx	1.0
DECnet/SNA ULTRIX 3270 Terminal Emulator	29.88.xx	1.0
DECnet/SNA VMS 3270 Terminal Emulator	26.84.xx	1.4
DECnet/SNA Data Transfer Facility	27.85.xx	2.0
DECnet/SNA Gateway for Channel Transport	29.76.xx	1.0
DECnet/SNA Gateway for Synchronous Transport	25.C6	1.0
DECnet/SNA Printer Emulator	26.70.xx	1.1
DECnet/SNA VMS 3270 Data Stream Programming Interface	26.87.xx	1.2
DECnet/SNA VMS Application Programming Interface	26.86.xx	2.2
DECnet/SNA VMS APPC/LU6.2 Programming Interface	26.88.xx	2.0
DECnet/SNA VMS DISOSS Document Exchange Facility	26.72.xx	1.3
DECnet/SNA VMS Distributed Host Command Facility	26.71.xx	1.1
DECnet/SNA VMS Gateway Management	29.70.xx	2.0
DECnet/SNA VMS RJE	26.85.xx	1.2
DECrouter 200	27.72.xx	1.0
DECrouter 2000	28.85.xx	1.0
DECserver 200 for RSX-11M-PLUS and Micro/RSX	15.72.xx	2.0
DECserver 200 for ULTRIX-32	27.54.xx	2.0
DECserver 200 for VMS	27.53.xx	2.0
DECserver 500/550 for RSX-11M-PLUS and MicroRSX	18.53.xx	1.1
DECserver 500/550 for VMS	26.97.xx	1.1
EDE with IBM DISOSS	26.92.xx	2.0
EDE-W Document Exchange	26.37.xx	1.2
FUSION TCP/IP	29.81.xx	3.2

Software Product	SPD	Version
KMS11 RSX X.25 LAPB Link Level Software (UNIBUS)	13.42.xx	2.0
KMV1A MicroVMS Driver	28.23.xx	1.1
KMV1A MicroVMS Development Tools	28.24.xx	1.0
KMV1A MicroVMS X.25 Link Level	28.25.xx	1.0
KMV1A X.25 Link Level (Q-bus)	13.43.xx	1.0
KMV1A RSX and Micro/RSX Development Tools	13.41.xx	1.0
KMV1A RSX and Micro/RSX HDLC Framing Software	14.22.xx	1.0
LAN Traffic Monitor	27.80.xx	1.0
MUX200/VAX Protocol Emulator	25.02.xx	2.0
MUXserver 100 Remote Terminal Server (VMS)	28.45.xx	2.0
MUXserver 100 Remote Terminal Server (RSX)	15.27.xx	2.0
MUXserver 100 Remote Terminal Server (ULTRIX)	28.46.xx	2.0
NMCC/DECnet Monitor	26.91.xx	2.0
NMCC/VAX ETHERnim	26.96.xx	2.0
poly-COM	A3.23.xx	1.2
Remote Bridge Management Software	27.12.xx	1.1
Remote System Manager	29.59.xx	2.1
RSX-11 2780/3780 Emulator	10.01.xx	4.1
RSX-11 P.S.I./M	10.42.xx	3.0
RSX-11 P.S.I./M-PLUS	10.43.xx	3.0
RSX-11/3271 Protocol Emulator	10.88.xx	3.1
RSX-11M/M-PLUS RJE/HASP Emulator	10.48.xx	1.3
Terminal Server Manager	27.64.xx	1.2
ULTRIX Mail Connection	29.05.xx	1.0
VAX 2780/3780 Protocol Emulator	25.07.xx	1.6
VAX 3271 Protocol Emulator	25.21.xx	2.3
VAX DEC/MAP	27.66.xx	2.1
VAX Distributed File Service	28.78.xx	1.0
VAX Distributed Name Service	28.79.xx	1.0
VAX Distributed Queuing Service	28.80.xx	1.0
VAX FTAM	29.86.xx	1.0
VAX KCT32	26.04.xx	1.1
VAX KMS11-BD/BE HDLC/BSC Framing	26.55.xx	1.2
VAX KMS11-BD/BE X.25 Link Level	25.80.xx	1.3
VAX MAILGATE for MCI Mail	27.34.xx	1.0
VAX Message Router Programmer's Kit	26.33.xx	3.0
VAX Message Router X.400 Gateway	27.50.xx	2.1
VAX Message Router/P Gateway	28.94.xx	1.0
VAX Message Router/S Gateway	29.24.xx	1.0
VAX Message Router VMSmail Gateway	26.33.xx	3.0

