PATHWORKS for DOS

digital

Overview

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Purpose

This guide explains how PATHWORKS software integrates different types of personal computers, operating systems, and local area network (LAN) technologies such as Ethernet and Token Ring, and communication transports such as DECnet and TCP/IP.

The chapters describe key features and services provided with each product.

Audience

This guide is intended for users who are interested in understanding how PATHWORKS products work together. New system administrators will find this guide especially helpful.

Organization

This guide starts with an introduction to PATHWORKS, followed by chapters that describe each product and how they work together. If you have a different version of a particular product, consult the Software Product Description (SPD) for specific information.

The chapters describe:

- An introduction to the family of PATHWORKS products
- The VMS server, including PATHWORKS for VMS Version 4.1 and PATHWORKS for Macintosh Version 1.0, and how it integrates DOS, OS/2, and Macintosh clients.
- The ULTRIX server, PATHWORKS for ULTRIX Version 1.1, and how it integrates DOS and OS/2 clients.
- The OS/2 server, PATHWORKS for OS/2 Version 2.0, and how it integrates DOS and OS/2 clients.

- The DOS clients, PATHWORKS for DOS Version 4.1 and PATHWORKS for DOS (TCP/IP) Version 1.1, and how they work with VMS, OS/2, and ULTRIX servers. The chapter also describes the add-on product PATHWORKS for DOS (NetWare Coexistence).
- The OS/2 client, PATHWORKS for OS/2 Version 2.0, and how it works with VMS, OS/2, and ULTRIX servers.
- PATHWORKS for Macintosh Version 1.0 from the Macintosh client viewpoint and how it works with the VMS server.

Related Documents

Table 1 provides pointers to manuals that offer more detailed information about the products. To order manuals that are not in your kit, see the ordering information on the copyright page of this manual, or contact your Digital representative.

Table 1 Manuals to Read

For more information about	Read
VMS server	*PATHWORKS for VMS Server Administrator's Guide*
Macintosh server	*PATHWORKS for VMS Server Administrator's Guide*
OS/2 server	*Microsoft LAN Manager Administrator's Guide*
ULTRIX server	*PATHWORKS for ULTRIX Server Administrator's Guide*
DOS client	*PATHWORKS for DOS User's Handbook*
OS/2 client	*Microsoft LAN Manager User's Guide for MS OS/2*
Macintosh client	*PATHWORKS for Macintosh Network Services User's Guide*

1

What Is PATHWORKS?

From your PC, you can use the resources of many computers on the network.

PATHWORKS is the framework that integrates different types of computers into a complete working environment. Even if these computers use different operating systems such as DOS, OS/2, ULTRIX, Macintosh, and VMS, you can continue working as you usually do within your own environment.

At the same time, you can take advantage of the resources available on host computers in your own building or at distant sites. From your PC, you can access corporate, national, and international databases and applications, incorporating data into applications that run on your desktop.

This chapter describes:

- Client and server
- Communication links used by PATHWORKS
- Networking software used by PATHWORKS
- Features of PATHWORKS
- The PATHWORKS family of products

PATHWORKS lets you use resources on local and wide area networks.

With PATHWORKS software, you can share resources on the **network**. Networks give you access to resources in a building, company, or international organization.

You can access local resources on a local Ethernet or Token Ring, which physically connects computers over a limited distance in a **local area network (LAN)**. A LAN offers a high-speed communication channel over a limited distance, such as a building or a cluster of buildings.

You can also connect to computers over a wider area in a **wide area network (WAN)**. A WAN comprises two or more LANs, connected by communications equipment such as routers or bridges.

In addition, with PATHWORKS you can communicate outside a PATHWORKS network. For example, you can connect to the IBM SNA (Systems Network Architecture) environment by means of an SNA gateway, a hardware/software communications product.

Many companies use personal computers and operating systems from different vendors to perform daily tasks. For example, while some people work on personal computers and use DOS for word processing, others work on terminals connected to a VAX computer and use VMS. Users of these different systems often need to share information and resources, but they do not want to learn different operating systems.

With PATHWORKS, you can share data and files, take advantage of different printers, exchange mail, and use network services. You can also run personal computer applications and send files to each other without thinking about the operating system.

The Server and Client

Some computers on the network operate as **servers**. Servers make resources such as printers, applications, and data files available to users. These resources become available as **services**. When a personal computer is connected to a service, it is called a **client**. A client requests services.

You can use resources directly connected to your personal computer **(local)**, such as a printer. Or you can use resources available as services from a server **(remote)**, such as an application. When the server delivers the application, the client runs it as if it were local.

You can connect to the server, copy files to and from the client, and run an application from the client.

In addition, each client can connect to one or more servers at the same time. An OS/2 client, for example, can access file and printer services from VMS and OS/2 servers simultaneously. You can be using a DOS computer running client software and can connect to separate services on VMS, ULTRIX, and OS/2 servers.

An Example of How the Server and Client Work Together

Suppose you work for the finance department of a large corporation where financial information is stored in a relational database such as Rdb/VMS. From this database, you and other financial analysts take the information you need to develop your own spreadsheets on your own PCs.

For example, one of you uses an Excel spreadsheet program on a Macintosh; another uses Lotus 1-2-3 on an IBM PC AT. When the individual spreadsheets are complete, their data is entered into the database. The combined data can be developed into a master spreadsheet for corporate decision-makers.

You can also print the spreadsheets on printers connected to a server. And with Mail, you can send the spreadsheets over the network to a worker in another department.

Communication Links

Communication links include the cables, modems, or phone lines that physically join PCs to other PCs and servers on the network. PATHWORKS supports the following communication links:

- Ethernet
- Token Ring
- Asynchronous DECnet

These links are discussed in the following subsections.

Ethernet

The Ethernet is a LAN topology and broadcasting technique. It runs on a coaxial or twisted pair cable that connects clients, servers, printers, and other devices in a local area network. The Ethernet is typically used in department and office environments.

An Ethernet controller board in a PC connects the PC to the network. PATHWORKS for DOS and PATHWORKS for OS/2 software communicate on the network through the Ethernet board.

To use an Ethernet board, the client requires an NDIS-supported device driver, a software program that enables the computer's operating system to communicate with a hardware device such as the Ethernet controller card. NDIS is the Network Device Interface Specification written jointly by Microsoft Corporation and 3Com Corporation.

Install the appropriate EtherWORKS controller board.

For Ethernet communications, install either a Digital EtherWORKS controller board or one of the industry-standard Ethernet boards supplied by another vendor and certified by Digital.

EtherWORKS controller boards support one or more of the following types of connection:

- ThinWire Ethernet
- Twisted-pair cable
- AUI 15-pin connector

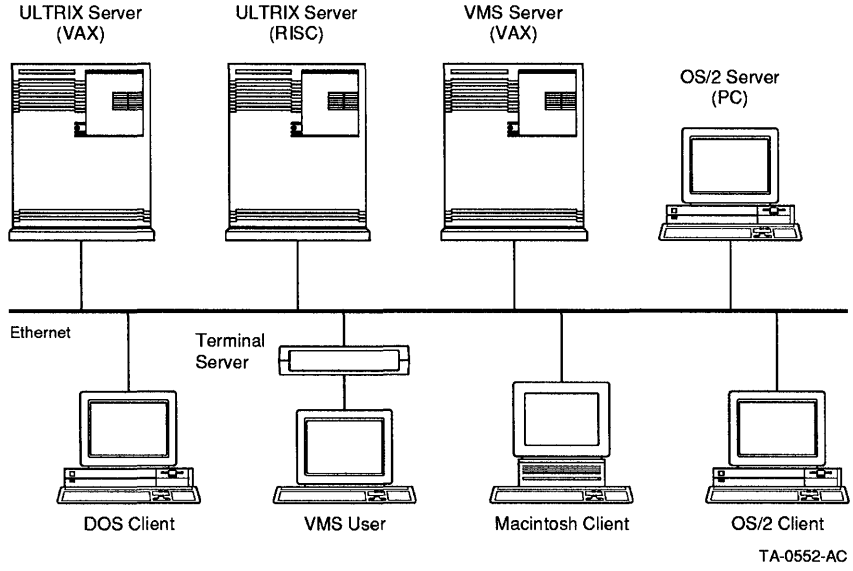
Table 1–1 shows how EtherWORKS boards correspond with various types of PC.

Table 1–1 Digital Ethernet Controller Boards

Controller Board	Part No.	Used With...
EtherWORKS LC	DE100	AUI or ThinWire for IBM or compatible XTs and slower EISA/ISA bus-compatible ATs
EtherWORKS LC TP	DE101	AUI or twisted-pair for XTs and slower EISA/ISA bus-compatible ATs
EtherWORKS Turbo	DE200	AUI or ThinWire for ATs, 486s, and high-performance EISA/ISA bus-compatible processors
EtherWORKS Turbo TP	DE201	AUI or twisted-pair for ATs, 486s, and high-performance EISA/ISA bus-compatible processors
EtherWORKS Turbo TP/BNC	DE202	Twisted-pair or BNC for ATs, 486s, and high-performance EISA/ISA bus-compatible processors
EtherWORKS MC	DE210	AUI or ThinWire for microchannel-compatible PCs such as PS/2 Model 50 and above
EtherWORKS MC TP/BNC	DE212	Twisted-pair or ThinWire for microchannel-compatible PCs such as PS/2 Model 50 and above

Figure 1–1 shows how PATHWORKS integrates **nodes** (clients and servers) on Ethernet over a DECnet network. DECnet is Digital's networking software, described later in this chapter.

Figure 1–1 How PATHWORKS Integrates Nodes on Ethernet Over DECnet

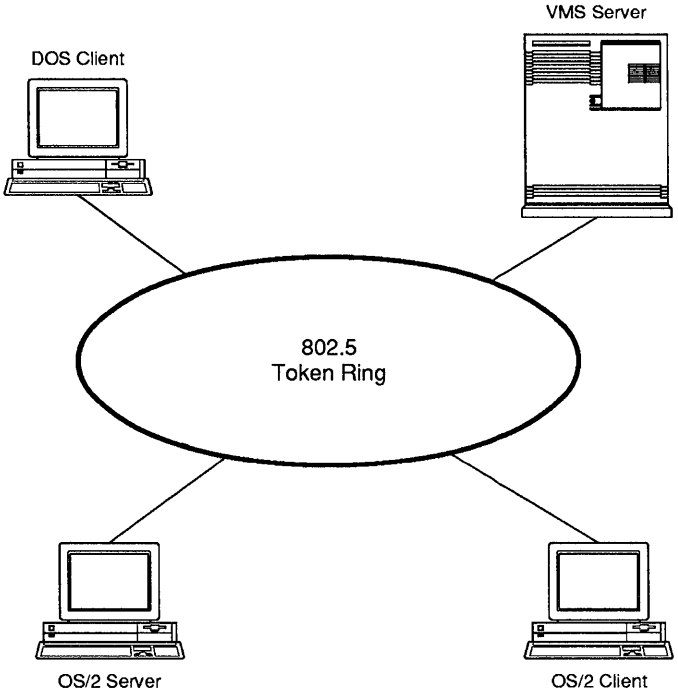


Token Ring Communications

DOS clients, OS/2 clients and servers, and Q-bus VAX servers running VMS can operate as DECnet nodes on an IEEE 802.5 **Token Ring** LAN. An NDIS-compliant Token Ring device driver and an NDIS Token Ring controller board are required for DOS and OS/2 clients. Token Rings use the concept of a single control **token** passed around the network ring to control communication between the stations.

Figure 1–2 shows how PATHWORKS integrates different clients and servers on Token Ring over a DECnet network.

Figure 1–2 How PATHWORKS Integrates Nodes on Token Ring Over DECnet



Asynchronous DECnet Communications

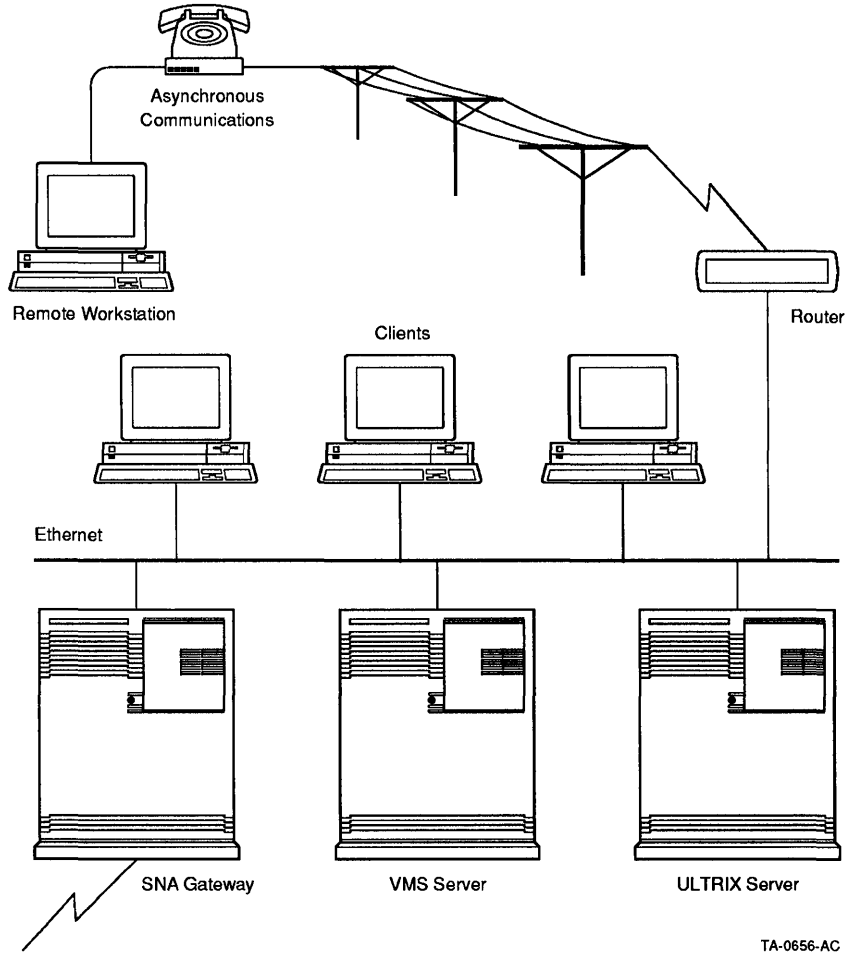
Asynchronous DECnet connects nodes by means of modems or phone lines.

Asynchronous DECnet communications connect remote computers to a network over telephone lines, over leased lines, or through a dial-up or integral modem. A router transmits the data from the phone lines or modem to the Ethernet. DOS and OS/2 clients can access DECnet nodes by using asynchronous DECnet over a serial line. Through Macintosh Toolbox, Macintosh clients use a serial tool that supports asynchronous DECnet.

Asynchronous DECnet can also provide the communication link between two Ethernet networks.

Figure 1–3 shows how asynchronous communications work.

Figure 1–3 How Asynchronous Communications Work



Networking Software

The same networking software must be installed on both the client and the server.

Clients can connect to LANs or WANs by using **networking software.** Networking software provides the mechanism that enables computers to interact with one another. The types of networking software supported by PATHWORKS are:

- DECnet
- LAST
- LAT
- TCP/IP
- AppleTalk
- NetBEUI

Although PATHWORKS gives you a choice of networking software, you use only one at a time on DOS and Macintosh clients (OS/2 allows you to use multiple transports concurrently). The client and server must share common networking software.

DECnet

DECnet is Digital's networking software.

DECnet software runs on nodes in LANs and WANs, enabling a large number of computers and operating systems to communicate with each other. With PATHWORKS, DECnet can be used to provide file and printer services to all types of clients and servers.

DECnet software enables DOS, OS/2, and Macintosh clients to participate in a DECnet network as nodes. Information is transferred between nodes over a network communication link such as Ethernet, Token Ring, or asynchronous DECnet connections.

Local Area System Transport (LAST)

LAST provides file, disk, and printer services.

LAST (Local Area Systems Transport) provides high-performance disk services to DOS and OS/2 clients, and file and printer services to DOS clients that are connecting to a VMS server on a local area network.

Disk services provide access to space on a VMS server for clients to use as a DOS or OS/2 **virtual disk**, also called a **local area disk** (LAD). The virtual disk looks like a DOS- or OS/2-formatted diskette. Disk services are available to clients on local area Ethernet networks.

Clients can use a virtual disk service for DOS **remote boot**. The remote boot process connects the client to a virtual disk called a **network key disk** and loads the DOS operating system from the network to the client.

File services supported by LAST enable clients to connect to directories, subdirectories, and files stored on a VMS server on local area networks.

Local Area Transport (LAT)

LAT (Local Area Transport) provides communication between nodes, host computers, printers, and modems in a local area network.

TCP/IP

TCP/IP provides access to the Internet.

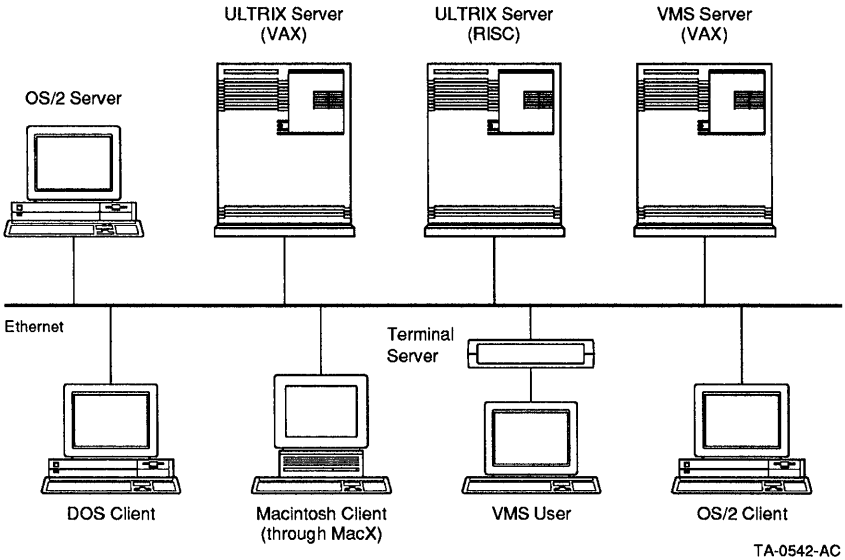
TCP/IP (Transmission Control Protocol/Internet Protocol) is networking software that allows computers, networks, and operating systems from various vendors to communicate with each other.

