Software Product Description

PRODUCT NAME: hp DECnet-Plus for Tru64 UNIX, Version 5.1A   **SPD 41.92.14**

DESCRIPTION

HP DECnet-Plus for Tru64 UNIX software is an implementation of the DIGITAL Network Architecture (DNA) for the DECnet-Plus for Tru64 UNIX operating system. This software supports DNA Phase V, which is the integration of DECnet, OSI, and TCP/IP protocols. This support allows the different network protocol stacks to be available to upper layers as discrete transport services. Upper layers have been implemented as separate towers, enabling existing DECnet and OSI applications to share available network services.

HP DECnet-Plus for Tru64 UNIX software offers the following features:

- Support for TruCluster rolling upgrades. DECnet-Plus may be upgraded as part of a rolling upgrade.

- Recognition of Link Aggregation (LAG). DECnet-Plus recognizes LAG devices and the interfaces reserved for LAG.

- TruCluster aware. Each member of the cluster is an independent DECnet node. While there is no DECnet cluster alias, you can configure the IP-based transports (RFC 1006 and 1859) to use the IP cluster alias.

- DECnet for Small Configurations (DNALITE511). For installation on systems with limited disk space and memory (32 MB of memory or less), or requiring only basic DECnet Phase IV functionality (mail, file transfer, and remote login). This configuration also supports use of DECnet over TCP/IP.

- A graphical user interface (GUI) for basic and advanced configuration

- An OSI Session Programming Interface (SPI)

- Remote file transfer

- Network virtual terminal

- Task-to-task communications

- Mail

- Coexistence and interoperation with the Internet protocols (TCP/IP based), including the ability to run DECnet and OSI applications over the TCP/IP transport

- Networkwide resource sharing and management as defined by the DNA protocols

- A GUI to the network management facility known as the Network Control Language (NCL)

- Expanded naming options, allowing the use of a large local namespace, DECdns, and/or DNS/BIND as naming services

- Network services access point (NSAP) addresses in DECdns and BIND

- A configurable routing option (segregated mode) that allows the routing layer to choose a Phase IV router for packets having a Phase IV compatible address

HP DECnet-Plus for Tru64 UNIX software and TCP/IP software can share system resources such as local area network (LAN) interfaces. You can modify existing programs running over TCP/IP to run over DECnet-Plus software. You can modify DECnet programs to run directly over TCP/IP if the programs do not make use of operations that are specific to DECnet. Similarly, OSI and DECnet applications or user-written software using the X/Open Transport Interface (XTI) can operate over a TCP/IP backbone network using RFC 1006 (for OSI) and RFC 1859 (for DECnet).

Depending on the network configuration, networks combining HP DECnet-Plus systems with other DECnet software might limit certain functions if all products do not support the same features. To determine function availability, compare the products' Software Product Descriptions.

HP DECnet-Plus for Tru64 UNIX is available in two forms: End System and Extended Function. See the Software Licensing section for details about each form of license.

HP DECnet-Plus for Tru64 UNIX software supports the features described in the following sections.

HP DECnet-Plus for Tru64 UNIX software supports ISO 8802-2 *Logical Link Control Type 1* connectionless service over ISO 8802-3 *CSMA/CD*. DECnet-Plus software also supports Ethernet Version 2.0 packet formats on CSMA/CD devices. For FDDI devices, ISO 9314 *FDDI Token Ring Media Access Control* is supported. For 802.5/Token Ring devices, ISO 8802-5 *Token Ring Access Method* is supported. DECnet-Plus is also supported over the Tru64 UNIX NetRAIN virtual interface.

Use of FDDI packets larger than 1500 bytes is supported but requires a DNA Phase V router if the LAN is interconnected to other local area networks.

Wide area network (WAN) connectivity is provided using the High-Level Data Link Control (HDLC) protocol and device drivers for point-to-point full-duplex connections. This functionality is included as part of the HP DECnet-Plus for Tru64 UNIX license and installed from the HP Wide Area Networking Support for Tru64 UNIX (X.25) software. For a list of supported devices, refer to the Software Product Description (SPD 42.47.xx).

Network Layer

HP DECnet-Plus for Tru64 UNIX software supports end-system routing only.