Software Product	SPD	Version
VAX Notes	27.06.xx	1.3
VAX NTR Protocol Emulator	25.68.xx	1.1
VAX OSI Applications Kernel (OSAK)	27.47.xx	1.1
VAX P.S.I.	25.40.xx	4.2
VAX P.S.I. Access	27.78.xx	4.1
VAX PrintServer 40 Client	27.67.xx	2.1
VAX PrintServer 40 Support Host	27.68.xx	2.1
VAX Public Access Communications (VAXPAC)	28.51.xx	1.1
VAX VTX	26.57.xx	3.0
VAX Wide Area Network Device Drivers	29.64.xx	1.0
VAXmate Services for MS-DOS	55.09.xx	2.0
VAX/VMS Services for MS-DOS	30.50.xx	2.1
VIDA with IDMS/R	27.25.xx	2.0
VMS/SNA	27.01.xx	1.3
VMS/ULTRIX Connection	25.A4.xx	1.0
WIN/TCP	29.80.xx	3.0
WPS-PLUS/PC	30.75.xx	1.0
X25router 2000	28.86.xx	1.0



Appendix D

Related Documentation

Document	Order Code
Networks and Communications Handbooks	
Introduction to RSX-11 PSI	AA-M369B-TC
Introduction to VAX-11 PSI	AA-L0670C-TE
Architecture Specifications (Order through DECdirect)	
DECnet-DNA Ethernet Data Link Functional Specification V1.0	AA-Y298A-TK
DECnet-DNA Ethernet Node Product Architecture Specification V1.0	AA-X440A-TK
DECnet-DNA Phase V General Description	AA-N149A-TC
DECnet-DNA Maintenance Operations Functional Specification V3.0	AA-X436A-TK
DECnet-DNA Network Management Functional Specification V4.0	AA-X437A-TK
DECnet-DNA NSP Functional Specification V4.0	AA-X439A-TK
DECnet-DNA Routing Layer Functional Specification V2.0	AA-X435A-TK
DNA Phase V General Description	AA-DNAPV-GD
Ethernet Specification V2.0	AA-K759B-TK
DECconnect System Documentation	
DECconnect System General Description	EK-DECSY-GD
DECconnect System Installation and Verification Guide	EK-DECSY-VG
DECconnect System Planning and Configuration Guide	EK-DECSY-CG
DECconnect System Requirements Evaluation Workbook	EK-DECSY-EG
Unshielded Twisted-pair Configuration Manuals	
Unshielded Twisted-pair Ethernet Installation Guide	EK-TPEIG-IN-001
Unshielded Twisted-pair Ethernet Wiring Certification Guide	EK-TPEWC-IN-001

Document	Order Code
Additional Documents	
ALL-IN-1 Office and Information Systems	EB-26203-52
DECmate Family Handbook	EB-26272-60
DECnet Systems Services Overview	EK-DSSO1-OV
Digital Equipment Corporation Reference Service	ED-23800-18
Digital Industrial Networks Guidebook	EB-31782-70
Distributed Computing Solutions/ Reseller Pocket Card	EJ-31399-68
Installing Applications with PCSA Software	EK-VAXIA-IN-002
Microsystems Handbook	EB-26085-41
MicroVAX Systems Handbook	EB-30991-41
Networks and Communications Publications/Fall 1988	EZ-32647-42
PDP-11 Software Source Book	EB-28783-41
PDP-11 Systems and Options Catalog	ED-32702-41
PDP-11 Systems Handbook	EB-29317-41
Routing and Networking Overview	AA-HS15A-TK
VAX Software Buyer's Guide	EB-31128-48
VAX Software Quick Reference Guide	EG-32334-48
VAX Systems and Options Catalog	ED-32618-46