For PATHWORKS for DOS (TCP/IP) and PATHWORKS for OS/2 (TCP/IP) users, TCP/IP provides file access to the Internet, which includes regional networks as well as local networks at universities, government agencies, and commercial institutions.

Over TCP/IP, clients can access file and printer services offered by PATHWORKS for OS/2, PATHWORKS for ULTRIX, and PATHWORKS for VMS servers on Ethernet. DOS clients, OS/2 clients, and OS/2 servers using TCP/IP can communicate over Token Ring.

Figure 1–4 illustrates how PATHWORKS integrates different types of servers and clients on Ethernet over TCP/IP.

Figure 1–4 How PATHWORKS Integrates Nodes on Ethernet Over TCP/IP



AppleTalk

AppleTalk supports Macintosh computers.

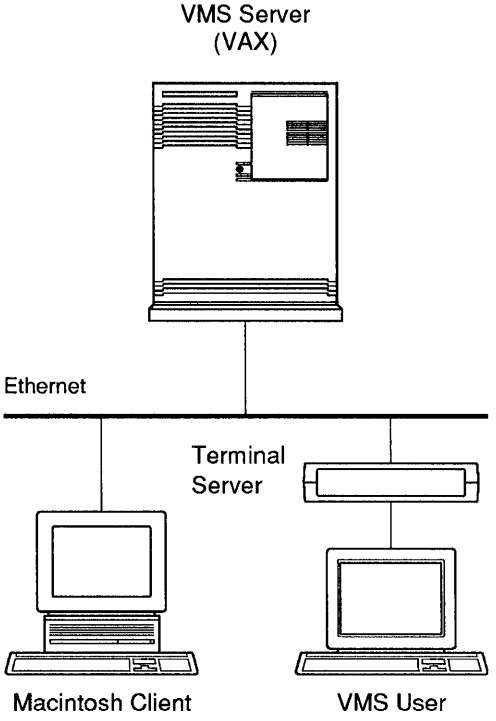
The AppleTalk Networking software for Macintosh computers supports a variety of personal computers and devices. AppleTalk for VMS is an implementation of AppleTalk Phase 2 network protocols for the VMS operating environment.

AppleTalk for VMS runs on VMS systems and allows them to use AppleTalk protocols to communicate with Macintosh computers. Macintosh users can access services that run on VMS systems, including VAXshare file and printer services, terminal services, and DECwindows Motif applications.

VAXshare file and printer services comply with the Apple Filing Protocol Version 2.10, allowing Macintosh files to be stored on VMS systems.

Figure 1–5 illustrates how AppleTalk for VMS integrates Macintosh computers into the VMS operating environment.

Figure 1–5 How PATHWORKS Integrates Macintosh and VMS Users on Ethernet Over AppleTalk



NetBEUI

NetBEUI is networking software for a LAN.

PATHWORKS for OS/2 Version 2.0 supports NetBEUI networking software. NetBEUI is the default local area network software for retail Microsoft LAN Manager and IBM Extended Edition. PATHWORKS for OS/2 clients have the option of using NetBEUI to communicate with clients and servers on other NetBEUI networks. NetBEUI runs over Token Ring or Ethernet local area networks.

Features of PATHWORKS

The major features of PATHWORKS products are:

- File services
- Printer services
- Disk services
- CDROM services
- System management
- Local and remote boot

For a summary of these features according to server, communication link, and networking software, see Appendix A.

File Services

Using PATHWORKS file services, you have direct, system-wide access to shared application and data files stored in directories on VMS, ULTRIX, or OS/2 servers.

File services offer these features:

- Many types of clients can share files stored on the same server.
- From a client, you can read and write to (edit) files. Therefore, file services are well suited for files that need updating by several users or that are used for reference by several users.
- You can access file services over Ethernet, asynchronous DECnet, and Token Ring.

Users can share files by storing them on a common **file service**. For example, suppose you are using Microsoft Word on an OS/2 computer to write a proposal. Another writer working on the same proposal uses Microsoft Word on a DECstation. With PATHWORKS, you and the other writer can share files by storing them on a common file service on a VMS server.

Disk Services

DOS and OS/2 clients can access disk services, which are available on VMS servers running LAD and LAST. Disk services provide access to space on a VMS server for use as a DOS- or OS/2-formatted disk.

Disk services have the following features:

- They enable many users to read from the disk simultaneously, or one user to read and write to the disk.

  Therefore, they are especially useful for libraries of stable files that many users access for reference. Disk services can include DOS applications, system utilities, development tools, and personal disks that are not shared among users.

- They work in a local area Ethernet network only.

Printer Services

Using PATHWORKS printer services, you have direct, system-wide access to printers connected to VMS, ULTRIX, or OS/2 servers, as well as to local printers connected to clients. You can access printer services over Ethernet, asynchronous DECnet, and Token Ring.

CDROM Services

Using PATHWORKS CDROM services, users can take advantage of shared CDROM services offered on the InfoServer 100. The InfoServer 100 is an Ethernet-based high-performance virtual disk server. The InfoServer 100 offers access on local area DECnet networks to shared libraries of software, documentation, and training programs.

CDROMs use the industry-standard High Sierra and ISO 9660 formats.

In addition, if you have a CDROM player attached to your ULTRIX system, you can access ISO 9660 CDROMs offered from a read-only file service.

System Management

System administrators can manage PATHWORKS from the server or from the client. The server provides the following tools:

- Easy-to-use menus for managing the server
- A full complement of commands designed for batch programming and ad hoc management functions
- Remote administration

  Optional remote management of multiple PC LANs is available.
- Security

  Each server type includes security mechanisms to allow or deny access to file, disk, or printer services
- Performance management

  Each server includes its own tools for monitoring and tuning performance.

The client provides:

- A full complement of commands that can be used for ad hoc management functions or placed in individual client batch files
- Memory management

  With PATHWORKS for DOS, several techniques are available for saving conventional memory space for user applications.
- Remote administration

  Optional remote management of multiple PC LANs can be done from the client, as well as from the server.
- Network management, configuration, and troubleshooting tools such as NCP (Network Control Program) and LATCP (Local Area Transport Control Program)
- Netsetup

  Netsetup is a menu-driven configuration utility that enables you to define how your PC connects to the PATHWORKS network.

Local and Remote Boot

You can **boot**, or start up, your DOS client in a PATHWORKS environment through **local** or **remote** boot. Booting the PC over the network means connecting through software to services offered by a server.

With local boot over the network, you start the PATHWORKS software from a **key disk** that resides on a diskette or on a hard disk on the client, depending on where the client configuration files are stored. The DOS software stays resident, and the PATHWORKS software is loaded into the key disk from the system file service on the server.

With remote boot, client configuration files are stored on a VMS virtual disk called a network key disk. The remote boot process connects the client to the network key disk and loads the DOS operating system and PATHWORKS product over the network to the client. Remote boot is available only to DOS clients from a VMS server over Ethernet.

Network Applications for PATHWORKS

From the client, you can take advantage of useful applications available over the network, such as:

- Mail
- Terminal emulation
- Connection to network services
- Support for X Window applications
- Support for Microsoft Windows
- Text editor for DOS or OS/2
- LAN Manager Version 2.0 services
- NETBIOS services

Mail

Mail provides a quick and easy way for you to exchange messages with other users on the network.

Terminal Emulation

A terminal emulator is a program that enables a client to operate as if it were a terminal connected to a host computer. From your client, you simply enter a command or make a window selection. Once you are in terminal emulation mode, you can use all the commands and conventions associated with the host computer.

PATHWORKS offers terminal emulation for four different platforms, as shown in Table 1–2.

Table 1–2 Terminal Emulation Platforms

Platform	Terminal Emulator
DOS client	SETHOST
DOS client, running Microsoft Windows V3.0	VT320 within Windows
OS/2 client	SETHOST
Macintosh client	MacTerminal Version 3.0

Terminal emulation uses the appropriate network protocol or the asynchronous communication port:

- LAT

  LAT (Local Area Transport) is Digital's Ethernet protocol, used in local area networks. LAT enables a client to communicate with other nodes and with devices offered by terminal servers as services, such as modem pools.

- CTERM

  CTERM (Digital Command Terminal) provides wide area network services to terminal emulators for Ethernet or asynchronous DECnet Digital Data Communications Message Protocol (DDCMP) configurations.

  A DOS client or OS/2 client on a Token Ring can use CTERM to establish a terminal emulation session with a VMS or an ULTRIX server.

  PATHWORKS for DOS clients on the Ethernet can use LAT or CTERM. PATHWORKS for Macintosh users can select LAT or CTERM from the Macintosh Communications Toolbox. Clients on Token Ring and asynchronous links use CTERM only.

- TELNET

  TELNET lets PATHWORKS for DOS (TCP/IP) and PATHWORKS for OS/2 (TCP/IP) clients establish TCP/IP terminal emulation connections to remote systems running the TCP/IP transport.

Connections to Network Services

From a DOS or an OS/2 client, you can connect to network services by means of USE commands or the LAN Manager menu.

From a Macintosh client, you can connect to services by using the Macintosh Chooser application.

Support for X Window Applications

DOS clients can use any application written in X through PC DECwindows Motif, the Digital implementation of the X Window System. Macintosh clients can use X applications through MacX, the Macintosh implementation of the X Window System.

With PC DECwindows Motif, DOS users can display and use X Windows applications that are executing on remote systems across the network.

With MacX, Macintosh users can access DECwindows Motif applications. For example, a user can display an ULTRIX DECwindows Motif application in one window and a VMS DECwindows Motif application in a different window.

VMS and ULTRIX servers provide support for remote X Windows applications over DECnet, TCP/IP, and AppleTalk for VMS.

Support for Microsoft Windows

Digital provides DOS clients with a set of support functions for Microsoft Windows Version 3.0, including VT320 Terminal Emulation within Microsoft Windows.

Text Editor

SEDT is the default editor for PATHWORKS. It is a full-screen editor that provides text editing functions from the DOS or OS/2 prompt. SEDT is available as the default editor for Mail.

Network Management

PATHWORKS supports a full range of network management tools, including:

- The Network Control Program (NCP) for DECnet management
- The Local Area Transport Control Program (LATCP) for managing and configuring the local area transport on DOS or OS/2 clients
- PING, a TCP/IP network troubleshooting tool that lets you know if a specific node can be reached
- NETSTAT, which shows the status of the TCP/IP network

LAN Manager Version 2.0 Services

DOS and OS/2 clients connecting to servers running PATHWORKS for OS/2 over DECnet or TCP/IP can access the services of LAN Manager Version 2.0 or higher. All LAN Manager **application programming interfaces** (APIs) are supported, including Named Pipes.

NETBIOS Services

NETBIOS is an API that provides a standard for applications to communicate over a network. On PATHWORKS, many DOS and OS/2 applications use the NETBIOS interface for data sharing and communication.

NETBIOS enables software developers to write an application once, with a NETBIOS interface, and immediately have the application available for a wide range of networking software. NETBIOS must run over the same networking software at both ends of the communication.

PATHWORKS supports DECnet and TCP/IP networking software. NETBIOS for DECnet is built into the PATHWORKS DECnet architecture. NETBIOS for TCP/IP conforms to RFCs 1001 and 1002, the accepted standard for NETBIOS over TCP/IP.

The PATHWORKS Family of Products

Table 1–3 summarizes the PATHWORKS family of server and client products discussed in this chapter.

Table 1–3 PATHWORKS Family of Software Products

Product Name	Description
PATHWORKS for VMS	Over DECnet, enables a VAX or MicroVAX computer running VMS to provide file, printer, disk, and mail services to DOS and OS/2 clients on Ethernet or Token Ring. Over TCP/IP (through the VMS/ULTRIX connection software product), provides file and printer services to DOS and OS/2 clients on Ethernet.
PATHWORKS for ULTRIX	Over DECnet and TCP/IP, enables a VAX or RISC computer running ULTRIX to act as a file, printer, and mail server to DOS and OS/2 clients on Ethernet.
PATHWORKS for DOS	Over DECnet, enables DOS clients to use the services provided by PATHWORKS for VMS, PATHWORKS for ULTRIX, PATHWORKS for OS/2, PATHWORKS for DOS (NetWare Coexistence), and InfoServer 100 on Ethernet. DOS clients can communicate with VMS and OS/2 servers on Token Ring.
PATHWORKS for DOS (TCP/IP)	An add-on product to the PATHWORKS for DOS client that enables DOS clients to access the services of VMS and ULTRIX servers on Ethernet.
PATHWORKS for DOS (NetWare Coexistence)	An add-on product to PATHWORKS for DOS that enables DOS clients to connect to PATHWORKS servers over DECnet or TCP/IP or to Novell NetWare servers over IPX. PATHWORKS for DOS (NetWare Coexistence) supports Ethernet configurations.
PATHWORKS for OS/2	Over DECnet, enables an OS/2 system to function as a client or a server. An OS/2 client can access the services of PATHWORKS for VMS or PATHWORKS for ULTRIX or the services of another OS/2 system running PATHWORKS for OS/2 or LAN Manager server software. An OS/2 server provides file, printer, and mail services to DOS and OS/2 clients on Ethernet or Token Ring.
PATHWORKS for OS/2 (TCP/IP)	An add-on product to PATHWORKS for OS/2 that provides TCP/IP support for file and printer services to OS/2 clients connecting to OS/2, ULTRIX, and VMS servers on Ethernet, and to OS/2 servers on Token Ring.

(continued on next page)

Table 1–3 (Cont.) PATHWORKS Family of Software Products

Product Name	Description
PATHWORKS for Macintosh	Integrated client/server software that includes VMS server software, Macintosh client applications, network connectivity software, and developer tools. PATHWORKS for Macintosh enables Macintosh and VMS users to share information and resources over DECnet and AppleTalk.
Packaged servers	Packaged server systems available for sites that do not have existing VMS or OS/2 systems. Each package contains the hardware, operating system, and client/server software required to integrate PCs. The package is easy to use because it is menu driven and does not require experience with DECnet or VMS. All packages require only PC experience for operation.

PATHWORKS products are discussed in more detail in the chapters that follow.

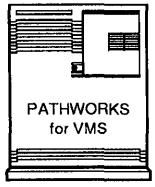
2

How the VMS Server Works

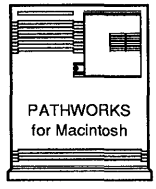
PATHWORKS provides software for two different VMS servers:

- PATHWORKS for VMS
- PATHWORKS for Macintosh

These two VMS servers can be installed on separate VAX computers or on the same VAX computer.



PATHWORKS for VMS allows VAX and MicroVAX computers running VMS to act as servers to DOS and OS/2 clients. The clients require either PATHWORKS for DOS or PATHWORKS for OS/2 software to access these services.



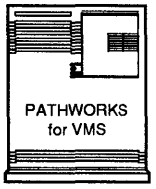
PATHWORKS for Macintosh is integrated server and client software that allows VAX or MicroVAX computers running VMS to act as servers to Macintosh clients. Macintosh clients also require PATHWORKS to access services.

When the same VAX computer is running both types of server software, Macintosh, DOS, OS/2, and VMS users can share resources, such as printers and files.

This chapter describes how the VMS servers:

- Provide file, printer, or disk services
- Provide system management tools
- Provide security mechanisms
- Work with networking software

File, Disk, and Printer Services



PATHWORKS for VMS provides file, disk, and printer services to DOS and OS/2 clients. By storing applications on a file or disk service, the system administrator can easily update users with the latest version of software.

The following services are created and managed with the PCSA Manager utility and are referred to in this section as PCSA services:

- File services provide access to files stored in directories on a VMS server.
- Disk services provide access to areas on a VMS server that are formatted as DOS disks.
- Printer services provide access to VMS print queues.

PATHWORKS for Macintosh provides VAXshare file and printer services. VAXshare file and printer software allows file and printer sharing between VMS and Macintosh users. VAXshare services can be integrated with PATHWORKS file services.

The following services are created and managed with the VAXshare Manager utility:

- File services provide access to files stored in directories on a VAXshare server.
- Printer services provide access to VMS print queues set up for Digital and Apple printers.

Both PATHWORKS for VMS software and PATHWORKS for Macintosh software can be installed on the same VAX computer. With certain restrictions, common areas can be created for file sharing. All clients supported by VMS file servers can share files and remote printers.

File Services

Both PATHWORKS and VAXshare file servers allow users to:

- Share files stored on a file service.

  Types of files that can be shared include text, data, binary, and executable files.

- Access applications stored on a file service.

  Individual users do not need to store an application on the client's hard disk.

For example, suppose a DOS user wants to use Microsoft Word to draft a document. This application is stored on an application file service on the VMS server.

With the USE utility, the DOS user connects to the file service. To the user, the service looks like a DOS drive.

To use the Microsoft Word application, the user selects the Microsoft Word directory on the file service and starts the application. Although the application is stored on the server, the application runs on the client and uses the resources of the client and not those of the VMS computer.

Data stored on a file service is accessible to VMS users and clients on local area networks (LANs) and wide area networks (WANs). Because several types of clients can share files stored on a VMS server, the file service is especially useful for sharing data and text files between clients and VMS users.

How file services appear to DOS and OS/2 users

File Services for DOS and OS/2 Clients

To the DOS and OS/2 user, file services look like additional DOS or OS/2 drives. Users can move between VMS file services and DOS drives by using DOS or OS/2 commands. In addition, clients can create, maintain, and delete files in a service just as they would in a local directory.