The network layer supports ISO 8473 *Protocol for Providing Connectionless-Mode Network Service* (CLNS). In addition to full Connectionless Network Protocol (CLNP) header support, DECnet-Plus for Tru64 UNIX software supports the inactive subset (null Internet) specified in ISO 8473 as well as the OSI ping function (ISO 8473/PDAMx). Null Internet is the operation of OSI transport directly over a LAN data link. The OSI ping function enables a network entity to generate a message that is echoed back to the sender when received by its target destination.

Exchange of routing information between end systems and routers uses the ISO 9542 *End System to Intermediate System Routing Protocol* (ES-IS). Addresses adhere to the ISO 8348 *Network Service Definition* Addendum 2 specification, allowing the support of large network topologies.

As long as the network address stays within the addressing range of DNA Phase IV systems (up to 1023 systems per area and up to 63 areas per network) and uses the same initial domain part (IDP), you can use any router that conforms to the DIGITAL Network Architecture. The Network layer is able to cache information about the paths that are used to reach remote nodes.

You can set the Segregated Routing Mode attribute, which determines a DNA Phase IV router for those packets having a destination address that can be translated to the Phase IV format. All other packets are sent to a DNA Phase V or OSI router, if available.

The Network layer supports multicircuit and multihomed end systems. Multicircuit end systems allow up to four circuits to be active simultaneously. This support increases network reliability and data throughput. Multihomed end systems allow a system to have up to three unique addresses. This functionality allows an end system to have both a DECnet Phase IV compatible address and a DECnet-Plus extended address.

The Network layer supports ISO 8878 *Use of X.25 to Provide the OSI Connection-Oriented Network Service* (CONS). You can configure OSI Transport classes 0, 2, and 4 to run over a CONS network. In addition to CONS support, DECnet-Plus software allows a properly configured DECnet-Plus system to use CCITT X.25 compliant networks as OSI Connectionless-Mode Network Service (CLNS) subnetworks. This functionality is included as part of the DECnet-Plus license and is installed from the HP Wide Area Networking Support for Tru64 UNIX software.

The HP DECnet-Plus for Tru64 UNIX software can be used in conjunction with X.25 connectivity over LLC2 services (ISO 8881 *Use of X.25 Packet Level Protocol in Local Area Networks*). This functionality provides connection-oriented network services over a LAN to another suitably configured X.25 end system on the LAN. It also allows X.25 logical connections to be made through a relay system using LLC2. The LLC2 functionality is included as part of the HP DECnet-Plus for Tru64 UNIX license and is installed from the HP Wide Area Networking Support for Tru64 UNIX software.

An HP Wide Area Networking Support for Tru64 UNIX software license is required when you connect a system directly to a packet switch data network (PSDN) using the X.25 and Link Access Protocol Balanced (LAPB) protocols. For more information, see the HP Wide Area Networking Support for Tru64 UNIX Software Product Description (SPD 42.47.xx).

Transport Layer

The Transport layer supports OSI and DECnet protocols. The HP DECnet-Plus for Tru64 UNIX software supports the OSI transport protocol as specified in ISO

8073 *Connection-Oriented Transport Protocol.* The OSI transport supports classes 0, 2, and 4 (also known as TP0, TP2, and TP4). Classes 0 and 2 work only on CONS. Class 4 works with either CONS or CLNS.

The HP DECnet-Plus for Tru64 UNIX software also supports ISO 8602 *Connectionless Transport Service* (CLTS). CLTS provides a datagram transport service.

The Network Services Protocol (NSP) is the supported DECnet transport protocol. NSP offers communications between DECnet systems and provides backward compatibility with DNA Phase IV systems.

DECnet and OSI Applications over TCP/IP

The HP DECnet-Plus for Tru64 UNIX software supports OSI applications over TCP/IP (Internet RFC 1006). RFC 1006 defines a specification for running OSI applications over TCP/IP. Operation of FTAM and Virtual Terminal over a TCP/IP network is supported.

Implementation of RFC 1859 allows DECnet applications to run over TCP/IP. The supported applications include all licensed DECnet applications as well as layered products and user-written applications that conform to the documented DECnet programming interfaces. DECnet-Plus for OpenVMS (Version 6.0 and later) also provides this functionality, enabling interoperation of OpenVMS and Tru64 UNIX DECnet applications over a TCP/IP backbone.

OSI Upper Layers

HP DECnet-Plus for Tru64 UNIX software supports the Session, Presentation, and Application layers. The Application layer provides Association Control Service Elements (ACSE) and Remote Operations Service Element (ROSE) services. DECnet-Plus software also includes the HP implementation of OSI File Transfer, Access, and Management (FTAM) and Virtual Terminal (VT) protocols.