NETset Modeling Kit

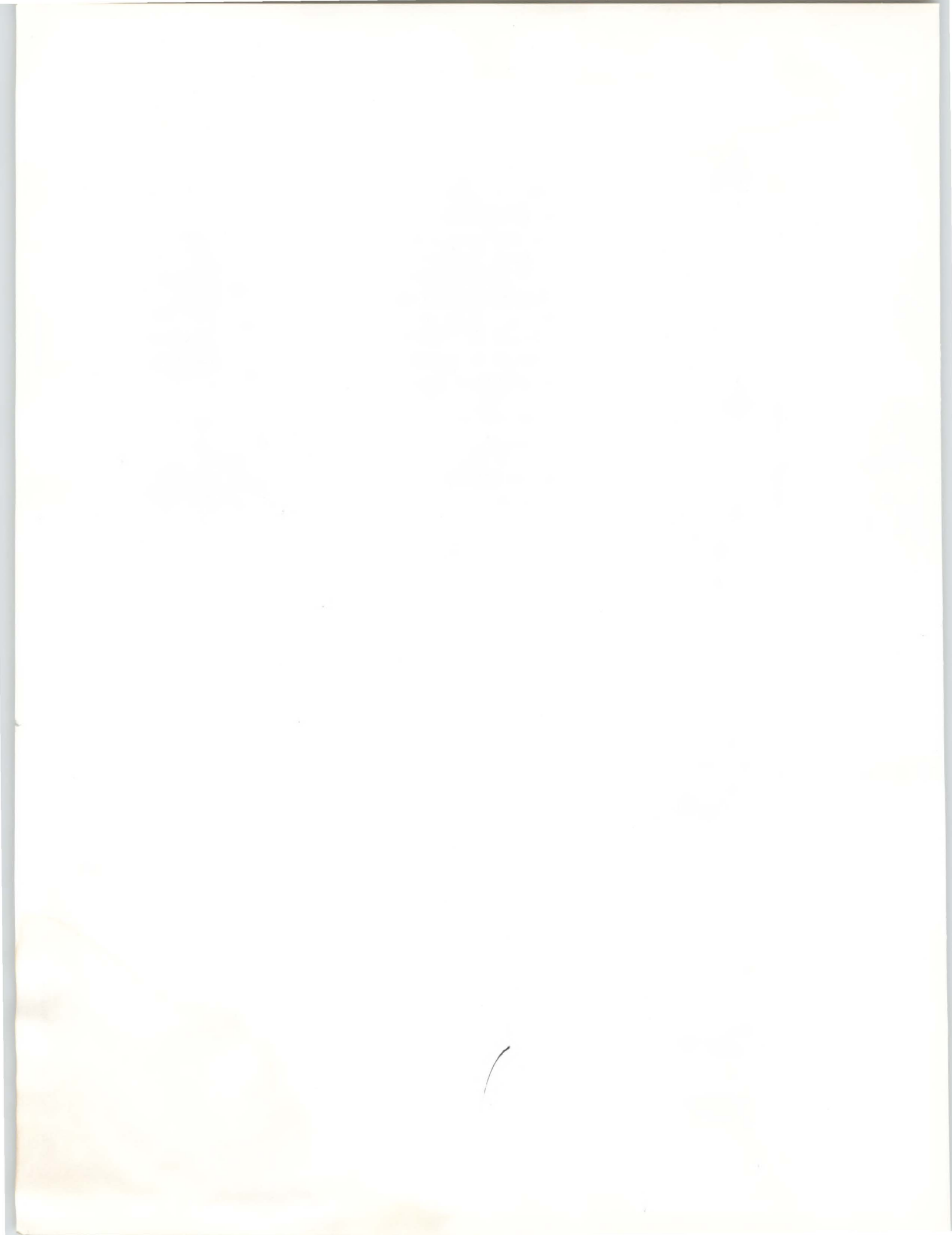
The NETset Modeling Kit contains every component needed to model any network topology, from a straightforward local area network to the most complex wide area network, at either the conceptual level or a more detailed and technically accurate level.

Each NETset piece is color-coded for quick and easy identification during the network-building process. Reusable stick-on labels provide an additional layer of identification for individual building blocks. Color-coded cables highlight network technologies such as 802.3/Ethernet, fiber, dialup, and service.

NETset turns the process of building information networks, simple or complex, into convenient topological reference models for easier, more efficient decision making.

NETset components can be ordered individually as well as in the NETset Modeling Kit. Orders can be placed by calling DECdirect at 1-800-DIGITAL.

Description	Order Code
Complete NETset Kit (one)	EZJ403294
Large blue blocks (16 per package)	EZJ403295
Small blue blocks (45 per package)	EZJ403296
Large gray blocks (eight per package)	EZJ403297
Small gray blocks (45 per package)	EZJ403298
Large plum blocks (36 per package)	EZJ403299
Small plum blocks (45 per package)	EZJ403300
Gray clouds (eight per package)	EZJ403301
Black mounting platforms (four per package)	EZJ403302
Stick-on labels (sheets, five sets of 110 each)	EZJ403303
Clear platform posts (16 per package)	EZJ403304
Fifty-foot spools of colored cables (five assorted colors: one each of orange, purple, green, white, clear)	EZJ403305
Fifty-foot spools of orange cable (five per package)	EZJ403306
NETset brochure	EZJ403308



- Barrel Connectors, 2.29
- Baseband 802.3/Ethernet, see Ethernet
- Binary Synchronous Communications Protocol Emulators, 4.60
- Bisync Emulators Performance Guidelines, A.78
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 - DECnet/SNA Gateway-CT Performance Guidelines, A.60
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 - /SNA VMS 3270 Terminal Emulator, 4.39
 - /SNA VMS Advanced Program-to-program Communication/LU6.2 Programming Interface (APPC), 4.56
 - /SNA VMS Application Programming Interface (API), 4.54
 - /SNA VMS DISOSS Document Exchange Facility (DDXF), 4.50

- /SNA VMS Distributed Host Command Facility, 4.52
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- DELNI Local Network Interconnect, 2.32
- DELQA 802.3/Ethernet Communications Controllers, 2.74
- DELUA 802.3/Ethernet Communications Controller, 2.73
- DEMPR ThinWire Multiport Repeater, 2.41
- DEPCA 802.3/Ethernet Communications Controller, 2.76
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- DECnet/SNA Gateway-ST
- DECnet/SNA Gateway-CT
- DSV11
- VAX File Transfer and Access Management
- DECnet/SNA Data Transfer Facility