PATHWORKS for VMS provides the following types of file services:

- Application file service

  Stores application software and simplifies the management of applications because they are stored in one location.

  The service and the files stored in the service have the same protection.

- Common file service

  Contains data and text files that all users can share and update. For example, a common service can be used to store a spreadsheet file that more than one user needs to access.

  Files stored in a common file service can be individually protected.

- Personal file service

  Is a VMS user account that stores an individual user's DOS and VMS files.

- System file service

  Offers system software to clients using any supported transport. The system file service may include PATHWORKS for DOS, PC DECwindows Motif software, the SEDT editor, and the DOS operating system and utilities.

File Services for Macintosh Clients

How files services appear to Macintosh clients

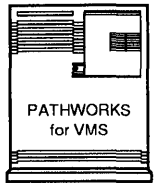
To the Macintosh user, a VAXshare file service looks like a Macintosh **volume**. A volume is a storage device that can be an entire disk or only part of a disk. It has a name and a directory that lists files. Users work within the Macintosh operating system and move between VAXshare volumes by using the Macintosh Finder application.

PATHWORKS for Macintosh provides a common file service to its clients. VAXshare volumes are created as common file services. Macintosh users can connect to a VAXshare volume and see its folders and files using Macintosh procedures. VMS users can set their default directories to the same disk or directory and access files using VMS methods.

Users can store application software, data and text files, and personal files in the volume.

Disk Services

Disk services are available only with PATHWORKS for VMS.



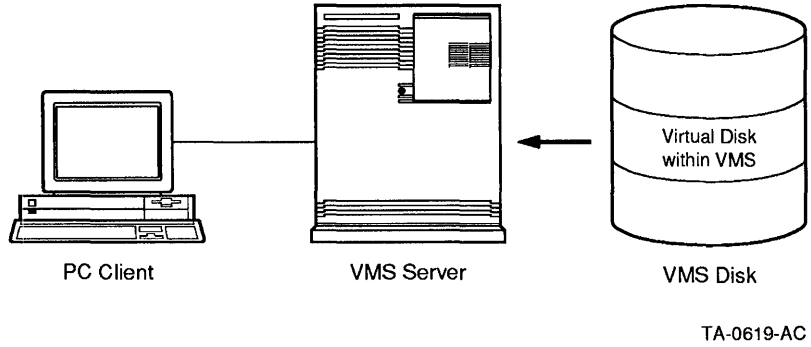
Disk services are available only to DOS and OS/2 clients in local area networks using LAD and LAST.

The disk server allocates a file on a VMS disk where clients can create, store, and maintain DOS and OS/2 files. Once the disk is mounted, it is offered as a service to clients.

Clients access the disk as though it were a local disk drive. This virtual disk contains DOS-formatted files only, so VMS users cannot access them directly. To VMS users, the disk service looks like one file. To access the individual files within the virtual disk, VMS users must use the PCDISK utility

A virtual disk is a DOS formatted area on a VMS disk, as shown in Figure 2–1.

Figure 2–1 How the Disk Server Works



Disk services have the following features:

- Access to a disk service is determined by how it is mounted. The disk service is mounted and made available with read-only or read-write access.

  Therefore, disk services can be set up to allow many users to read simultaneously from the same disk or to allow one user to read-write to the disk.
- Disk services contain only DOS or OS/2 formatted files.
- Disk services are available only in local area networks.

Disk services are best suited for:

- Libraries of stable files that many users access for reference, such as DOS application files, system utilities, and development tools. This type of service is set up with read-only access.
- Personal disks that are not shared between users. This type of service is set up with read-write access.

The following types of disk services are useful for purposes of system management:

- Application disk service

  Stores application software such as Lotus 1-2-3. With the appropriate application licenses, the system manager can copy an application to a virtual disk, offer it as a read-only service, and restrict the number of simultaneous users.

- Network key disk

  Contains the DOS operating system and other files necessary to boot a client over the network.

- Personal disk service

  Stores user-specific data. These disks are usually mounted for a single user and often require a password for access.

Choosing File Services or Disk Services

From the DOS or OS/2 user's perspective, file and disk services look alike because they both appear as drives. Disk services are assigned to specific drives depending upon the client configuration. File services are assigned to one or more remaining drives.

Table 2–1 describes which service is best suited for users' needs, based on their type of work.

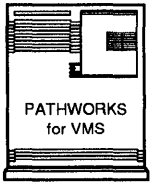
Table 2–1 Using File or Disk Services

Service Type	Use
Disk service	Available in LANs only. Multiple users have fast access to read-only disks.
	For personal files that are not intended for sharing. One user has read and write access to files.
File service	Available in LANs and WANs. For files that are shared between VMS, DOS, OS/2, and Macintosh users.
	For files that require simultaneous read and write access.

Printer Services

The VMS file server maintains the **printer services.** A printer service is useful because it:

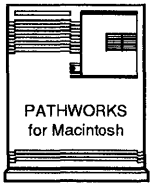
- Allows files to be printed in a remote location
- Allows central printer maintenance
- Coordinates the sharing of printers



A system manager assigns a VMS print queue name to each printer. With PATHWORKS for VMS, users can send print jobs directly to existing VMS print queues. The queue name becomes the printer service name. However, the system administrator needs to create a printer service for each additional **form** to be used with a printer. A form specifies the:

- Physical page layout, such as paper width or stock on which a file is printed
- Printing mode, such as landscape, portrait, or letter-quality (enhanced)

The system administrator uses the PCSA Manager Menu to define the printer services.



PATHWORKS for Macintosh provides Digital PostScript and Apple LaserWriter printer services to Macintosh and VMS users in the following ways:

- Macintosh users can send print jobs to Digital printers connected to a VAX computer.
- Macintosh users can send print jobs to Apple LaserWriter printers connected to a VAX computer.
- VMS users can send print jobs to Apple LaserWriter printers connected to a VAX computer.

Note

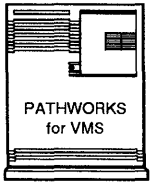
VMS users can continue to send print jobs to Digital printers by using standard VMS print commands. Macintosh users can continue to send print jobs to Apple LaserWriters that have not been defined by the VAXshare Manager.

System Management

The system administrator is responsible for managing services and users on the server. Depending on the server software, different tools are used for system management. The command syntax for managing PATHWORKS for VMS is similar to that for managing PATHWORKS for Macintosh.

PATHWORKS for VMS System Management

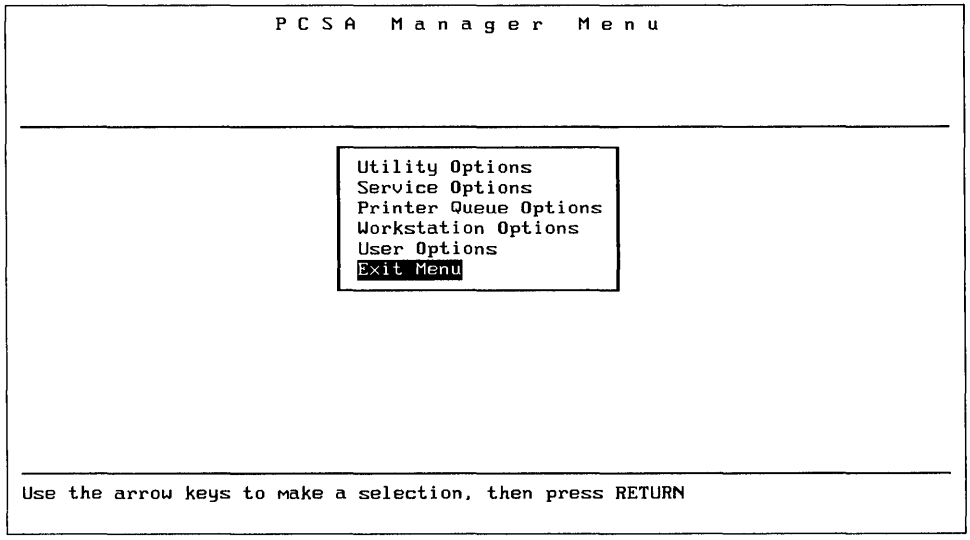
With PATHWORKS for VMS, the PCSA Manager Menu and PCSA Manager commands are the server management tools. They are used to manage servers and users. They are also used to control server configuration.



The PCSA Manager Menu is an easy-to-use, menu-driven utility. This menu is designed for managers who are familiar with DOS but who are unfamiliar with VMS. The menu provides screens for adding file, disk, and printer services and for setting up user accounts.

Figure 2–2 is an example of the main menu.

Figure 2–2 PCSA Manager Menu



The PCSA Manager commands provide additional and advanced functions unavailable with the menu. An advantage of PCSA Manager commands is that they can be included in VMS batch files.

Improving performance with PATHWORKS for VMS

The administrator can use the PCSA Manager to adjust network and server parameters to achieve efficient and reliable performance. Menu options are provided for monitoring the file server. The system administrator can collect data in an ASCII text file, evaluate server performance, and change parameters.

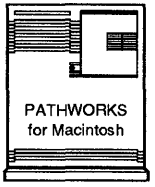
High levels of performance on the file server are achieved by using **cache memory**. Cache is physical memory on the VAX computer that can be accessed at high speeds.

The server stores files temporarily in cache memory. When a file is stored in cache, it can be reopened quickly because it does not have to be accessed from the disk.

The administrator can improve server performance by monitoring cache use, changing the cache size, and changing how the server uses the cache. The administrator can also manage cache size on the disk server.

PATHWORKS for Macintosh System Management

With PATHWORKS for Macintosh, the AppleTalk for VMS Manager and the VAXshare Manager are the tools provided for system administration.



The system administrator uses AppleTalk for VMS Manager commands to manage AppleTalk for VMS and the AppleTalk/DECnet Transport Gateway. Managing these components includes modifying the network configuration, and defining and changing how routing works on the VAX computer. Most of the network parameters are provided to improve performance or to reduce memory usage.

The administrator uses VAXshare Manager commands to add and manage volumes on VAXshare file servers, define user accounts, add and manage printer services, and add and modify file servers and their characteristics.

The manager requires some knowledge of the VMS Authorize utility to set up VMS user accounts. The system administrator also needs to understand some VMS print commands.

VAXshare commands also are used to control security and improve performance and memory usage for the file server.

Security

The ability to secure data is a major factor in determining whether to use file or disk services and how to configure clients. Several types of security controls are available with VMS servers including:

- VMS security including user accounts and User Identification Code (UIC) protection on files and directories. A UIC is a name or number assigned to you that identifies the type of access you have to files and other system resources.
- PATHWORKS security on servers

VMS Security Features

The VMS operating system provides sophisticated security mechanisms to control access. Many of these VMS security features are used by the server to restrict access and to protect files and directories. The following features are included with PATHWORKS for VMS and PATHWORKS for Macintosh:

- VMS user accounts, including user name and password

  In addition, when a client logs on to VMS using a terminal emulator, the client follows the same login procedure as a VMS user.

- Access Control Lists (ACLs), which define users' rights to access resources or services

- User Identification Codes (UICs)

  Each user has a UIC and each resource such as a file has an associated UIC. Access to resources is controlled by the relationship between the UIC of the user and the UIC of the resource.

- System privileges

  All users and files are assigned privileges according to the following protection code:

  - System: all users with system privileges
  - Owner: the user who created the file
  - Group: all users with the same group number in their UICs as the owner of the file
  - World: all users

  A log file alerts the system manager to security breaches.

PATHWORKS File and Disk Server Security

PATHWORKS provides additional security features for VMS servers.

Key security features provided by the server include:

- Separate listing of user information
- Listing of current connections, sessions, and services
- Support for Access Control Lists (ACLs) and UIC-based protection

VAXshare maps AppleShare security as closely as possible to the VMS security model. For more information on PATHWORKS for VMS security, see the PATHWORKS for Macintosh *Server Administrator's Guide*.

Networking Software

PATHWORKS for VMS supports DECnet and TCP/IP. PATHWORKS for Macintosh supports DECnet and AppleTalk for VMS.

DECnet Transport

PATHWORKS for VMS supports DECnet and TCP/IP.

The DECnet transport is used to provide file and printer services in LANs and WANs to all clients that connect to a VMS server running PATHWORKS for VMS or PATHWORKS for Macintosh.

TCP/IP Transport

File and printer services are offered to DOS clients that have installed the PATHWORKS for DOS (TCP/IP) product. With the appropriate bridges, TCP/IP also supports wide area networks.

In the TCP/IP network environment, support is provided for the following PATHWORKS features: terminal emulation, file, printer, broadcast, and receiver services.

AppleTalk for VMS

PATHWORKS for Macintosh supports AppleTalk for VMS.

PATHWORKS for Macintosh supports AppleTalk for VMS, which implements AppleTalk protocols in the VMS environment. With AppleTalk for VMS, VAXshare file and printer services are provided to Macintosh clients in LANs and WANs.

Macintosh clients can also connect to TCP/IP networks. Support is provided for the MacX server.

Communication Links

PATHWORKS for VMS supports the following communication links:

- Ethernet

  The Ethernet is a coaxial cable that connects clients, servers, printers, and other devices in a LAN. The Ethernet is typically used in department and office environments.

- Token Ring

  DOS clients and Q-bus VAXs running VMS can operate as DECnet nodes on an IEEE 802.5 Token Ring LAN.

- Asynchronous DECnet communications

  Asynchronous communications connect remote clients to a VMS server over telephone lines, over leased lines, or through a dial-up or integral modem.

3

How the ULTRIX Server Works

PATHWORKS for ULTRIX is the server software that allows VAX and RISC computers running ULTRIX to act as servers to DOS and OS/2 clients. By connecting to the ULTRIX server, clients can share information, system resources, and network services.

This chapter describes how the ULTRIX server:

- Provides file services
- Provides printer services
- Provides system management tools
- Provides security mechanisms
- Works with networking software

File Services

File services provide access to files stored in directories on the ULTRIX server. ULTRIX file services let users share files and access applications stored on a file service. In addition, by storing applications on a file service, the system administrator can update users with the latest version of software.

An example of sharing files between DOS users

For example, suppose you write a document using WordPerfect on your personal computer. Another worker needs to access and edit this document. By storing the file on a file service, both DOS users can easily share the file.

How file services appear to DOS and OS/2 users

With the USE command, the DOS or OS/2 user connects to the file service. To the user, file services look like standard DOS or OS/2 drives. Users can move between file services and drives by using DOS or OS/2 commands.

Several clients can write to a file at the same time. With byte-range locking, the contents of the file are protected from data corruption. For example, two DOS users can work on the same file stored on an ULTRIX server simultaneously.

The following types of file services are provided by the ULTRIX server:

- Application file service

  Simplifies the management of applications because they are stored in one place.

- Common file service

  Stores files that users need to share. For example, files from a spreadsheet application that more than one user needs to access can be stored in this type of service.

- Personal file service

  Is a user account on the server that generally is used to store private files. Each time an account is created for a user, a personal file service is automatically available.

- System file service

  Stores system software such as the DOS operating system.

If an ULTRIX user wants to edit a DOS file, the file needs to be converted. Because DOS and ULTRIX file formats are different, the ULTRIX user needs to convert the DOS file to the ULTRIX format before it can be read.

Two file conversion utilities provided by the ULTRIX server work with ASCII files. To use these utilities DOS users need to use SETHOST to log into their ULTRIX accounts. One utility (ult2dos) converts ULTRIX files to DOS or OS/2 formats; the other (dos2ult) converts DOS and OS/2 files to ULTRIX format.

If you have a CDROM player attached to your ULTRIX server, you can use ISO CDROMs from a read-only file service.

Printer Services

With PATHWORKS for ULTRIX, printer services enable PC users on the network to print files through the server. Users can send print jobs directly to ULTRIX print queues or printer services.

The ULTRIX server allows DOS, OS/2, and ULTRIX users to share printers connected to VAX or RISC computers. Clients can send files to a printer directly from DOS and OS/2 applications.

Using the PATHWORKS for ULTRIX Manager Menu, the system administrator can create a print queue. When you send a file to a printer, the file is placed in a printer queue. A queue collects the print jobs and assigns them to the appropriate printer on the server. Each queue is associated with a printer.

The client software directs the printer job to a defined printer queue. After creating a printer queue, the system manager can create a printer service and associate the queue with the service. Users can specify either a printer queue or service when sending files to shared printers.

Example of creating print queues

Managers can also create multiple printer services and associate each service with the same queue. You might want to do this if different groups need to access the same printer queue. For example, if a finance group and a personnel group need to access a printer queue called LA50_DOT_MATRIX, you could create a printer service called FINANCE_LA50 for the finance group and PERSONNEL_LA50 for the personnel group.

In addition, from the client workstation, a user can print a file and specify a printer form. The printer form determines the layout of the page such as the width. A form is not associated with any particular queue or service.

A parallel printer can be used as a printer service.

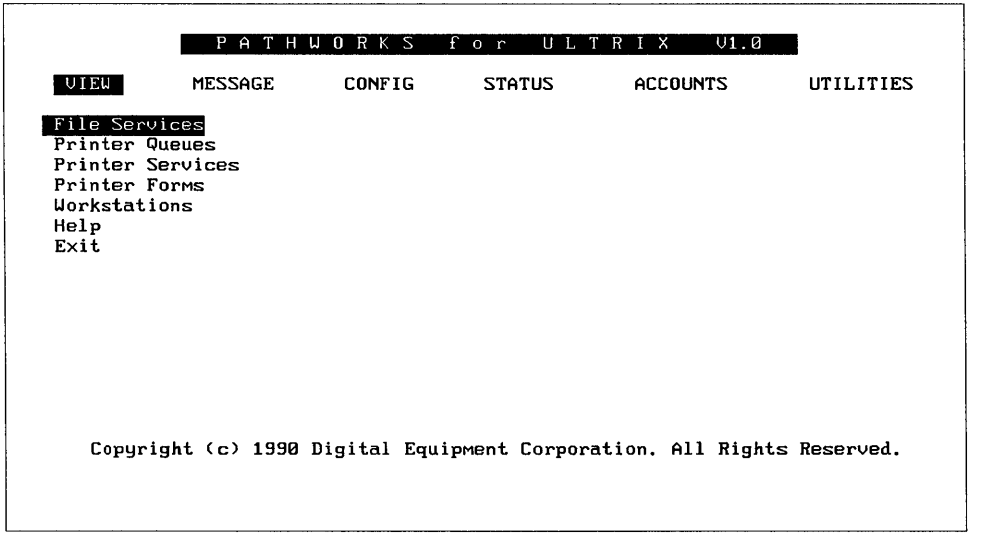
A parallel printer attached to a PC can be used by any client that can connect to a VMS print queue. For example, if you have a parallel printer in your office, you can offer it as a printer service to other users on the network.