OSI applications can run over Transport layer classes 0, 2, or 4 over CONS and TP4 over CLNS. OSI applications can also run over TCP/IP networks using RFC 1006.

OSI Application Programming Interfaces

The OSI application programming interfaces (APIs) enable users to write distributed applications that communicate over open networks and use the OSI services provided by DECnet-Plus.

The following APIs are provided under the Extended Function license and permit application writers to use the services of the OSI upper layers in their applications:

* An interface to FTAM (File Transfer, Access, and Management)

* Interfaces to the ACSE (Association Control Service Element) and Presentation layers

* An interface to ROSE (Remote Operations Service Element)

* A direct interface to the services provided by the Session layer. This interface is called the session programming interface (SPI).

The APIs allow for the development of customer and third-party OSI applications on DECnet-Plus systems. An application's source code must be compiled with the API header files and linked against the appropriate API shareable library. You can run the resulting application image on any HP DECnet-Plus for Tru64 UNIX system with the appropriate API library installed. The API header files are shipped through DECnet-Plus programming tools, which is an optional subset in the HP DECnet-Plus for Tru64 UNIX software kit.

For more information about the APIs, see Appendix C.

Network Management

The HP DECnet-Plus for Tru64 UNIX network management software allows system or network managers to:

* Control and monitor the operation of a network

* Configure network operating parameters

* Modify and display directory service name templates and search paths

* Start up and shut down network components as needed

* Monitor network traffic and performance

* Detect, isolate, and repair network problems

In addition, the network management software can provide information that warns network managers of faulty or failing network components, both hardware and software.

NCL (Network Command Language) is the utility provided for managing management operations. Network managers can access NCL through either the command line interface or the graphical user interface (GUI). The GUI allows network managers to view the status of network components and control those components from a Motif-based window interface.

Network managers can also use NCL to test specific components of the network and to isolate network problems. NCL enables transmission and reception of test messages either between systems or through controller loopback arrangements. They can then compare the messages for possible errors.

HP DECnet-Plus for Tru64 UNIX software provides network event logging to a terminal device, disk file, or remote system. Network managers can use NCL to enable and disable the event logging facility as well as to optionally filter specific events.

Problem-solving is facilitated by the Common Trace Facility (CTF). CTF enables network managers to trace and analyze frames passing between the network and the DECnet-Plus system through the interfaces and protocols of the DECnet and OSI stacks. Network managers can trace NSP, OSI Transport, Routing, and RFC 1006.

HP DECnet-Plus for Tru64 UNIX software supports installation, management, and down loading by way of ISO 8802-3 *CSMA/CD*, Ethernet, and FDDI using the Maintenance Operation Protocol (MOP) to HP servers, routers, portals, and gateways. To determine if a product supports HP DECnet-Plus for Tru64 UNIX software, refer to that product's Software Product Description.

MOP is a management protocol used for lower-level communications with a system that is either not fully operational or being tested. You can configure MOP or run it standalone without installing all of DECnet-Plus. An HP DECnet-Plus for Tru64 UNIX license is not required for standalone MOP operation.

Name Services

HP DECnet-Plus for Tru64 UNIX provides simple access to the node name and addressing information stored in one or more directory services. Three name service options are supported:

- Local namespace—Stores names and address information locally in database files

- DECdns distributed namespace—Stores names and address information in the DIGITAL Distributed Name Service (DECdns), a global name service (includes both clerk and server configurations)

- DNS/BIND—Retrieves names and Internet or NSAP addresses from a DNS/BIND name server

When configuring a node, the system administrator can elect to use any combination of the Local namespace, the DECdns distributed namespace, and DNS/BIND. HP DECnet-Plus for Tru64 UNIX provides access to the Local namespace or to a DECdns server running on an HP OpenVMS, Tru64 UNIX, or ULTRIX system.

The *decnet_register* namespace management tool centralizes and simplifies namespace management tasks by replacing functionality previously provided by *decnet_dns_register* and *decnet_loc_register*. After setting up one or more directory services along with search path information during DECnet-Plus configuration, the system administrator uses *decnet_register* to transfer information between namespaces and to manually register, de-register, and modify node registration information. Both command line and forms interfaces are provided as well as online help information.