System Management

The PATHWORKS for ULTRIX Manager Menu is an easy-to-use menu-driven tool that lets system managers control the server. The menu does not require ULTRIX knowledge and so system managers who are unfamiliar with ULTRIX can use the menu easily.

This PC-style interface has horizontal menus and pull-down submenus. When the manager chooses an item from the menu, a submenu pulls down automatically. The manager chooses options from the submenus to create services, register workstations and users, and manage the server. Online help also is available for each screen. Figure 3–1 is an example of the menu.

Figure 3–1 ULTRIX Manager Menu



The menu provides screens for setting up and managing the server, including:

- Registering workstations
- Creating groups and user accounts
- Adding and managing file and printer services and applications

- Modifying the server configuration
- Broadcasting messages
- Accessing ULTRIX utilities

  The system administrator can access ULTRIX utilities without exiting the Manager Menu.

Security

PATHWORKS for ULTRIX provides security features to control user access to files. The following are examples of access control:

Controlling Access to File Services

- The system manager can create a **common file service.**

  By default, all users have access to common file services. All users can connect to a common file service, and display, edit, and delete the files stored there.

- The system manager can create an **application file service.**

  When creating an application file service, the system manager associates a group of users with the application file service. By default, only members of that group can access the file service.

- The system manager can use the Manager Menu to change access to a file service.

Controlling Access to Files

- ULTRIX assigns access to a file when the file is created in or copied to a file service. Access is based on the defaults defined by the ULTRIX server. The system manager can change these defaults.

- The user can change access to a file that he or she creates.

  Although access to a file is assigned automatically by ULTRIX when a user creates it, the user can change the access. For example, the user can prevent other users from reading or editing the file.

  Users can change access to files in a file service through the DOS client utility, NET ATTRIB.

Assigning Permissions

Access is defined by **permissions** assigned to a file service and to any files created in or copied to the service. The ULTRIX server checks the permission assigned to the file service before letting a user connect to it.

Permissions assigned to files stored in the file service include:

- READWRITE—lets users display, edit, and delete files
- READONLY—lets users display, but not edit or delete files
- NOACCESS—prevents users from displaying, editing or deleting files

For each file, a permission is assigned to three classes of users:

- Owner—the user who creates the file or copies it to the file service
- Group—users who are members of the group that the system manager associates with the file service
- Other—users who are not members of the group that the system manager associates with the file service.

Note

Users can be assigned to several groups, but only one is the user's primary group. For example, a writer's primary group could be WRITERS. Other groups to which the writer is assigned could include EDITORS and ENGINEERS.

Maintaining Security

The system manager can maintain security by viewing the audit log file from the Manager Menu. The audit log file shows:

- Break-in attempts to server resources. For example, a user may try to access a personal file service without permission to do so.
- Permission violations. For example, a user may try to access a file without permission to do so.

Networking Software

PATHWORKS for ULTRIX supports DECnet and TCP/IP.

DECnet Transport

DECnet enables clients to access the ULTRIX server in wide and local area networks. DOS and OS/2 clients can connect to the server and access information from remote systems.

DECnet provides file and printer services to all clients connecting to the ULTRIX server. DECnet also supports Mail, ULTRIX applications, PC DECwindows Motif, terminal emulation, Microsoft Windows, Broadcast, and Receive.

TCP/IP Transport

TCP/IP lets users connect to the Internet to exchange data with the Internet, a group of regional and local networks at universities and commercial institutions.

TCP/IP protocols enable DOS clients to access the ULTRIX server. Support for file and printer services is provided to local area networks. With TCP/IP, support also is provided for mail, terminal emulation, PC DECwindows Motif, Broadcast, and Receive.

4

How the OS/2 Server Works

The same OS/2 system can be both client and server.

PATHWORKS for OS/2 allows personal computers running the OS/2 operating system to act as clients or servers. The same OS/2 system can function as both client and server. It can provide services to other personal computers and act as a client to access the services of VMS, ULTRIX, or OS/2 servers. See Chapter 6 for information on how the OS/2 client works.

Version 2.0 of PATHWORKS for OS/2 supports client and server operation over both Ethernet and Token Ring networks. It uses either DECnet, TCP/IP, or NetBEUI networking software. Over a TCP/IP network on Token Ring, OS/2 clients can access VMS and OS/2 servers directly, and they can access ULTRIX servers on Ethernet through a Proteon router. PATHWORKS for OS/2 provides limited support of IBM OS/2 Extended Edition V1.3 clients over DECnet and NetBEUI.

An OS/2 personal computer can be either a dedicated or a nondedicated server, providing file and printer services to DOS and OS/2 clients. A dedicated OS/2 server is used only to offer services to clients. A nondedicated server can be used concurrently as an OS/2 client.

PATHWORKS for OS/2 includes LAN Manager Version 2.0.

In addition to supporting PATHWORKS applications and utilities, such as printer services and mail, PATHWORKS for OS/2 includes Microsoft LAN Manager Version 2.0 software.

The LAN Manager server runs on 80286, 80386, and 80486 systems. OS/2 clients connecting to servers running PATHWORKS for OS/2 can access all LAN Manager services.

The LAN Manager 386 server supports the High Performance File Service (HPFS). This server provides the same functions as the basic LAN Manager but offers much faster performance. It also supports file names up to 256 characters, including special characters.

PATHWORKS for OS/2 supports all of the LAN Manager application programming interfaces (APIs).

Named Pipes, for example, is a LAN Manager API supported on DOS and OS/2 clients and servers, and on DOS clients using the Enhanced Redirector. Named Pipes saves time and memory by bypassing the filing procedure.

This chapter describes how the OS/2 server provides:

- File services
- Printer services
- Communication services
- Peer services
- System management tools
- Security mechanisms

File Services

With LAN Manager, the PATHWORKS for OS/2 server provides file services to DOS and OS/2 clients. A file service provides access to files and directories on a remote server.

LAN Manager has some specific naming conventions for network components. Network services are known as **shared resources**. Resources are stored on or physically connected to a server or other workstation on the network. For example, a printer connected to a server is a shared resource. LAN Manager also refers to file services as **shared directories**.

To the user, file services or shared directories look like DOS or OS/2 drives. Users access services using network commands. In addition, the LAN Manager screen lets users connect to resources without having to memorize commands.

The file server supports byte-range locking, which lets several users write to a file concurrently. Byte-range locking prevents simultaneous updating of the same section of a file when multiple users simultaneously write to a file.

Printer Services

Using printer services, DOS and OS/2 clients can send files to remote printers that are connected to an OS/2 server. LAN Manager calls printer services **shared printers**.

The system administrator can set up local and remote printers. Clients can copy a file directly to a printer or to a print queue. The queue collects the print jobs and then sends them to a printer service.

DOS clients can use DOS commands, and OS/2 clients can use OS/2 commands, to access printer services. In addition, both DOS and OS/2 clients can use the LAN Manager Screen to access printer services.

Communication Services

With LAN Manager, OS/2 clients have access to communication services. These services allow clients to access shared communication devices, such as modems and image scanners. Devices can only be accessed by one user at a time.

Users access communication devices attached to a server by using a **communication queue**. The queue stores requests for connections to a device. The queue submits a user's request for a device when it becomes available. While waiting for the connection, the user can switch to another OS/2 session and work on other tasks.

One device can receive requests from several queues and one queue can use several devices, such as modems.

Peer Services

Peer services provide one-on-one resource sharing without a server license.

With OS/2 LAN Manager **peer services**, an individual OS/2 workstation can act as a server and share its hard disk, printer, communication device, and applications with one other user at a time.

Any OS/2 computer that is configured as a peer server can offer its resources, such as a local printer, to one other OS/2 client. The advantage of the peer server is that it does not require a server license.

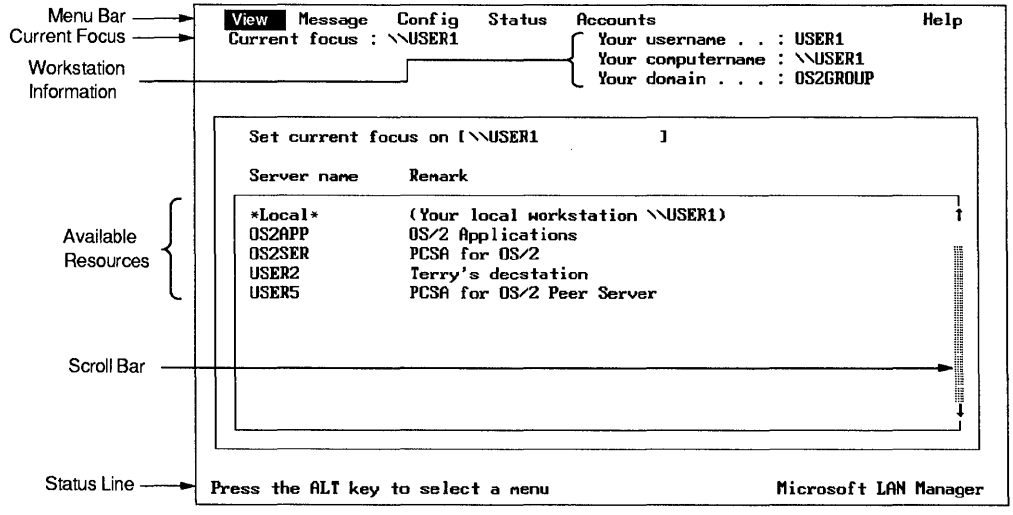
System Management

LAN Manager commands can be performed from a menu or from the command line.

The LAN Manager software includes a menu-driven application called the LAN Manager Screen. This application allows users to perform tasks without memorizing command syntax. The same tasks can be performed from the command line.

The NET ADMIN command brings up the administrator's version of the LAN Manager Screen, which the system administrator can use to manage the server. The system administrator can manage both local and remote OS/2 servers using this screen. Figure 4–1 shows an example of the LAN Manager Screen that displays the OS/2 servers.

Figure 4–1 LAN Manager Screen



Administrative privileges are required to use most of the NET ADMIN functions. However, with NET ADMIN, users can modify their user names and passwords on a LAN Manager server without system privileges. All other options depend on privileges assigned by the system administrator.

Administrative responsibilities include:

- Setting up clients and servers
- Sharing resources on servers
- Controlling access to resources by managing security
- Managing user accounts
- Adding new users and resources
- Broadcasting messages

In addition to using the LAN Manager Screen, all users can type commands at the command line to perform tasks. For example, to look at all OS/2 servers on the network, enter the following command:

```
[C:\] NET VIEW
```

Security

Security can be keyed on resources or on individual users.

LAN Manager provides security features that let administrators control access to shared resources. Servers can use either **share-level** or **user-level security**.

Share-level security protects a resource, such as a printer or file service, with a password. User-level security defines an individual's access to the resource. The network can include servers running either type of security.

Permissions are set for each resource, including a directory, file, print queue, and communication queue. Permissions define the types of actions the user can perform on the resource.

The default is share-level security. With share-level security, users who know the password can access the resource. All users get the same permissions.

User-level security controls each person's access to each shared resource. This kind of security is more restrictive because users need specific permissions to access resources.

Each user has an account. The account contains information about the user, including a user name and password. The user must type the name and password to access the server's resources. The system manager defines which users can access resources.

5

How the DOS Client Works

A DOS user can become a client that uses either DECnet or TCP/IP networking software. A DOS user can also use add-on software that connects the client to both PATHWORKS and Novell NetWare servers.

DOS clients can work with familiar DOS applications, use local resources, and access remote resources on the server. Users can choose to work with a DOS prompt or with a graphical user interface such as Microsoft Windows.

PATHWORKS for DOS

With PATHWORKS for DOS software, a DOS user becomes a client using DECnet and can connect to:

- A VAX computer running PATHWORKS for VMS over DECnet
- A VAX or RISC computer running PATHWORKS for ULTRIX over DECnet
- A personal computer running PATHWORKS for OS/2 server software over DECnet

PATHWORKS for DOS (TCP/IP)

With PATHWORKS for DOS (TCP/IP) software, a DOS user becomes a client using TCP/IP networking software and can connect over the Ethernet to:

- A VMS computer running PATHWORKS for VMS over TCP/IP
- A VMS or RISC computer running PATHWORKS for ULTRIX over TCP/IP

PATHWORKS for DOS (NetWare Coexistence)

PATHWORKS for DOS (NetWare Coexistence) lets clients connect to NetWare or PATHWORKS applications.

With the PATHWORKS for DOS (NetWare Coexistence) add-on option, a DOS user becomes a client that can operate Digital's PATHWORKS for DOS client software and Novell's NetWare client software concurrently on the same personal computer. With PATHWORKS for DOS (NetWare Coexistence) installed on your DOS PC, you can use NetWare commands to access NetWare file and printer services and PATHWORKS commands to access PATHWORKS file and printer services. A client with this dual capability is called a **coexistence client**.

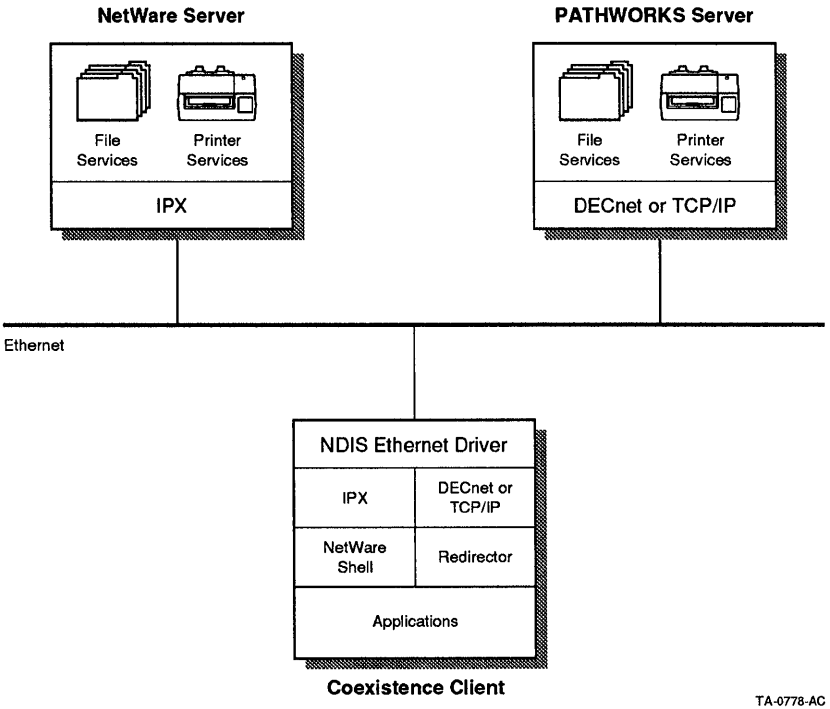
On a coexistence client you can "mix and match" NetWare and PATHWORKS applications. For example, you can use a NetWare print queue to print a file stored on a PATHWORKS server. Or you can use an application stored on a NetWare server to operate on data stored on a PATHWORKS server.

Each client uses its own software program to route requests to a server. The NetWare client uses commands in the NetWare shell (network software). The DOS client uses the Redirector, a PATHWORKS network component.

Each client software program also uses its own type of network protocol. NetWare uses the IPX protocol; PATHWORKS uses DECnet or TCP/IP.

Figure 5–1 shows how a coexistence client accesses NetWare and PATHWORKS servers.

Figure 5–1 How NetWare Coexistence Lets a Client Access NetWare and PATHWORKS Applications



Installing PATHWORKS for DOS Software

To install PATHWORKS for DOS software, you have two options: tapes (TK50 cartridge tapes or magtapes) or diskettes. Each offers its own advantages.

TK50 Cartridges or Magtapes

With a magtape or TK50 cartridge, you can complete the installation in one step.

TK50 cartridge kits or magtape kits are recommended for their ease of installation, which can be completed in one step. The PATHWORKS for DOS software is installed on the VMS or ULTRIX server. Then, using diskettes, you configure the client to make the initial connection to the server. Following the initial connection, you can customize client configurations using the PATHWORKS for DOS software on the server.

Diskettes

Diskettes let you install to a PC hard disk.

The diskette kit is *required* for:

- Installing PATHWORKS for DOS (NetWare Coexistence)
- Installing PATHWORKS for DOS to a local hard disk on a DOS client or to an OS/2 server

It is *recommended* for:

- Users who want to use DECnet-DOS only
- Users who want to use PC DECwindows Motif on ULTRIX or VMS systems, but do not need the capabilities of a VMS or ULTRIX server.
- Users who are installing on a PC using asynchronous communications at a remote location and do not have access to a server. Users who can connect to a server can select asynchronous DECnet with Netsetup.

Applications and Services

Depending on the server software and the networking software, DOS clients can access the following services:

- File services
- Disk services
- CDROM services
- LAN Manager services
- Printer services
- Mail
- System management
- Text editor
- Terminal emulators
- Support for X Window applications
- Support for Microsoft Windows Version 3.0
- Memory management
- Configuration utility
- Broadcast and Receive utilities

- Network management and file transfer tools
- Security

File Services

The DOS client can connect to file services on the ULTRIX, VMS, and OS/2 servers.