The Local namespace stores name and addressing information on each node that is configured appropriately. The service can support up to 100,000 names and does not require or use DECdns.

The DECdns distributed service maintains a consistent, networkwide directory of network resources, called the namespace. You can construct the network resources without including location information, thereby permitting users to reference the network resources independent of their physical locations.

Note: DECdns requires native DECnet connectivity to operate over a wide area network. It will not operate over RFC 1006 or RFC 1859 links.

A single DECdns server system can provide a networkwide name service. You can install DECdns servers on additional systems in a network to provide availability and performance benefits. As a general rule, you should place DECdns servers on two systems in each LAN. This configuration provides adequate service and redundancy for most networks.

Note: The DECdns server provided with HP DECnet-Plus for Tru64 UNIX operates with other integrated DECdns implementations for HP DECnet-Plus for OpenVMS and for ULTRIX systems. However, there is no support for interoperability with any DECdns Version 1.0 or Version 1.1 server, which is an obsolete standalone product. Be aware that HP will not solve problems related to the presence of DECdns Version 1.0 or Version 1.1 servers in the same namespace as the HP DECnet-Plus DECdns server.

DECdts—DIGITAL Distributed Time Service

DECdts is a software-based service that provides precise, fault-tolerant clock synchronization for systems in LANs and WANs. The DECdts service also enables the coordination of other distributed computing applications. Distributed applications use the time service to determine event sequencing, duration, and scheduling.

The following is a summary of DECdts features for networks running distributed applications:

- DECdts provides an NCL management interface for controlling and monitoring the software.

- DECdts provides C Coordinated Universal Time (UTC) support, measuring and supplying time using this internationally recognized time standard.

- DECdts supports a callable interface for applications to obtain UTC.

Note: DECdts requires native DECnet connectivity to operate over a wide area network. It will not operate over RFC 1006 or RFC 1859 links.

Network Virtual Terminal

DECnet-Plus software supports CTERM, the HP defined protocol for terminal access. CTERM is the DNA protocol that allows remote login between DECnet systems. CTERM supports users on DECnet conformant implementations.

HP DECnet-Plus for Tru64 UNIX also supports the OSI Virtual Terminal (VT) application. VT allows you to connect to open systems, and open systems to connect to your system, using the OSI protocols for terminal access. VT provides remote login capabilities between OSI systems and DECnet-Plus systems.

For detailed information about VT, see Appendix A.

Remote File Transfer

HP DECnet-Plus for Tru64 UNIX software supports DAP (Data Access Protocol) for remote file transfers. HP DECnet-Plus for Tru64 UNIX software provides the dcp utility for network file transfers using the DAP protocol. The commands supported are: dcp (copy), dls (list or directory), drm (remove), and $dcat$ (concatenate and display). The commands operate with files on any other DECnet conformant systems.

Using the OSI protocols, FTAM software performs the communications for the following file operations between open systems:

- Copying files

- Appending, deleting, or renaming files

- Displaying information about files

For detailed information about FTAM, see Appendix B.

Network File Access

Remote file access from other HP systems is supported. User programs on other DECnet conformant systems can perform directory operations as well as sequentially read, write, create, delete, and print files on a DECnet conformant system. Network file access is also supported from OSI-conformant remote systems using the FTAM protocols.

Mail

HP DECnet-Plus for Tru64 UNIX software allows users to send and receive mail to and from users on other DECnet conformant systems. The DECnet-Plus Mail utility extends the existing Tru64 UNIX operating system mail system to include support for DECnet-Plus software. Both the HP DECnet-Plus mail utility and the current Tru64 UNIX mail systems share the same user interface.

Task-to-Task Communications

Task-to-task communications let DECnet-Plus applications communicate with remote DECnet conforming applications through a programming library interface.

XTI (X/Open Transport Interface) supports ISO transport protocol classes 0, 2, and 4, in addition to TCP/IP and User Datagram Protocol (UDP). This support allows software developers and applications to use multiple network transport protocols through a single interface. The XTI programming interface now supports writing applications to run over Internet RFC 1006, thereby allowing OSI applications to run over TCP/IP.

DECnet-Internet Gateway

The DECnet-Internet Gateway, based on the 4.3 BSD TCP/IP, provides bidirectional network access between DECnet systems and Internet systems. It allows DECnet and Internet system users to communicate and cooperate through their respective file transfer, remote login, and mail capabilities. An Internet system user can use the FTP, Telnet, and SMTP protocols to communicate with a DECnet system user who uses the DAP, CTERM, Mail-11 protocols, and vice versa. The DECnet-Internet Gateway does not require special software on systems that use its service, nor does it require accounts for remote users on the gateway system.