A **file service** provides many users with read-write access to applications at the same time. **Read-write** access is the ability to read an application file, and write to (edit) it, as well.

File services make files created on one type of client accessible to other types of users. For example, by storing files on a file service, PATHWORKS for Macintosh clients can share files with PATHWORKS for DOS clients.

File services are available through directories and subdirectories on the server. Over DECnet or TCP/IP on Ethernet, file services allow DOS clients access to files stored on remote servers. To the DOS user, file services look like local drives. Depending on the type of file service, users can control which of their files are accessible to others.

The system administrator sets up the following file services. You automatically connect to these file services when you log on:

- A **system file service**, such as PATHWORKS software and DOS system service.
- Your **personal file service**, which contains your DOS system and server files. Your personal file service is protected from other users by your user name and password.
- A **common file service**, which contains data and text files you can share and update with other users.

  Common file services can be set up so that certain users' access can be restricted. For example, a system administrator can specify that certain users can read, but not write to, the common file service.

- One or more **application file services** you frequently use.

  The administrator configures each DOS client to meet that individual user's needs. For example, User A requires access to the WingZ and WordPerfect file services, but User B requires access to the Microsoft Word and ORACLE file services. When these users display the services connected to their personal computers, the service names are different because the users are configured only for the services they need.

- A **printer service**, which enables you to print files. Printer services are described in detail later in this chapter.

Disk Services

Disk services are available to the DOS client only from the VMS server.

Disk services provide read-write access to one user at a time. Your system administrator can set up the following disk services that connect you automatically when the system boots:

- A **system disk service**, such as PATHWORKS software and DOS system service
- One or more **application disk services** you frequently use, containing an application such as Lotus 1-2-3, Excel, or Microsoft Word

PATHWORKS enables you to use other VMS disk services by creating a **virtual disk** on the server. The virtual disk appears as a VMS file on the server and allows a client to access it as though it were a local disk drive. To the client, it looks like a DOS formatted disk and is assigned a drive letter like other DOS disks.

Disk services are available from PATHWORKS for VMS servers running LAD and LAST. LAST (Local Area Systems Transport) makes access to files stored on virtual disks (LADs) as fast as using a local hard disk.

CDROM Services

CDROMs distribute read-only application software and documentation.

By adding the PATHWORKS for DOS (InfoServer) product to their network services, PATHWORKS for DOS users can take advantage of shared CDROM services offered on the InfoServer 100, an Ethernet-based high-performance virtual disk server. The InfoServer 100 offers access on local area DECnet networks to shared libraries of software, documentation, and training programs.

The CDROM applications on the InfoServer 100 are written in industry-standard formats such as High Sierra and ISO 9660.

LAN Manager Services

LAN Manager services are available to the DOS client with an OS/2 server.

DOS clients connecting to servers running PATHWORKS for OS/2 can access LAN Manager services. LAN Manager software provides a menu called the LAN Manager Screen that lets you manage connections to network resources.

Application Programming Interfaces

LAN Manager Version 2.0 or higher supports all of the LAN Manager application programming interfaces (APIs). An API is a standard or proprietary software interface to a network.

Named Pipes, for example, is a LAN Manager API supported on DOS and OS/2 clients and the OS/2 server. Named Pipes saves time and memory by bypassing the filing procedure.

Redirector

The redirector is the DOS software that interprets instructions for DOS drives and sends these instructions to remote network services. The redirector is selected in Netsetup, along with other network components.

PATHWORKS provides three redirector options:

- Basic Redirector
- Enhanced Redirector
- Enhanced Redirector with Full LAN Manager Version 2.0 or higher

Basic Redirector

The Basic Redirector responds to all PATHWORKS for DOS commands. It is recommended for the DOS client that connects only to a VMS or ULTRIX server. If you do not need full LAN Manager Version 2.0 or higher functions, you can save memory by using the Basic Redirector.

Through SETLOGON, the Basic Redirector can also connect DOS clients to an OS/2 server, which recognizes the Microsoft LAN Manager Version 1.0 file and print server commands. However, the Basic Redirector does not all functions such as Named Pipes for full LAN Manager Version 2.0 or higher.

Enhanced Redirector

The Enhanced Redirector recognizes all the PATHWORKS for DOS commands. In addition, it enables the DOS client to access servers such as PATHWORKS for OS/2 that offer full functionality for Microsoft LAN Manager Version 2.0 or higher, including Named Pipes. ULTRIX and VMS servers respond to Microsoft LAN Manager Version 1.0 file and print server commands.

When the DOS client is configured to use the Enhanced Redirector, the LAN Manager files needed to start the Redirector are copied to the client's local disk. The remainder are stored on the server.

Enhanced Redirector with Full LAN Manager Version 2.0 or Higher

The Enhanced Redirector with Full LAN Manager Version 2.0 or higher offers all the benefits of the Enhanced Redirector plus two added features:

- It automatically copies all LAN Manager files to the local disk containing your PATHWORKS software.
- It recognizes both PATHWORKS and Microsoft LAN Manager commands.

  You can use PATHWORKS commands to connect to ULTRIX and VMS services. You can also connect directly to LAN Manager services on the OS/2 server without using SETLOGON.

  PATHWORKS NET commands provide some functions not offered by LAN Manager. The Enhanced Redirector with Full LAN Manager Version 2.0 or higher provides separate executable files for the NET commands:

  - NET.EXE for LAN Manager Version 2.0 or higher NET commands
  - NETD.EXE for PATHWORKS for DOS NET commands

  To invoke the PATHWORKS functions, enter NETD instead of NET.

Printer Services

Printer services are available to the DOS client from all servers.

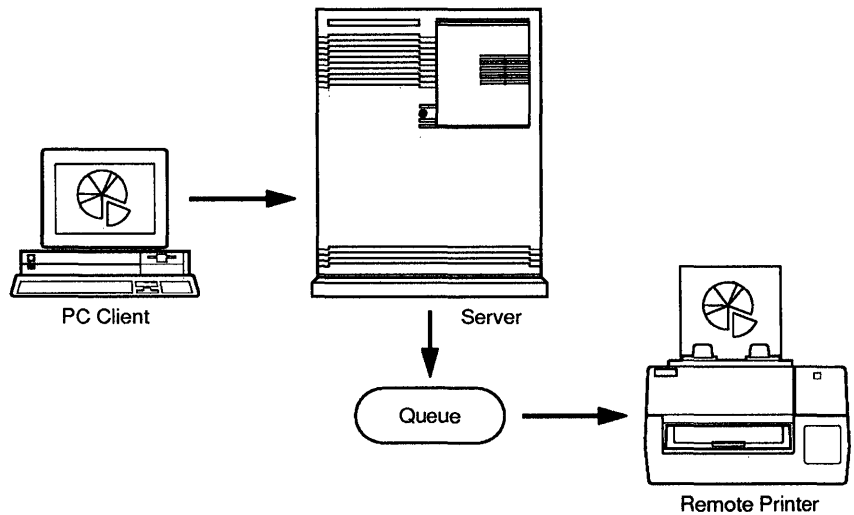
Printer services provide access to print queues on the network. Printers connected to servers on the network work as though they were attached directly to the client, as shown in Figure 5–2.

Printer services enable DOS, OS/2, Macintosh, VMS, and ULTRIX users to share printers. Users can print files on a remote printer connected to a host or terminal server on the network or to a local printer connected directly to the personal computer.

DOS clients also can make a local parallel printer attached directly to the personal computer available as a printer service. This capability is useful, for example, when you want to provide client access to a parallel printer.

Clients can send data or graphics files to the printer service from DOS applications, Microsoft Windows, PC DECwindows Motif, or a terminal emulator.

Figure 5–2 Printing from the DOS Client

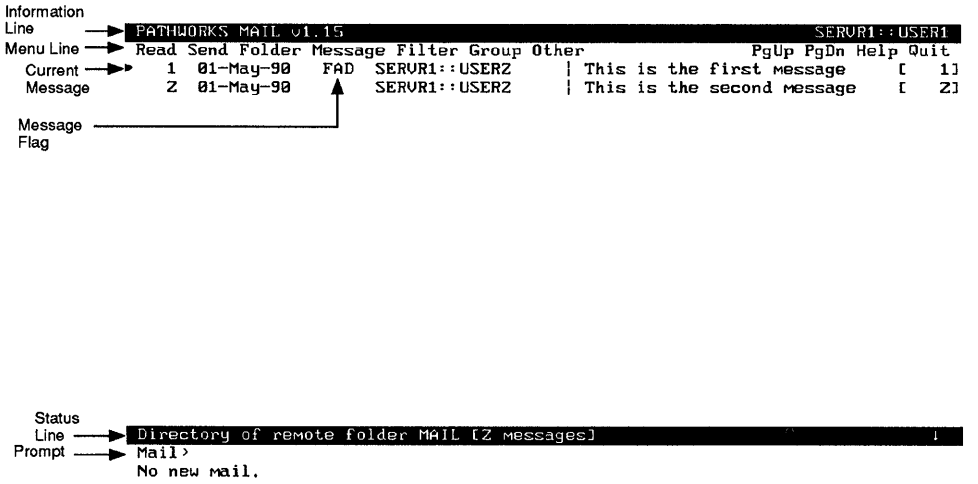


Mail

The Mail program lets you use electronic mail services on DECnet. You log on to a PATHWORKS mail server, a host computer set up by the system administrator to send and receive mail. You can then exchange mail with other PATHWORKS users on the network.

Like other DOS applications, Mail is started from the DOS prompt. A simple pull-down menu interface and mouse support are included. Figure 5–3 shows an example of a mail screen.

Figure 5–3 Mail Screen



Network Management and File Transfer Tools

PATHWORKS for DOS provides network management and file transfer tools, including:

- Network Control Program (NCP)

  With NCP, users can configure, monitor, and manage their local DECnet nodes.

- Local Area Transport Control Program (LATCP)

  With LATCP, DOS users can configure and manage a LAT transport.

Use LATCP to configure a local parallel printer as a LAT service.

- Network File Transfer (NFT)

  With NFT, users can transfer files to and from DECnet nodes that are not part of the PATHWORKS network.

- File Transfer Protocol (FTP)

  With FTP, users can transfer binary and text files to and from host computers that support TCP/IP.

- Address Resolution Protocol (ARP)

  With ARP, users can list Internet Protocol addresses and their corresponding Ethernet addresses for TCP/IP network nodes.

- PING

  With PING, a TCP/IP network troubleshooting tool, users can determine whether a specific node can be reached.

- NETSTAT

  With NETSTAT, users can see the status of the TCP/IP network.

Terminal Emulators

A terminal emulator is a program that allows a client to operate as if it were a terminal connected to a host computer. From your PC, you simply enter a command or make a window selection. Once you are in terminal emulation mode, you can use all the commands and conventions associated with the host computer.

The DOS client provides two terminal emulators:

- SETHOST at the DOS prompt for VT320 character cell emulation.
- VT320 from within Microsoft Windows Version 3.0. (For more information, read the section on Microsoft Windows later in this chapter.)

From the DOS prompt, SETHOST enables DOS users to establish up to four terminal sessions to host systems. Both SETHOST and VT320 for Microsoft Windows run over DECnet and TCP/IP.

DOS users can connect to the host using one of the following:

- Local Area Transport (LAT) over Ethernet

  Because LAT is used only with Ethernet, it does not use the complete DECnet protocol stack. Consequently, LAT connections are the fastest way to communicate with a host in a LAN.

  Before your personal computer can use LAT services, you need to add the name and address to the LAT service table, using the LATCP utility.

- Digital Command Terminal (CTERM), using DECnet

  CTERM uses the complete DECnet protocol stack and may be slower than LAT. However, CTERM provides wide area network capabilities to hosts that are outside the local area network.

  CTERM operates over Ethernet, Token Ring, and asynchronous DECnet communication links. CTERM is the only protocol supported by Token Ring for terminal emulation.

- Asynchronous communications through a serial port

  For personal computers without access to Ethernet or Token Ring, asynchronous communications are available. Connections can be made through the client's serial port to a terminal port on a remote VMS or ULTRIX system or to a terminal server.

- TELNET

  Over the Ethernet, TELNET lets users establish remote TCP/IP connections to other systems running the TCP/IP protocol.

Text Editor

SEDT is a full-screen text editor that provides useful editing functions. For example, SEDT enables users to use screen buffers and redefine function keys. SEDT is also the default editor for Mail.

Support for X Window Applications

PC DECwindows Motif turns a personal computer into an X terminal capable of accessing remote X Window applications, including DECwindows Motif.

DECwindows Motif is based on the X Window System, Version 11. DECwindows Motif provides:

- A desktop application environment that operates across VMS, ULTRIX, UNIX, and DOS operating systems
- A common window interface for these systems so that users can share a variety of applications

PC DECwindows Motif is an X server for 80286, 80386, and 80486 DOS-based personal computers. With PC DECwindows Motif, DOS users can connect to multiple remote X Window applications running on VMS or ULTRIX systems, or other UNIX systems.

For example, a user can display a DECwindows Motif application executing on a remote VMS system in one window and another X Window application executing on a remote ULTRIX system in a different window.

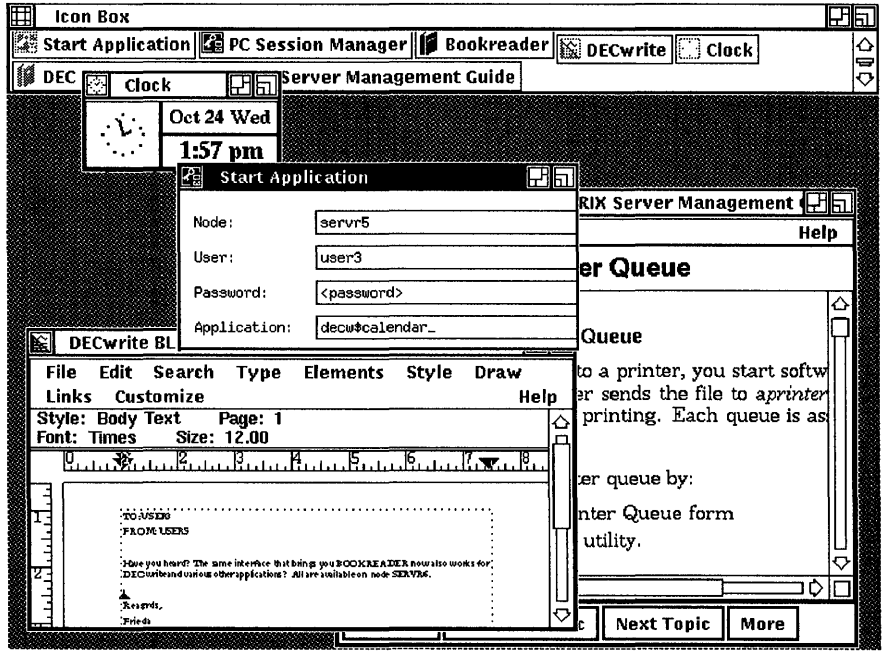
These applications can be used in a windowing environment as if they were running locally. DECnet and TCP/IP are supported by PC DECwindows Motif.

Some features of PC DECwindows Motif include the following:

- Support for a complete library of fonts
- Ability to suspend the PC DECwindows Motif session, execute DOS applications, and then resume the session
- PC Session Manager, which lets users start applications on remote systems
- Support for DOS extended memory

Figure 5–4 shows a sample PC DECwindows Motif screen.

Figure 5–4 Sample PC DECwindows Motif Screen



Support for Microsoft Windows Version 3.0

PATHWORKS for DOS and PATHWORKS for DOS (TCP/IP) provide support for Microsoft Windows Version 3.0.

Microsoft Windows is a third-party product that provides a graphical window-oriented user interface to DOS, to the applications that run on DOS, and to the network. Users can display multiple tasks in different windows on the screen and switch between tasks with a mouse or the keyboard. Users also can perform many of the same tasks they perform at the DOS prompt.

Without exiting Microsoft Windows, DOS clients can:

- Connect to PATHWORKS file, disk, and printer services
- Print files on local and remote printers
- Run DOS and Microsoft Windows applications stored on the client or a server

From within Microsoft Windows Version 3.0, you can use the VT320 terminal emulator, which enables your client to operate like a terminal connected to a host computer on Ethernet or Token Ring, running over DECnet or TCP/IP. This emulator provides LAT and CTERM support over DECnet on Ethernet, CTERM support over DECnet on Token Ring, and TELNET support over TCP/IP for local and wide area communications.

Microsoft Windows Version 3.0 on PATHWORKS supports drivers for the network, the keyboard, mouse, the DEPCA mouse, and several Digital printers. It also includes a Network File Transfer (NFT) utility for Microsoft Windows. NFT transfers files between two different operating systems.

Memory Management

PATHWORKS for DOS provides several techniques for making conventional memory available for DOS applications. Users can choose the solution that meets their own requirements.

- Network components can be loaded into expanded memory, making conventional memory space available for DOS applications. To load components into EMS, you need:
  - A user-supplied Expanded Memory Specification (EMS) Version 4.0 board and memory driver for 8088, 8086, and 80286 systems.
  - An EMS Version 4.0 memory driver for 80386/80486 systems
- The LAN Manager Basic Redirector or the LAN Manager Enhanced Redirector can be loaded into the high memory area (HMA) portion of extended memory with the Digital supplied driver, HIMEM.SYS, or a memory manager that supports the Extended Memory Specification (XMS) Version 2.06.
- If EMS or XMS is unavailable, PATHWORKS for DOS provides the user with the ability to unload network components. Then conventional memory space can be used for application software.

Using memory boards and managers

The requirements for using expanded memory depend on the specific type of processor being used.

With an 8086, 8088, or 80286 processor, an EMS Version 4.0 board that includes a software driver is required. Network components can be run from EMS and application software can be run from conventional memory.

With an 80386 or 80486 processor, an 80386 memory manager provides the best solution. A memory manager is a software driver that provides EMS Version 4.0 support without the need to install an EMS board.