Standards Conformance

DECnet-Plus software has been designed and implemented to comply with the following standards:

- ISO

  - 4335: *High Level Data Link Control Procedures*

  - 7809: *High Level Data Link Control Elements of Procedures*

  - 8073: *Connection-Oriented Transport Protocol*

  - 8327: *Connection-Oriented Session Protocol*

  - 8348: *Network Service Definition*

  - 8473: *Protocol for Providing Connectionless-mode Network Service*

  - 8571: *File Transfer, Access, and Management*

  - 8602: *Connectionless Transport Service*

  - 8650: *Association Control Service Element*

– 8802-2: *Logical Link Control Type 1*

– 8802-3: *CSMA/CD*

– 8802-5: *Token Ring Access Method*

– 8823: *Connection-Oriented Presentation Protocol*

– 8878: *Use of X.25 to Provide the OSI Connection-mode Network Service*

– 8881: *Use of X.25 Packet Level Protocol in Local Area Networks*

– 9041: *Virtual Terminal*

– 9314: *FDDI Token Ring Media Access Control*

– 9542: *End System to Intermediate System Routing Protocol*

- EN

  – EN/ENV 41 204 FTAM: Simple File Transfer (unstructured)

  – EN/ENV 41 205 FTAM: File Management

  – EN/ENV 41 206 FTAM: Position File Transfer (flat)

  – EN/ENV 41 207 FTAM: Positional File Transfer (flat)

- UK GOSIP Version 4.0

- NIST OIW Stable Implementor's Agreements, Version 5, Edition 1

- Internet Standards RFC 1006 and RFC 1859.

INSTALLATION

HP DECnet-Plus for Tru64 UNIX software is customer installable. However, installation services are available for those customers who desire installation of this software by an experienced HP software specialist.

DECnet-Plus Configuration and Performance

Configuring a DECnet-Plus system to satisfy a user's application requirements involves making trade-offs of cost, performance, and functionality. The performance of a given DECnet-Plus system depends not only on the expected network traffic and resultant processing but also on the amount of concurrent local processing at that system. When you configure a DECnet-Plus system, you should consider the following factors:

- CPU type

- Message size and frequency of transmission by all network applications

- Local applications

DECnet for Small Configurations (DNALITE)

This configuration supports installation on systems with limited disk space and memory (32 MB or less). In addition to the DNALITE511 subset, this configuration also requires installation of the DECnet-Plus Kernel Components (DNAKBIN511) subset. The only additional subsets that can be installed with this configuration are the DECnet-Plus Reference Pages (DNAMAN511) and DECnet-Plus Miscellaneous Software (DNAUTIL511) subsets.

HARDWARE REQUIREMENTS

Processors Supported

HP DECnet-Plus for Tru64 UNIX is supported on all valid Tru64 UNIX Alpha configurations. For additional hardware information, refer to the configuration charts listed in the Tru64 UNIX operating system Software Product Description (SPD 70.70.xx).

HP DECnet-Plus for Tru64 UNIX supports the Ethernet, FDDI, and 802.5/Token Ring controllers listed in the Tru64 UNIX operating system Software Product Description (SPD 70.70.xx). At least one controller is required on an HP DECnet-Plus system. For a list of valid configurations using serial synchronous communications interfaces, refer to the Software Product Description for HP Wide Area Networking Support for Tru64 UNIX (SPD 42.47.xx).

For general device or controller descriptions, consult your local hardware support provider.

Memory Requirements

A typical HP DECnet-Plus for Tru64 UNIX system uses an additional 2 MB of memory. For further memory configuration guidelines, consult the Tru64 UNIX operating system Software Product Description (SPD 70.70.xx).

Disk Space Requirements

The entire installation kit requires approximately 65 MB of total disk space, including:

- 20 KB maximum required in the / (root file system) for all subsets

- 50 MB in */usr* for subsets

- 5 MB in */var* for database files

Disk Space Requirements for the Full-Capability DECnet-Plus Installation

The minimum full-capability DECnet-Plus installation requires approximately 34 MB of total disk space including:

- 20 KB in the / (root file system) for all subsets

- 20 MB in */usr* for subsets

- 4 MB in /*var* for data files

Note also that if you load a large number of nodes in the local node database, the disk space requirements for /*var* increase.

Disk Space Requirements for a DECnet For Small Configurations (DNALITE) Installation

The DNALITE installation requires approximately 13 MB of total disk space including:

- 11 MB in /*usr* for the required subsets

- 2 MB in /*var* for data files

Note that the requirements and limitations for a DNALITE installation also reflect many of the requirements and limitations for a Tru64 UNIX installation for small configurations. If you load a large number of nodes in the local node database, the disk space requirements for /*var* increase.

SOFTWARE REQUIREMENTS

Tru64 UNIX operating system Version 5.1, 5.1A or 5.1B.

OPTIONAL SOFTWARE

HP Wide Area Networking Support for Tru64 UNIX (X.25), Version 4.1. Consult the Software Product Description (SPD 42.47.xx) for product information.

GROWTH CONSIDERATIONS

The minimum hardware and software requirements for any future version of this product may be different from the requirements of the current version.

DISTRIBUTION MEDIA

Media and documentation for this product are available on the HP CD-ROM Software Library. You can order hardcopy documentation separately.

ORDERING INFORMATION

HP DECnet-Plus for Tru64 UNIX software and documentation are shipped as part of the Tru64 UNIX Layered Products CD-ROM.

The current order numbers are as follows, where an asterisk (*) denotes variant fields:

Software Licenses:	QL-MTJA*-AA (End System), QL-MTKA*-AA (Extended Function)
Software Documentation:	QA-MTJAA-GZ
Software Product Services:	QT-MTJ**-**, QT-MTK**-**

For additional information on available licenses, services, and media, refer to the appropriate HP price book.

SOFTWARE LICENSING

The HP DECnet-Plus for Tru64 UNIX license gives users the right to use the software on a single system and includes the delivery of a License Product Authorization Key (PAK) to enable the HP DECnet-Plus for Tru64 UNIX software.

The HP DECnet-Plus for Tru64 UNIX end system license provides the right to use all DECnet-Plus features (except OSI application gateways and the DECdns server), DECnet-Plus over HDLC point-to-point devices, and DECnet-Plus over X.25 using the LLC2 protocol.

The HP DECnet-Plus for Tru64 UNIX extended function license provides the right to use all the DECnet-Plus components of the end system license as well as OSI application gateways and the DECdns server.

To obtain a license for direct connections to a PSDN using the X.25 and LAPB protocols, refer to the product information listed in the Optional Software section.

This software is furnished only under a license. For more information about HP's licensing terms and policies, contact your local HP office.

License Management Facility Support

This software supports the Tru64 UNIX operating system License Management Facility.

For more information on the License Management Facility, refer to the Tru64 UNIX operating system Software Product Description (SPD 70.70.xx) or documentation set.

SOFTWARE PRODUCT SERVICES

A variety of service options are available from HP. For more information, contact your local HP office.

SOFTWARE WARRANTY

This software is provided by HP with a 90 day comformance warranty in accordance with the HP warranty terms applicable to the license purchase.

APPENDIX A—Virtual Terminal (VT)

DECnet-Plus Virtual Terminal (VT) is HP Computer Corporation's implementation of the ISO Virtual Terminal Basic Class standard, which consists of the service definition (ISO 9040) and the protocol (ISO 9041). The VT software adheres to these standards, thereby providing interactive access between DECnet-Plus systems and other multivendor terminal systems and host systems that also adhere to the ISO Virtual Terminal Basic Class standard.

VT is implemented as an application service element (ASE) of the OSI Application layer.

VT can run over Transport layer class 0, 2, or 4 over CONS, and TP4 over CLNS. VT can also run over TCP/IP networks using RFC 1006.

VT provides terminal/initiator (for a local user) and host/responder (for the remote user) capabilities. Terminal/responder and host/initiator are not supported.