PATHWORKS for DOS provides the MEMMAN utility to help DOS users manage memory usage on the personal computer. Refer to *Memory Solutions for Client Administrators* to learn more about conserving conventional memory.

Configuration Utility

The Netsetup utility configures DOS personal computers to use the PATHWORKS network. Typically, the system administrator uses Netsetup, but it is available to any DOS client user.

By responding to a series of Netsetup prompts, you provide the information used to create or edit a **client profile**. A client profile defines how a personal computer connects to specific network services.

Broadcast and Receive Utilities

The Broadcast utility lets clients and servers send messages to other network users. The Receive utility clients store and read messages sent by clients and servers.

Security

From the DOS client, users and system administrators can use the NET ATTRIB command to set and change permission to access files stored on VMS and ULTRIX servers. With NET ATTRIB:

- Users can set Record Management Service (RMS) protection on files and display file protection
- System administrators can grant file access to selected users by means of an access control list (ACL)

Summary of Services for DOS Clients with DECnet

Table 5–1 summarizes the list of services available to DOS clients with DECnet on Ethernet.

Table 5–1 Services Offered to DOS Clients with DECnet

With the VMS Server	With the ULTRIX Server	With the OS/2 Server
File, printer, disk	File, printer	File, printer
Local and remote boot	Local boot	Local boot
Mail	Mail	Mail
Terminal emulation	Terminal emulation	–
SEDT editor	SEDT editor	SEDT editor
X Window displays[1]	X Window displays[1]	–
Microsoft Windows V3.0	Microsoft Windows V3.0	Microsoft Windows V3.0
Asynchronous support	Asynchronous support	Asynchronous support
Broadcast/Receive	Broadcast/Receive	Broadcast/Receive
NDIS support[2]	NDIS support[2]	NDIS support [2]

[1]To use this component, you do not need a server.

[2]PATHWORKS for DOS supports Ethernet controllers that are equipped with an NDIS (Network Driver Interface Specification V1.0) driver.

Summary of Services for DOS Clients with TCP/IP

Table 5–2 summarizes the list of services available to DOS clients with TCP/IP on Ethernet.

Table 5–2 Services Offered to DOS Clients with TCP/IP

With the VMS Server	With the ULTRIX Server	With the OS/2 Server
File, printer	File, printer	File, printer
Local boot	Local boot	Local boot
–	Mail	Mail
Terminal emulation	Terminal emulation	Terminal emulation
SEDT editor	SEDT editor	SEDT editor
X Window displays[1]	X Window displays[1]	–
Microsoft Windows V3.0	Microsft Windows V3.0	Microsoft Windows V3.0
Broadcast/Receive	Broadcast/Receive	Broadcast/Receive
NDIS support[2]	NDIS support[2]	NDIS support

[1]To use this component, you do not need a server.

[2]PATHWORKS for DOS supports Ethernet controllers that are equipped with an NDIS (Network Driver Interface Specification V1.0) driver.

6

How the OS/2 Client Works

PATHWORKS for OS/2 allows an OS/2 system to function as both a server and a client. Read Chapter 4 in this guide for more information on the OS/2 server.

OS/2 clients can access VMS, ULTRIX, and OS/2 servers.

PATHWORKS for OS/2 client software integrates OS/2 clients into the PATHWORKS environment. OS/2 users can use applications stored on OS/2, ULTRIX, or VMS servers, and can communicate with other OS/2, DOS, ULTRIX, and VMS users. PATHWORKS for OS/2 supports DECnet, TCP/IP, and NetBEUI networking software.

This chapter describes the key features and functions available to an OS/2 client. Depending on the server software, OS/2 clients can use:

- Mail
- Text editor
- Connections to network services
- Terminal emulation
- Network management tools
- Transfer of files to other DECnet or TCP/IP nodes
- File services
- Printer services
- Disk services
- LAN Manager services
- Broadcast and Receive utilities

Mail

The Mail utility lets users send and receive messages, including binary and text files, and store them on a local hard disk or in a directory on the Mail server. Mail is available from all servers except VMS servers running TCP/IP networking software.

Text Editor

SEDT is the default screen editor for PATHWORKS. It is a full-screen editor that provides editing and text functions. It is also available as the default editor for Mail.

Connections to Network Services

Clients can connect to servers, services, and applications with the USE utility or the LAN Manager Screen. The LAN Manager Screen is a menu-oriented interface provided with the LAN Manager software that allows users to perform tasks without memorizing command syntax. LAN Manager also provides NET commands that let users manage network tasks from the command line.

OS/2 clients connecting to servers running PATHWORKS for OS/2 can access LAN Manager services. LAN Manager provides file, printer, and communication services. Communication services include modems, plotters, and images scanners that can be shared by clients. These services let a single user view, connect to, and delete requests from shared communication devices.

PATHWORKS for OS/2 supports all of the LAN Manager application programming interfaces (APIs). Named Pipes, for example, is one popular LAN Manager API supported on OS/2 clients and servers, and on DOS clients using the Enhanced Redirector.

Terminal Emulation

OS/2 clients use the SETHOST utility for terminal emulation.

The SETHOST terminal emulator lets an OS/2 client operate like a VT320 terminal. Each time SETHOST is used to log on to a VMS or ULTRIX account, a network connection is established. SETHOST uses the TELNET protocol over TCP/IP, the CTERM protocol over DECnet, or the LAT protocol directly on Ethernet networks to connect to servers.

Network Management Tools

PATHWORKS for OS/2 and PATHWORKS for OS/2 (TCP/IP) provide a full set of network management tools, including:

- DECnet utilities
  - Network Control Program (NCP)

    NCP is used to locate, manage, and configure network nodes. For more information on NCP, see the *DECnet Network Management Guide.*
  - Local Area Transport Control Program (LATCP)

    LATCP is used to manage and configure the Local Area Transport. For more information on LATCP, see the *Client Commands Reference.*
  - File Access Listener (FAL)

    FAL enables another user on the network access files on your local disk. For more information on FAL, see the *DECnet User's Guide.*
- TCP/IP utilities
  - PING

    PING is a utility that lets you know whether a specific node can be reached.
  - NETSTAT

    NETSTAT is used to show the status of a TCP/IP network.
  - Address Resolution Protocol (ARP)

    ARP is a utility that lists the hardware (or IP) addresses and the corresponding Ethernet addresses of nodes on the Internet.

File Transfer

With Network File Transfer (NFT), you can transfer files to and from any DECnet node. For more information on NFT, see the *DECnet User's Guide.*

With File Transfer Protocol (FTP), you can transfer binary and text files to and from any host computer that supports TCP/IP.

File Services

A file service lets OS/2 clients connect to directories and files stored on a remote server. On the server, the service looks like a directory. To the client, file services look like local OS/2 drives. File services from VMS, OS/2, or ULTRIX servers are available to OS/2 clients.

Printer Services

A printer service lets clients direct print jobs to printers connected to servers. Printer services from VMS, OS/2, and ULTRIX servers are available to OS/2 clients.

Disk Services

A LAD is a virtual disk with single-user write access.

OS/2 clients can access disk services stored on a VMS server running PATHWORKS for VMS. Disk services provide access to space on a VMS server formatted as a DOS or OS/2 disk. This space, known as a local area disk (LAD) or virtual disk, allows fast read-write file access from one user only. Other users have read-only access to the LAD. Disk services are available only from a VMS system running the LAST transport and PATHWORKS for VMS.

Broadcast and Receive Utilities

The Broadcast utility lets clients and servers send messages to other network users. The Receive utility lets users receive messages sent by clients and servers.

Functions Available to OS/2 Clients

Clients can access the services offered by PATHWORKS for VMS, PATHWORKS for OS/2, and PATHWORKS for ULTRIX using DECnet or TCP/IP. In addition, clients can access PATHWORKS for OS/2 services using the NetBEUI network protocol. Table 6–1 lists the functions and services available.

Table 6–1 Services Offered to OS/2 Clients

With the OS/2 Server (DECnet, TCP/IP, and NetBEUI)	With the VMS Server (DECnet)	With the VMS Server (TCP/IP)	With the ULTRIX Server (DECnet and TCP/IP)
File, printer, communication	File, printer, disk	File, printer	File, printer
Local boot	Local boot	Local boot	Local boot
Mail	Mail	–	Mail
–	Terminal emulation	Terminal emulation	Terminal emulation
SEDT editor	SEDT editor	SEDT editor	SEDT editor
LAN Manager	–	–	–
NDIS support[1]	NDIS support[1]	NDIS support[1]	NDIS support[1]

[1]PATHWORKS for OS/2 supports most Ethernet or Token Ring controllers that are equipped with an NDIS (Network Driver Interface Specification V1.0) driver. However, because individual vendors' interpretations of the specification may vary, some may not function in Digital's PATHWORKS for OS/2 network environment.

IBM OS/2 Extended Edition Clients

IBM does not support NDIS with Token Ring hardware, and provides limited support for Ethernet. Therefore, Extended Edition (EE) V1.3 clients can access only the following two configurations:

- A PATHWORKS for OS/2 server, installed on a workstation running OS/2 Standard Edition (SE), over Token Ring

  EE clients on a Token Ring can access PATHWORKS for OS/2 servers only. The server must be running NetBEUI networking software. EE clients on a Token Ring cannot access PATHWORKS for VMS or ULTRIX servers.

- Any PATHWORKS server over Ethernet (using DECnet, LAD/LAST, or LAT networking software)

  LAD/LAST and LAT networking software are not supported on Token Ring. EE clients on a Token Ring cannot run DECnet as well.

There may be other limitations to the network services available to IBM OS/2 EE clients. Refer to the PATHWORKS for OS/2 *Installation and Configuration Guide* for more information.

7

How the Macintosh Client Works

This chapter describes how Macintosh clients are integrated into the network. Macintosh users can share files, printers, and network resources with DOS and VMS users without changing the desktop environment to which they are accustomed.

The sections in this chapter describe the features and functions available to a Macintosh client, including:

- VAXshare file services
- VAXshare printer services
- Database services
- X Window display services
- Terminal emulation
- Mail services
- Network connectivity, including AppleTalk for VMS, the AppleTalk/DECnet Transport Gateway, DECnet for Macintosh, and the Macintosh Communications Toolbox

VAXshare File Services

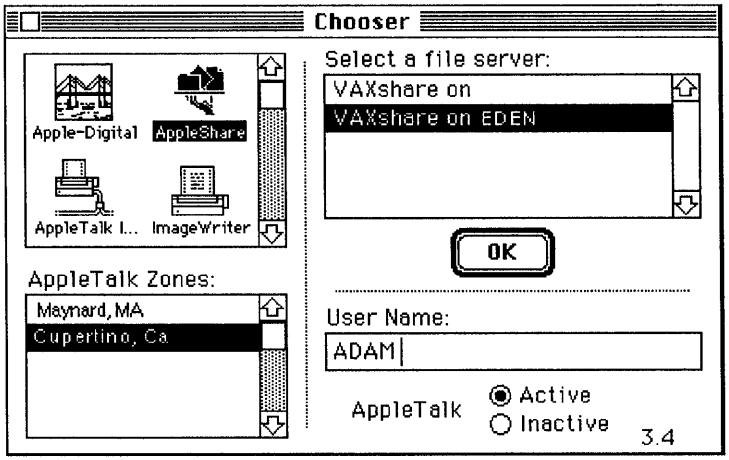
VAXshare file services enable Macintosh users to store, access, and share files on VAX computers. VAXshare services also make VMS files and Digital printers available to Macintosh users. By using VAXshare file services, Macintosh users gain increased file storage, improved data integrity because of operator backups, and access to information and applications through local and wide area networking.

Because VAXshare file services comply with the Apple Filing Protocol (APF V2.0), AppleShare and VAXshare file services can be used interchangeably. Macintosh files can be stored on VAX systems and accessed as easily as if they were stored on the Macintosh computer.

For example, you can mount both AppleShare and VAXshare file services on your desktop at the same time. Your Macintosh computer can act as a client to VAXshare and AppleShare file servers.

Figure 7–1 shows a Macintosh user making a connection to a VAXshare file server using the familiar Chooser desk accessory.

Figure 7–1 Choosing a VAXshare File Service



VAXshare file services provide transparent file sharing between Macintosh and VMS users. Just as VMS users create directories to organize files and other directories, Macintosh users create folders to organize files and other folders. Related folders and files are stored in a volume. Each volume served by a VAXshare file server maps directly to a VMS device and directory.

To make VMS directories and files accessible to Macintosh clients, the system manager adds a volume to the VAXshare file server. Volumes can be added for the following purposes:

- To make an existing VMS directory available as a Macintosh volume
- To provide a new directory
- To store files for popular applications such as spreadsheets and word processors

If PATHWORKS for VMS is running on the same VAX computer as VAXshare software, then Macintosh, VMS, DOS, and OS/2 users can share the same directories and files.

The following sections include:

- An example of file sharing
- A brief description of VAXshare security

An Example of File Sharing Between DOS and Macintosh Users

An example of file sharing between DOS and Macintosh clients

Suppose you use the Excel application on your Macintosh computer to compile statistics for part of the corporate budget. Another worker on the same project uses Lotus 1-2-3 running on a DECstation 316 to compile a different set of statistics.

The corporate database files are stored on a VAX computer with the 20/20 spreadsheet application. By storing the corporate files in a common file service, both workers can extract information from 20/20.

The data then can be read into an Excel spreadsheet on the Macintosh. The DOS user can also transfer the Excel spreadsheets and merge them into Lotus files.

VAXshare Security

VAXshare file services provide VMS security. When Macintosh files are stored on a VAXshare server, the files use the VMS security system. Your system administrator can set up passwords for each VAXshare volume. Then you gain access to a VAXshare file service by using the Chooser desk accessory to select a service and logging in with a VMS account name and password.

VAXshare also supports VMS Access Control Lists (ACLs). ACLs give the system manager the ability to determine for each user the access to a particular file or directory and to determine the type of access that user receives.

VAXshare Printer Services

VAXshare printer services enable Macintosh and VMS users to share Digital PostScript printers networked to VMS systems as well as Apple LaserWriter printers connected to AppleTalk networks.

VAXshare printer services are set up by the system manager to make Digital PostScript printers available to Macintosh clients and to make Apple LaserWriters available to VMS users.

VAXshare printer services use standard VMS print queues and allow Macintosh applications to spool to those queues. VMS users access VAXshare print queues in the same way they access other VMS print queues, by using the DCL PRINT command.

Macintosh users select VAXshare printer services from the Chooser menu. Macintosh users can share network printers with other Macintosh clients, with DOS and OS/2 clients, and with VMS terminal users.

Database Services

Apple's Data Access Language (DAL) software lets users of Macintosh applications access VMS relational databases. DAL software must be installed on both the client and the server.

Any application that is compatible with DAL, such as Excel, can access information from local or remote databases stored on a VAX computer. Suppose, for example, that you need to write reports using sales information stored on a remote Rdb/VMS database on a VAX computer. With DAL you can transfer data from the database to an Excel spreadsheet on your Macintosh computer.

X Window Display Services

The MacX server is the Macintosh implementation of the X Window system. This system allows users to access applications and use them through windows that look like Macintosh windows. MacX lets Macintosh users access applications that run on remote hosts. Using MacX, for example, Macintosh users can access applications like DECwindows Motif on VAX computers running VMS or ULTRIX.

The MacX server works with several transports, including AppleTalk, DECnet, and TCP/IP.

MacX can be used as a full screen DECwindows Motif window or as part of the standard Macintosh desktop environment. Users can access information simultaneously from DECwindows Motif and Macintosh applications. MacX displays each DECwindows Motif application that you open in its own window. Each application can also create its own windows.

For example, you can run Microsoft Word on your Macintosh computer and use MacX to start DECwrite in another window. Then you can cut information from one application and paste it into another.

You can also cut and paste information between Macintosh, DECwindows Motif, and VMS applications.

Table 7–1 lists some of the DECwindows Motif applications you can access with MacX.

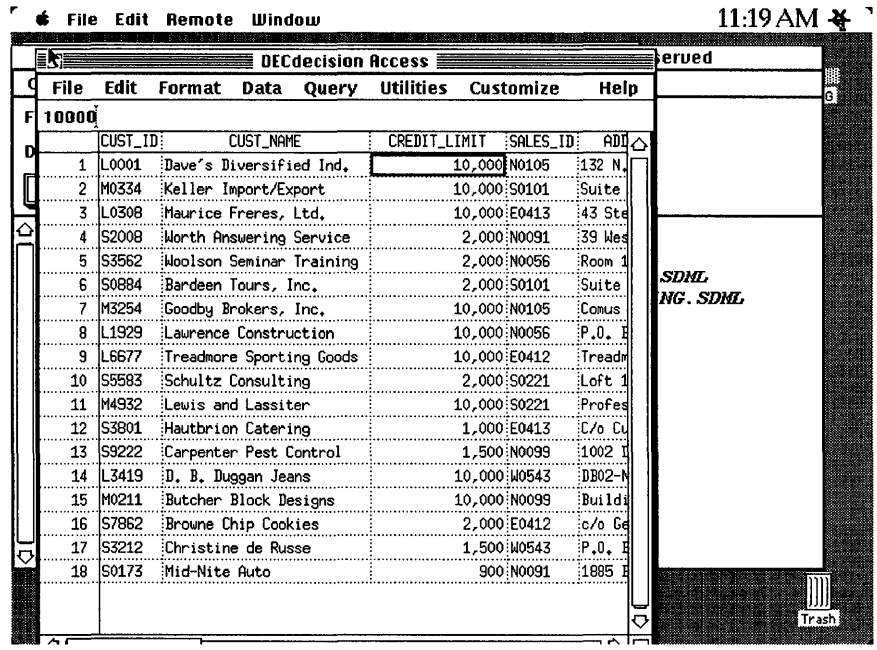
Table 7–1 DECwindows Motif Applications

Application	Description
Bookreader	Lets you read VMS DECwindows books online.
Calculator	Lets you perform simple arithmetic functions.
Calendar	Provides a method of scheduling appointments and planning work.
Clock	Displays the time and date.
Mail	Allows you to communicate online with other users.
Notepad	Provides basic text editing capabilities.
DECterm	Displays a window that functions like a VT300-series terminal.