Supported Standards

VT conforms to the following OSI standards:

- ISO 9041: Virtual Terminal protocol—basic class
- ISO 8650: ACSE protocol
- ISO 8823: Presentation protocol
- ISO 8327: Session protocol

VT Features

VT supports the following features:

- Class of Service
  - Basic class (character cell terminals)
- Mode of Operation
  - Asynchronous mode (A-Mode)
- Profile Support
  - Default A-mode (adheres to ISO 9040)
  - A-mode Generalized Telnet (adheres to OIW Stable Agreements)
  - A-mode Transparent (adheres to OIW Stable Agreements)
  - A-mode Telnet 1988 (adheres to OIW Stable Agreements)
- Functional Units
  - destructiveBreak
  - structuredCOs
  - urgentData
- Supported Gateways
  - Bidirectional VT/Telnet
  - Bidirectional VT/CTERM
  - LAT to VT
- Online Help

X.500 Address Lookup

The VT software is capable of retrieving network addresses from the X.500 Directory. This functionality can be used in conjunction with or instead of retrieving addresses from a local repository. For detailed information, see the X.500 product documentation.

Command Mode

Command Mode allows the user to execute commands that can modify the characteristics of the VT association with the remote application.

Trace Utility

The Virtual Terminal tracing utility (ositrace) is a tool for identifying problems in protocol exchanges between your local system and any remote system. The utility captures protocol exchanges and transcribes them into easily read text.

The tracing utility monitors data exchanges for individual associations. The utility can trace data originating from the VT, ACSE, presentation, and session components.

APPENDIX B—File Transfer, Access, and Management

File Transfer, Access, and Management (FTAM) software provides communications for performing the following file operations between open systems:

- Copying files between local and remote systems

- Appending, deleting, or renaming files

- Displaying information about files

An open system is a computer system that implements the standards for each of the seven layers of the Open Systems Interconnection (OSI) Reference Model for communications as defined by the International Organization for Standardization. An FTAM system is any open system containing an FTAM implementation that conforms to the FTAM standard and includes the implementations of the necessary underlying OSI services.

FTAM implements several standards that define the following components of these layers of the OSI basic reference model: the FTAM service element and the Association Control Service Element (ACSE) of the Application layer, the Presentation layer, and the Session layer.

Supported Standards

FTAM conforms to the following OSI standards:

- ISO 8571: File Transfer, Access, and Management service and protocol

- ISO 8650: ACSE protocol

- ISO 8823: Presentation protocol

- ISO 8327: Session protocol

The following table compares the supported implementation profiles for different standards bodies and their relationship to each other.

International Standardized Profiles (ISP) ISO 10607	NIST	CEN/CENELEC and EWOS
Part 1: Specification of ACSE, presentation and session protocols for use by FTAM	—	—
Part 2: Definition of document types, constraint sets, and syntaxes	—	—
Part 3: AFT11 — Simple File Transfer Service (Unstructured)	T1 — Simple File Transfer	A/111 — ENV 41 204
Part 4: AFT12 (DISP)[1] — Positional File Transfer Service (Flat)[2]	T2 — Positional File Transfer	A/112 — ENV 41 206
Part 5: AFT3 (DISP)[1] — File Management Service	M1 — Management	A/13 — ENV 41 205

[1] Draft ISP
[2] AFT12 is not supported by DECnet-Plus

FTAM Component Software

The component software includes the user facilities (initiators), responders, management tools, and problem-determination tools.

FTAM User Facilities

You access the FTAM user facilities by entering Tru64 UNIX operating system commands. These commands are *ocat* (concatenate and display), *ocp* (copy), *ols* (list or directory), *omv* (move or rename), and *orm* (remove). The commands operate on files stored on any FTAM system whose implementations are compatible with FTAM. You cannot use these commands to directly manipulate files on your local system.

Support for any File Naming Convention

A file designation is system-specific information that identifies a file to its storage system. FTAM software lets users specify files using the naming conventions of the systems where the files reside. FTAM supports the standard POSIX (Tru64 UNIX) operating system) format for file specifications and a comparable style of file-specification format.

Support for Several File Types

FTAM software can access and transfer files containing both binary and ASCII data. FTAM-1, FTAM-2, FTAM-3, and NBS-9 document types are supported.

FTAM-1 files are unstructured text files, FTAM-2 files are sequential text files, and FTAM-3 files are unstructured binary files. The FTAM-1, FTAM-2, and FTAM-3 document types support the following parameters:

Document Type	String Significance	Universal Class	Maximum String Length
FTAM-1	Not significant	IA5String GeneralString	Presence and absence of parameter
	Fixed	VisibleString GraphicString	Presence of parameter
	Variable	VisibleString GraphicString	Presence and absence of parameter
FTAM-2	Not significant	VisibleString GraphicString	Presence or absence of parameter
FTAM-3	Not significant		Presence or absence of parameter
	Fixed		Presence of parameter

NBS-9 files are NBS file directories.