The MacX server also supports DECwindows Motif fonts, and monochrome and 8-bit-color X client applications.

Figure 7–2 shows a Macintosh client connecting to a DECwindows Motif application using the MacX server.

Figure 7–2 MacX Software with DECwindows Application Display



Terminal Emulation

MacTerminal Version 3.0 software is a VT320 terminal emulator application that turns a Macintosh computer into a multiple-session terminal for communications with host computers. With MacTerminal, you can access terminal-based applications over the DECnet network.

For example, by using MacTerminal, you can:

- Connect to another computer over telephone lines by using a modem
- Display information from a VAX computer
- Establish several connections at the same time

MacTerminal is based on the Macintosh Communications Toolbox. By using the connection tools in the Macintosh Communications Toolbox, MacTerminal provides multiple high-speed terminal sessions over Ethernet.

For example, MacTerminal can use the LAT tool to provide local terminal emulation and the CTERM tool to provide terminal emulation capabilities in a wide area network (WAN).

Mail

The Mail for Macintosh program lets you use electronic mail services on Digital networks. Using Mail for Macintosh, you log on to a PATHWORKS mail server, a host computer set up by the system administrator to send and receive mail. You can then exchange mail with other PATHWORKS users on the network.

Network Connectivity

With PATHWORKS for Macintosh client, the basic connectivity features are:

- AppleTalk for VMS and the AppleTalk/DECnet Transport Gateway
- The Macintosh Communications Toolbox
- DECnet for Macintosh

AppleTalk Networking

AppleTalk for VMS Version 3.0 implements AppleTalk Phase 2 protocols on the VMS operating system. With AppleTalk for VMS, a VAX computer can participate in an AppleTalk **internet** and a Macintosh computer can access the VMS environment. An Apple internet is a grouping of two or more distinct networks connected with a router.

How Macintosh users work with DECnet tunnels

With AppleTalk for VMS, a VAX computer can serve as an AppleTalk internet router to connect Ethernet local area networks. A DECnet link can be used to connect two or more geographically separate AppleTalk internets.

The connection is made through a **DECnet tunnel**. The DECnet tunnel uses the DECnet logical link to connect two routers. A DECnet path must exist between the two ends of the tunnel but it does not have to be a direct path.

Using a DECnet tunnel, a Macintosh user located in one city can share files and printers with a Macintosh user located in another city hundreds of miles away.

The AppleTalk/DECnet Transport Gateway

The AppleTalk/DECnet Transport Gateway translates AppleTalk and DECnet protocols and provides reliable connections between the networks. The gateway enables Macintosh developers to design applications that use DECnet software.

Macintosh Communications Toolbox

The Macintosh Communications Toolbox is software that enables Macintosh users to access communications services, such as terminal emulation. The Toolbox provides standard application programming interfaces (APIs) for networking, terminal emulation, and file transfer.

For example, the LAT tool allows developers to provide terminal emulators that use Digital's Local Area Transport (LAT) technology.

The tools provided as part of the Communications Toolbox for the Macintosh client include terminal emulation tools, connection tools, and file transfer tools.

These tools include the following:

- AppleTalk Data Stream Protocol tool for AppleTalk connections
- DECnet tool for direct DECnet connections
- Transport Gateway Access Tool for connection through the AppleTalk/DECnet Transport Gateway
- MacTCP tool for TCP/IP connections
- CTERM tool for wide area terminal emulation
- VT320 tool for VT320 terminal emulation
- LAT tool for high-speed Ethernet connections to a host
- Asynchronous tool for serial line connections
- Modem tool

DECnet for Macintosh

DECnet for Macintosh enables Macintosh clients to participate as end nodes in a DECnet network. This means that connections can be made from the Macintosh client to any DECnet node. With asynchronous connections, Macintosh clients also can connect to DECnet nodes over telephone or dedicated serial lines.

You can use DECnet to transfer files among Macintosh, DOS, and ULTRIX users. For example, a small company has a DECstation 5000, which is a RISC-based workstation running ULTRIX. Workers use Macintosh computers and IBM personal computers to do their work. With DECnet, all users can exchange information with each other by sending data from one computer's hard disk to the other computer's hard disk.

With DECnet for Macintosh, users can:

- Make CTERM connections with a terminal emulator
- Transfer files between the Macintosh client and any DECnet node, including ULTRIX and VMS systems
- Execute command files anywhere on the network
- Manipulate files to and from Macintosh and other DECnet systems

A

Summary of Server Functions

Summary of Server Functions

Different combinations of services and networking software are available on different PATHWORKS servers. For example, file and printer services are available on all PATHWORKS servers; disk services, however, are available only on VMS servers.

The following tables help to distinguish the functions supported by various servers, according to communication link (Ethernet, Token Ring, or asynchronous DECnet) and networking software (DECnet, AppleTalk, TCP/IP, or NetBEUI).

Table A–1 PATHWORKS Server and Networking Software Functions on Ethernet Networks

	VMS			ULTRIX		OS/2		
	DECnet	AppleTalk	TCP/IP	DECnet	TCP/IP	DECnet	TCP/IP	NetBEUI
File/printer services	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Disk services	Yes	No	No	No	No	No	No	No
Security	VMS	VMS	VMS	ULTRIX	ULTRIX	LAN Mgr	LAN Mgr	LAN Mgr
Local boot	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Remote boot	Yes	No	No	No	No	No	No	No
System management	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table A–2 PATHWORKS Server and Networking Software Functions on Token Ring Networks

	VMS[1]			ULTRIX		OS/2		
	DECnet	AppleTalk	TCP/IP	DECnet	TCP/IP	DECnet	TCP/IP	NetBEUI
File/printer services	Yes	No	No	No	No	Yes	Yes	Yes
Disk services	No	No	No	No	No	No	No	No
Security	VMS	No	No	No	No	LAN Mgr	LAN Mgr	LAN Mgr
Local boot	Yes	No	No	No	No	Yes	Yes	Yes
Remote boot	No	No	No	No	No	No	No	No
System management	Yes	No	No	No	No	Yes	Yes	Yes

[1]Token Ring is supported on a Q-bus VAX running VMS

Table A–3 Server and Networking Software Functions Available to a Client Using an Asynchronous Connection

	VMS			ULTRIX		OS/2		
	DECnet	AppleTalk[1]	TCP/IP	DECnet	TCP/IP	DECnet	TCP/IP	NetBEUI
File/printer services	Yes	Yes	No	Yes	No	Yes	No	No
Disk services	No	No	No	No	No	No	No	No
Security	VMS	VMS	No	ULTRIX	No	LAN Mgr	No	No
Local boot	Yes	No	No	Yes	No	Yes	No	No
Remote boot	No	No	No	No	No	No	No	No
System management	Yes	Yes	No	Yes	No	Yes	No	No

[1]Through Macintosh Toolbox

Glossary

PATHWORKS Glossary

The terms that appeared in the text of this book in **boldface** are explained in this glossary. Additional computer-related terms are also explained here.

386 driver (n.)

See *386 memory manager.*

386 memory manager (n.)

A software program that manages the allocation of all personal computer memory types. It is based on the Intel 80386 microprocessor.

access (v.)

To use a resource, such as a printer, directory, or disk drive.

access control (n.)

The mechanism for validating the right to use a resource or service, such as a connection, logon, or file access, stored on or connected to a server. A user name and password combination is the most common means of access control.

access control entry (ACE) (n.)

In a VMS access control list (ACL), one identifier and its associated access rights to a service or resource. See also *access control list.*

access control list (ACL) (n.)

In the VMS environment, a list that defines users' rights to use a resource, file, or service.

account (n.)

A set of information on a computer system that allows users access to a multiuser or networked computer. It includes the user's name, often a password, other identifiers, a list of services and privileges the user is allowed, and files belonging to the user.

ACE (n.)

See *access control entry.*

ACL (n.)

See *access control list.*

adapter name (n.)

A unique name given to an application. Adapter names are used by NETBIOS applications communicating over the network. See also *remote adapter name.*

Address Resolution Protocol (n.)

A network management tool that lists Internet Protocol addresses and their corresponding Ethernet addresses for TCP/IP network nodes.

alias (n.)

An alternate name for a resource, such as a service, used to refer to several identical resources by the same name. It is also used to refer to the same service by alternate names.

API (n.)

See *application programming interface.*

AppleTalk (n.)

A family of protocols used by Macintosh computers to communicate with peripherals, other Apple products, and other types of computers.

AppleTalk for VMS (n.)

A complete software implementation of AppleTalk Phase 2 network protocols for the VMS operating environment.

application (n.)

A program used for a particular kind of work, such as word processing or database management.

application disk service (n.)

A virtual disk that contains application software. See also *disk service*.

application file service (n.)

A file service that contains application software.

application package (n.)

A set of software application programs that can be used individually or can be shared.

application programming interface (API) (n.)

A standard or proprietary software interface with a network or operating system. Examples of APIs are NETBIOS and Basic LAN Manager.

area (n.)

In networking, a group of interrelated nodes.

ARP (n.)

See *Address Resolution Protocol*

ASCII (n.)

American Standard Code for Information Interchange. A set of 8-bit, binary numbers representing the alphabet, punctuation, numerals, and other symbols used to represent text.

Also, a file that is in binary format. See also *binary*.

asynchronous communication (n.)

The method of transmitting data one character at a time over a serial interface. Asynchronous communication can work locally or through a modem. Timing between bits is constant; timing between characters is variable. (Also called start-stop transmission.)

attached device (n.)

In Token Ring architecture, a processor, printer, or controller that is connected to and can communicate with the Token Ring network.

back up (v.)

To copy the contents of an entire disk, directory, or file.

backup (n.)

A copy of the contents of an entire disk, directory, or file.

boot (v.)

Short for bootstrap. To run or initiate a program that loads the operating system into memory and starts or restarts the computer.

boot image (n.)

The minimum set of instructions needed to start and run a computer, including device drivers, directory structures, and memory management; also, the file containing these instructions.

boot media (n.)

The diskette, hard disk, or virtual disk that contains the startup files. See also *key diskette* and *network key disk.*

broadcast message (n.)

A message sent to personal computer users on the network. Users cannot respond to this message.

Broadcast utility (n.)

A program that enables one-way communication to personal computer users on the network.

buffer (n.)

A temporary storage place in volatile memory for data. An example is the paste buffer in the SEDT text editor.

cache (n.)

See *cache memory.*

cache memory (n.)

High-speed memory that contains copies of data recently used by the processor. Cache memory fetches several bytes of data from main memory (which is slower) in anticipation that the processor will require the next series of bytes in the sequence.

In networking, cache memory avoids frequent disk input/output over the network, providing faster operation. This use of cache memory stores data in main memory.

client (n.)

A personal computer or workstation, connected to the network with PATHWORKS, that can access resources on a server. A client can have DOS, OS/2, or Macintosh software.

Also, hardware or software that receives resources from a server. See also *server*.

client profile (n.)

Files created by the configuration process that contain information to start the client workstation and that define the workstation's hardware and software components.

coaxial cable (n.)

A communications wire consisting of an insulated conductor at the core, completely sheathed by a second conductor that is a woven screen. The outside of the cable is also insulated. See also *ThinWire*.

coexistence client (n.)

A personal computer with both Novell NetWare client software and PATHWORKS for DOS client software installed. From a coexistence client, users can access services on both NetWare and PATHWORKS servers. In addition, users have access to local PATHWORKS services such as PC DECwindows, SEDT, Mail, and terminal emulation.

command (n.)

An instruction issued to a computer operating system or application.

command line (n.)

That area of the screen in which commands are entered and displayed.

common file service (n.)

A file service used to store files that many users can share and update. An example of a common file service is PCCOMMON.

communication device (n.)

In LAN Manager, a COM or LPT connection on a personal computer. Communication devices include modems, image scanners, and serial printers.

communication device queue (n.)

In LAN Manager, a queue that stores communication device requests.

communication service (n.)

Communication devices that are connected to servers on the network and that can be shared among network users. See also *shared communication device.*

configuration (n.)

The set of hardware, hardware options, and software on a computer or network.

configure (v.)

To select, install, and customize hardware and software for a computer or network.

connectivity (n.)

In a network, the ability to connect one node to another node.

controller board (n.)

See *network controller*

conventional memory (n.)

That portion of system memory that is available for DOS and DOS application software. The maximum size is 640 Kbytes.

CPU (n.)

Central processing unit. The main unit of a computer that contains the circuits controlling interpretation and execution of instructions. The CPU includes the main storage, arithmetic unit, and special registers.

CTERM (n.)

Digital Command Terminal. A network protocol that provides local and wide area network services to computers for VT terminal emulation. CTERM is one of the possible protocols used in the SETHOST and VT320 terminal emulator utilities. See also *SETHOST, LAT, NET,* and *Telnet.*

data link (n.)

The interface between the computer's network controller and higher software levels. The type of data link used depends on the computer's network controller.

DECnet (n.)

Digital networking software that runs on server and client nodes in both local area and wide area networks. With DECnet, different types of computers that have different operating systems can be connected, and users can access information and services on a remote computer.

DECnet is a networking protocol and transport. See also *TCP/IP.*

DECnet link (n.)

A virtual or logical connection between a client and a server or between two nodes in the network.

DECnet node database (n.)

The file that contains information about the network nodes with which a computer communicates.

DECnet tunnel (n.)

A DECnet logical link used to connect two or more geographically separate AppleTalk internets.

default (n.)

The value assumed by a program if a value is not supplied by the user.

destination (n.)

The drive, file, or media to which a user is copying or moving information. (Also called target.) See also *source.*

device (n.)

A hardware component that performs a specific function. A keyboard is an input device; a printer is an output device; a terminal is an input/output device. See also *logical device.*

directory (n.)

A list of a set of files stored on a storage device such as a file service or disk.

disk server (n.)

A network program that allocates space on a VMS disk where DOS users can store, create, and maintain DOS files. This space is called a virtual disk. Disk services are available only on VMS servers accessed with the DECnet transport. See also *disk service* and *virtual disk.*

disk service (n.)

A service located on a VMS server that looks like a VMS file on a server, and lets users access it as if it were a local DOS disk drive. The service may contain more than one DOS file. A disk service gives multiple users fast access to read-only files, and gives one user fast access to read-write files. See also *disk server.*

dos2ult (n.)

An ULTRIX utility that converts ASCII files from a DOS format to an ULTRIX format. See also *ult2dos.*

downline load (v.)

To transfer data from a host system to a client system over the network. (Also called download.)

driver (n.)

A background software program typically dedicated to the control of a device or resource on a personal computer. For example, a mouse requires a mouse driver.

EMB (n.)

See *extended memory block.*

EMS (n.)

See *expanded memory* and *Expanded Memory Specification 4.0.*

EMSSPEED (n.)

A PATHWORKS utility that measures the performance of an EMS 4.0 memory board in relation to the speed of conventional memory on the personal computer.

end node (n.)

A network node that sends and receives network messages but cannot route packets intended for other nodes.

enhanced (adj.)

Pertaining to a printing specification for a form or mode. See also *landscape* and *portrait.*

Ethernet address (n.)

An alphanumeric string, six bytes in length, that identifies a node on the Ethernet. The string is six pairs of hexadecimal digits, separated by hyphens (for example, AA–00–04–00–91–27).

Ethernet controller (n.)

A network controller for the transmission and reception of data between a workstation or server and the Ethernet network. For example, a DEPCA is an Ethernet controller for a personal computer that is connected to the network. See also *network controller.*

expanded memory (EMS) (n.)

Physical memory outside the addressing range of a processor that can be accessed through a 64 Kbyte frame. Portions of expanded memory, called pages, are switched into a designated area of upper memory for execution. See also *extended memory.*

Expanded Memory Specification 4.0 (EMS 4.0) (n.)

A specification of methods for allocating and releasing expanded memory that was developed by Lotus, Intel, and Microsoft (LIM). (Also called LIMS 4.0.)

extended edition (EE) (n.)

A version of OS/2 developed by IBM that includes the Communications Manager, Database Manager, and LAN Requester software and that runs over the NetBEUI transport.

extended memory (XMS) (n.)

Memory beyond the 1 Mbyte addressable boundary up to 16 Mbytes. This space is normally not available to DOS applications. The high memory area (HMA) of XMS is the first 64 Kbytes above the 1 Mbyte line and can often be accessed by DOS. See also *expanded memory.*

extended memory block (EMB) (n.)

A section of memory above the 1 Mbyte line.

Extended Memory Specification 2.0 (n.)

A specification for allocating and releasing extended memory.

FAL (n.)

File Access Listener. A DECnet utility that runs on your personal computer and monitors the network for requests from other users for your files.

File Access Listener (n.)

See *FAL.*

file server (n.)

A network program that lets a client connect to available file and printer services.

file service (n.)

Directories, subdirectories, and files on a file server. Users can use network commands from a client to access a file service and then store and retrieve data. A file service provides read/write access to applications and services for many users simultaneously. See also *shared directory.*

form (n.)

In printing, a characteristic that specifies the physical layout of the page. Types of forms are landscape, portrait, and enhanced.

format (v.)

In the context of disks, to divide a disk into tracks and sectors, label those tracks and sectors for future reference, and create a directory structure in order to make the disk ready to accept new data and programs. The type of formatting done depends upon which operating system will use the disk. Formatting a disk destroys any data previously stored on the disk.

group (n.)

In system administration, a collection of users who have the same access to file services. Once users have accounts, they can be assigned to a group. With one command, the system administrator can assign and modify access for all users in the group.

group code (n.)

A number or set of numbers used by the LAT or LAST protocol to identify network resources and to control access to those resources. Group codes can be used to assign resources to a specific set of users and to balance the load between computers offering identical services. (Also called group code number.)

high memory area (HMA) (n.)

The first 64 Kbyte segment of extended memory immediately above the 1 Mbyte point. HMA is unique because it can operate in real address mode and be made available to DOS programs. See also *real address mode.*

HMA (n.)

See *high memory area.*

host system (n.)

A computer, such as a server, that provides services to clients.

initial workstation diskette (n.)

The first key diskette created for the workstation as part of the client installation procedure. Copy the initial key diskette before modifying it to create key diskettes for other workstations. See also *key diskette.*

Internet (n.)

A group of networks that includes regional networks and local networks at universities and commercial institutions. See also *DECnet* and *TCP/IP*.

key disk (n.)

See *network key disk*

key diskette (n.)

A diskette that is used to start up the personal computer or workstation and make network connections. The key diskette stores files with configuration information, optional user-specific information, and some DOS utilities. The key diskette is a type of boot media. See also *boot media* and *initial workstation diskette*.

LAD (n.)

Local area disk. Digital's virtual disk software on a local area network. LAD provides high-performance disk services to DOS and OS/2 clients connecting to a VMS server. See also *virtual disk*.

LAN (n.)

Local area network. A self-contained network that offers a high-speed, reliable communication channel. LANs span a limited distance, such as a building or cluster of buildings, but can be connected to WANs with bridge devices.

landscape (adj.)

In printing, pertaining to a VMS form in which the text or image is parallel to the long side of the paper. See also *enhanced* and *portrait*.

LAST (n.)

Local Area System Transport. The network protocol used by the virtual disk server to send and receive data between computers. LAST provides LAN services to LAD drives.

LAT (n.)

Local Area Transport. A character-oriented transport protocol that operates on a LAN to permit communication between nodes and other devices such as terminals, printers, and modems. See also *LAN* and *SETHOST*.

LATCP (n.)

LAT Control Program. A utility that allows the management of LAT services from the client.

LAT node (n.)

A computer that has LAT software and can offer services, access services, or both. A LAT node can be a personal computer, a terminal server, or a service node. See also *service node* and *terminal server*.

LAT service (n.)

Any service offered on the LAT; a terminal service is the most common type of LAT service.

link (n.)

The logical network connection to a computer or to an application.

load (v.)

To bring software into memory. See also *downline load*.

local (adj.)

Stored on or connected to a client computer, such as a file or a printer. Local is the opposite of being available over a network. See also *remote*.

local area disk (n.)

See *LAD*.

Local Area Transport (n.)

See *LAT*.

local boot (n.)

A process in which a client operating system is loaded and started locally from either the hard disk or a key diskette. See also *remote boot*.

local printer (n.)

A printer that is connected directly to a client. See also *remote printer.*

logical (adj.)

Nonphysical. For example, logical can refer to a name in the software that represents a hardware device. (Also called logical name.) See also *logical device.*

logical device (n.)

A software name that identifies a hardware device for use by an application or program.

log on (v.)

To enter a user name and a password that identify the user and start the session. (Also called log in.)

LPT1, LPT2, LPT3 (n.)

The default logical device names for local parallel printers. LPT1 is the default logical identification for the client local printer port.

Mail (n.)

A utility that lets users exchange messages with other users on the network.

memory manager (n.)

A software program for 80286- or 80386-based personal computers that manages the allocation of all memory types.

menu (n.)

A pull-down or pop-up list of available options. A menu takes the place of typed commands.

modem (n.)

Shortened form of Modulator/Demodulator. A device that converts computer signals into signals that can be sent and received over a telephone line.

mount (v.)

To make a virtual disk available as a disk service to users on a network.

multicast (adj.)

Pertaining to a type of network addressing that enables a node to send messages to any node on the network that has been configured to recognize a multicast address. See also *broadcast message* and *service announcement.*

Named Pipes (n.)

A LAN Manager API that saves time and memory by bypassing the filing procedure. Ordinarily, output is filed, and the user of a second application retrieves the information from the file. Named Pipes makes it possible for the output from an application program to be picked up immediately by another application that is listening for it. The second application can be on the server you are using or on a remote server.

NCP (n.)

See *Network Control Program.*

NDIS (n.)

The Network Device Interface Specification written jointly by Microsoft Corporation and 3Com Corporation. By supporting NDIS, Digital enables many personal computer vendors' Ethernet controllers to work under PATHWORKS for DOS software.

network (n.)

A group of servers, clients, and devices that are connected to each other by communications lines to share information and resources.

network adapter (n.)

See *network controller.*

network controller (n.)

A combination of hardware, firmware, and software that controls the transmission and reception of data between a workstation or server and the network. For example, EtherWORKS LC is an Ethernet network controller that connects a personal computer to the network. (Also called network adapter.)

Network Control Program (NCP) (n.)

A DECnet utility used to monitor, manage, and configure network nodes.

Network File Transfer (NFT) (n.)

A DECnet utility used to transfer files on a DECnet network.

network key disk (n.)

A virtual disk that enables a client to boot over the network by loading the operating system and network startup information to the client. A network key disk is a type of boot media. See also *boot media* and *remote boot.*

NFS server (n.)

See *ULTRIX server.*

NFT (n.)

See *Network File Transfer.*

node (n.)

An individual computer, such as a server or client, that can communicate with other computers in a network.

node address (n.)

A unique numerical identification of a node in a network. A node address includes the area and node number.

node name (n.)

A name uniquely identifying a node within a network. The node name must be alphanumeric and contain at least one alphabetic character.

In DECnet, a valid node name is one to six characters in length. An example of a DECnet node name is SERVR7.

In TCP/IP, a valid node name is one to sixteen characters in length, separated from its domain specification by a period. An example of a valid TCP/IP node name (including a domain specification) is alberteinstein.princeton.edu.

node number (n.)

A number uniquely identifying a specific node in the area.

packet (n.)

A group of bits, including data and control elements, that are switched and transmitted together.

parallel (adj.)

In data transmissions, pertaining to a method of information transfer in which all bits in a character are transmitted simultaneously, rather than sequentially, on different lines or channels. See also *serial.*

parallel port (n.)

The hardware component used to connect a client to a device that uses parallel data transmission, such as a parallel printer.

parallel printer (n.)

A printer that has a parallel data communications interface. See also *parallel port.*

parameter (n.)

One or more variables that are passed to a program or command before execution. A parameter can be a file specification, option, or device name.

In the following example, filename.txt and LPT1: are parameters of the NET PRINT command:

```
NET PRINT filename.txt LPT1:
```

See also *qualifier.*

password (n.)

A string of characters that uniquely confirms the identity of a user to the system. See also *user name.*

PATHWORKS for DOS (NetWare Coexistence) (n.)

A product that enables PATHWORKS for DOS and NetWare DOS client software to operate concurrently on the same personal computer, using a single NDIS-compliant Ethernet controller.

peer server (n.)

In LAN Manager, a server that lets an OS/2 workstation share directories, one print queue, and one communication device with one other network user at a time.

peer service (n.)

See *peer server.*

personal computer (n.)

See *client.*

personal file service (n.)

A file service that contains a user's DOS data and text files as well as server files. A personal file service is protected from other users by a user name and a password.

personal virtual disk service (n.)

A virtual disk service used to store a user's personal files. A user can write to this disk and can store personal files and application data files.

portrait (adj.)

In printing, pertaining to a VMS form in which the text or image is parallel to the short side of the paper. A standard business letter is in portrait mode. See also *enhanced* and *landscape.*

printer service (n.)

The availability of a printer that is connected to a server. From the client, users run network commands to access a print service and print files. A file server makes a print service available to clients. See also *shared printer.*

print queue (n.)

A list of files waiting to print.

privileges (n.)

The level of access to the system or service that a user is allowed; also, a characteristic assigned to a user or program that determines what operations the user or program can perform.

profile (n.)

A set of information about a client or a user. The profile provides information the server may require to recognize the client or the user.

prompt (n.)

A request to the user from the software for information or an input signal.

protocol (n.)

A set of rules that governs the format and timing of messages sent and received over a communication link. For example, CTERM and TELNET are network protocols.

protocol stack (n.)

See *protocol.*

public file services (n.)

File services to which users connect using the default account without specifying a user name and password. Users connecting in this way are automatically allowed access to public services.

qualifier (n.)

A portion of a command that modifies the action by setting or selecting one of several options. For example, in the following command, /COPIES is a qualifier with a value of 3.

```
NET PRINT filename.txt LPT1: /COPIES=3
```

See also *parameter.*

Q-bus (n.)

An input-output device that allows the transmission of data between a VAX computer and its peripheral equipment.

RAM (n.)

Random access memory. Memory from which information can be read and in which new information can be temporarily stored. See also *ROM.*

random access memory (n.)

See *RAM.*

read only memory (n.)

See *ROM.*

read-write access (n.)

The privilege to copy (read) or save to (write) a file, application, or disk area.

Receive utility (n.)

A utility that enables users to read Broadcast messages, retrieve stored messages, and manage message files and screens. The Receive utility RCV is used for messages sent over DECnet. The Receive utility TRCV is used for messages sent over TCP/IP.

redirect (v.)

To assign a logical device name, which is a local representation of a physical device on the network.

redirector (n.)

The DOS software that interprets instructions for DOS drives and sends these instructions to remote network services.

remote (adj.)

Stored on or connected to a server or other computer and available to a client over the network only. Remote is the opposite of local. See also *local.*

remote boot (n.)

A process in which a client's operating system is loaded and started remotely from a network key disk. See also *local boot* and *network key disk.*

remote boot database (n.)

A set of information containing a list of clients that can be started by a network key disk.

remote boot diskette (n.)

A diskette containing the minimum necessary software to connect a personal computer to a server. Once the two are connected, the server can start the personal computer with complete network startup software. A remote boot diskette is required to remote boot any personal computer that does not have a DEPCA Ethernet controller. See also *network key disk.*

remote printer (n.)

A printer connected to a server on the network. See also *local printer.*

resource (n.)

A service that is available to the client; also, a source of information or an available means to complete a task. Examples of network resources are applications, file services, disk services, and printers. Resources can be either local or remote.

ROM (n.)

Read only memory. Memory from which information can be read, but to which new information cannot be written. See also *RAM.*

router (n.)

A server or a node that can send and receive data packets and direct data packets to other nodes.

serial (adj.)

In data transmission, pertaining to a method of data transfer in which bits of information are sent one at a time on a single channel. In the PATHWORKS environment, serial transmission is always asynchronous. See also *asynchronous communication* and *parallel.*

serial port (n.)

The hardware component that connects the personal computer or workstation to a serial communication device, such as a modem, terminal, or serial printer. See also *serial.*

serial printer (n.)

A printer that has a serial communications interface. See also *serial* and *serial port.*

server (n.)

A computer running PATHWORKS software that offers file, printer, or disk services to clients. See also *client.*

service (n.)

The availability of files, devices, or disks that let clients access resources on the network or on a server. A service enables a client to use resources on a printer, on the network, or on a server. See also *disk service, file service, print service, shared resource,* and *virtual disk service.*

SETHOST (n.)

A terminal emulator. With SETHOST, clients can establish terminal sessions to host systems and act as terminals connected to a VAX computer.

shared resource (n.)

In LAN Manager, a service available on the network. See also *service*.

share-level security (n.)

In LAN Manager, a type of security that limits access to each shared resource by requiring a password. The password is assigned to the resource rather than to the user. See also *user-level security*.

shielded twisted-pair cable (n.)

Cable used in LANs for distances less than 1 kilometer. This low-noise cable is generally used for voice transmission. See also *unshielded twisted-pair cable*.

source (n.)

The drive, file, or media from which a user is copying or moving information. See also *destination* and *target*.

source routing (n.)

In Token Ring architecture, a function that allows a node to communicate outside the local ring. Source routing includes routing information within the frame of the data, which eliminates the need to specify the intermediate nodes (path) to a node on another ring.

standard application (n.)

In Microsoft Windows, an application that was not designed for but that can be used with Microsoft Windows. Many standard applications can run in a window, sharing the work area with other applications; some standard applications require the entire screen and run outside a window.

standard baseband Ethernet (n.)

Coaxial cable installed locally to which Ethernet network devices can be connected.

synchronous communication (n.)

A method of transmitting data using a timing signal. The timing signal synchronizes the transmitter and the receiver, eliminating the need for stop bits and providing efficiency in data transfer.

system file service (n.)

A file service offering system software, including PATHWORKS for DOS and PATHWORKS network software, DECwindows/Motif software and applications, and the DOS operating system and utilities.

system service (n.)

See *system file service.*

target (n.)

The drive, file, or media to which the user is copying or moving information. (Also called destination.) See also *source.*

TCP/IP (n.)

Transmission Control Protocol/Internet Protocol. A set of protocols that governs the transport of information between computers and networks of dissimilar types. The Internet is a group of networks that includes regional networks and local networks at universities and commercial institutions. TCP/IP is an alternative to DECnet networking softwre. See also *DECnet.*

terminal emulator (n.)

A program that lets you use the client as if it were a terminal connected to a host computer. The SETHOST utility is a terminal emulator.

terminal server (n.)

A dedicated communications system on the LAN that provides logical connections between its serial ports and service nodes, using the LAT protocol. A terminal server can access services and, in some cases, offer services. DECservers 100, 200, 300, and 500 are terminal servers. See also *service node.*

ThinWire (adj.)

Pertaining to a Digital Ethernet coaxial cable that is thin, flexible, and IEEE 802.3/Ethernet compliant. ThinWire is used for connecting LANs.

token passing (n.)

Passing of a free token around a Token Ring LAN until the token is captured by a station wanting to transmit. A token is passed in one direction only, downstream.

Token Ring (n.)

A combination of hardware, software, and firmware that controls the transmission of data between clients and servers on a network. The Digital Token Ring product consists of the DEC TRN Controller; device driver software; and firmware containing diagnostics, installation, and IVP (installation verification procedure).

Token Ring network (n.)

A LAN architecture in which a single control token is passed around the network ring to control communication between the stations. This ensures that only one station is transmitting on the ring at any time. See also *DECnet* and *TCP/IP*.

topology (n.)

The physical arrangement and relationship of interconnected nodes and lines on the network.

Transmission Control Protocol/Internet Protocol (n.)

See *TCP/IP*.

transparent (adj.)

Pertaining to a function that is invisible in operation. A user sees the results, but not the function.

transparent file service access (n.)

Access to a file service through DOS that acts like access to a file service on a local hard disk or diskette.

ult2dos (n.)

An ULTRIX utility that converts ASCII files from an ULTRIX format to a DOS format. See also *dos2ult*.

UAF (n.)

See *user authorization file*.

UIC (n.)

See *user identification code*.

ULTRIX server (n.)

In PATHWORKS, a VAX, MicroVAX, or RISC computer that runs the ULTRIX operating system and PATHWORKS for ULTRIX, the server software that offers clients network resources such as files, applications, and remote printing. (Also called an NFS server.)

UMB (n.)

See *upper memory block*.

unshielded twisted-pair cable (n.)

Ordinary phone wire, now used for IEEE 802.3/Ethernet and asynchronous network communications. See also *shielded twisted-pair cable*.

upper memory (n.)

Memory blocks in the 640 Kbyte to 1024 Kbyte space that are created by 80386 memory managers. DOS programs, device drivers, and startup software can be loaded into these blocks.

upper memory block (UMB) (n.)

A group of memory addresses allocated from the upper memory portion of system memory. See also *upper memory*.

user authorization file (UAF) (n.)

A VMS file that contains information specifying each user's access rights. See also *access control list* and *user identification code*.

user identification code (UIC) (n.)

A number that determines the type of access (read, write, execute, or delete) for files, mail, and common system commands a user is or is not permitted. See also *access control list* and *user authorization file.*

user-level security (n.)

In LAN Manager, a type of security in which a user account is set up for each user. Each user can access specific resources as defined for that user. See also *share-level security.*

user name (n.)

The name a user types when logging in to the system. The combination of the user name and password uniquely identifies a user account to the system. See also *password.*

user profile (n.)

Information provided to the server that may be required to recognize the user.

utility (n.)

A general-purpose program included in a system to perform common tasks.

virtual (adj.)

Having the attributes, but not the actual form, of something. For example, a virtual disk is space on a VMS disk that functions as if it were a DOS disk.

virtual disk (n.)

Space the disk server program sets aside on a VMS disk. The virtual disk, actually a VMS container file, functions like a DOS-formatted disk. Users can connect to the virtual disk through a DOS drive and can store, create, and maintain DOS files. See also *LAD.*

virtual disk service (n.)

The availability of a virtual disk to clients over the network. At a client, users can make use of a virtual disk service with network commands and can then store data on and retrieve data from the virtual disk. A virtual disk server makes a virtual disk service available to clients.

VMS server (n.)

A VAX or MicroVAX computer running PATHWORKS for VMS, the VMS operating system, and PATHWORKS server software offering clients network resources such as files, routers, remote printing, and applications.

VT320 terminal emulator (n.)

In Microsoft Windows, an application that lets you use your computer as if it were a terminal connected to a host computer. See also *terminal emulation.*

WAN (n.)

Wide area network. Two or more standard or extended LANs that are joined by routers, gateways, or Packet System Interface (PSI) software.

wide area network (n.)

See *WAN.*

window (n.)

An area within a display that is specifically defined and dedicated to a certain application or portion of an application.

window manager (n.)

In DECwindows/Motif, the software that manipulates windows on the screen. Examples of window managers are the X Window Manager and the Motif Window Manager.

workstation (n.)

See *client.*

XMS (n.)

See *extended memory.*

XMS 2.0 (n.)

See *Extended Memory Specification 2.0.*

X server (n.)

The primary component of PC DECwindows/Motif. It processes display requests from X applications and manages the screen. The X server also manages input from devices such as the mouse and keyboard and provides the input to the appropriate application. There are two X servers available with PC DECwindows/Motif: DWDOS286 and DWDOS386. See also *X client, DWDOS286* and *DWDOS386.*

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