Flexible and Transparent Access for Local Files

FTAM software treats local files the same way that the Tru64 UNIX operating system file system treats them.

File Transfers

The FTAM *ocp* command transfers files between compatible FTAM systems without modifying the source file. The facility can transfer files in either direction between the local system and a remote FTAM system. The ocp command can also transfer files between two remote FTAM systems for a local FTAM user.

The ocp command also allows you to append one or more files to a single output file within or between FTAM systems.

FTAM-FTP Gateway

The FTAM-FTP Gateway lets you perform file operations between OSI and Internet Systems. Remote users of the gateway need not establish accounts on the gateway system to use its capabilities.

File Deletion

The FTAM *orm* command deletes one or more files on any combination of FTAM systems provided that the user has delete access to those files on the specific FTAM system.

Renaming Requests

The FTAM *omv* command allows you to rename files. The command works on files stored on remote FTAM systems (remote files). The command enables you to change the path name or file name of an existing file. For remote files, you must specify the type of information the remote FTAM system requires for specifying files.

Directory Requests

The FTAM *ols* command displays the complete set of FTAM file attributes. Specific options allow users to vary the display of attributes that are meaningful in a Tru64 UNIX operating system environment: for example, date and time of the last modification to the file name.

FTAM File Error Recovery

FTAM provides file error recovery functionality both in the *ocp* initiator command and in the FTAM responder. File error recovery is provided for classes 1, 2, and 3 errors as detailed in ISO 8571-4.

Class 1 file error recovery provides only the restart functionality, while classes 2 and 3 file error recovery provide both the restart and recovery functionality as follows:

- If an internal error is detected in the data transfer regime, class 1 recovery restarts the data transfer regime by retransmitting the file data beginning at the negotiated checkpoint within the data transfer regime.

- Class 2 error recovery provides for re-establishment of the select and open regimes, and also allows for retransmission of file data beginning at a negotiated checkpoint within the data transfer regime.

- Class 3 error recovery provides full recovery by re-establishing a lost FTAM association and its select and open regimes. Class 3 recovery then restarts the data transfer regime by retransmitting the file data beginning at the negotiated checkpoint within the data transfer regime.

All restart and recovery operations and procedures are completely transparent to the user.

Management and Problem Determination Tools

FTAM software supplies a number of management tools, including an installation verification procedure (IVP), a tracing utility, event logging, and informational and error messages.

FTAM Installation Verification Procedure (IVP)

The FTAM IVP sets up outbound and inbound application associations. A connection is made to your local system (as a loopback test). The FTAM IVP checks that your installation is able to set up and release presentation and session connections. It tests the FTAM software by starting a responder and reading the attributes of a file with the *ols* command.

FTAM Tracing Utility

The FTAM tracing utility (*ositrace*) is a tool for identifying problems in protocol exchanges between your local system and any remote FTAM system. The tracing utility captures protocol exchanges and transcribes them into easily read text.

The FTAM tracing utility monitors data exchanges for individual associations. The tracing utility can trace data originating from the following components: FTAM (data, protocol, and structuring), the Association Control Service Entity (ACSE), presentation, and session.

FTAM Event Logging

For event logging, the FTAM listener writes records in the *syslog* file (*/usr/spool/mqueue/syslog*) and the responder writes records to the wtmp file (*/usr/adm/wtmp*).

Requirements for Compatibility with FTAM

FTAM lets an open system perform a specific set of file transfer, access, and management activities with any open system having a compatible FTAM implementation.

The Protocol Implementation Conformance Statement (PICS) provides more information about HP's FTAM implementation.

APPENDIX C—OSI Application Programming Interfaces (APIs)

FTAM API

The FTAM API supports the OSI standard ISO 8571: Information Processing Systems, Open Systems Interconnection, and File Transfer, Access, and Management.

The FTAM API provides the interface to the FTAM protocol machine provided in HP DECnet-Plus for Tru64 UNIX. Communications between the application code and the FTAM protocol machine are carried out using ASN.1 encoded data structures. The FTAM API supports the following functions:

>   Abort
>   Begin-Group
>   Cancel
>   Change-Attributes
>   Create
>   Close
>   Data
>   Data-End
>   Delete
>   Deselect
>   End-Group
>   Initialize
>   Open
>   Read-Attributes
>   Read
>   Select
>   Terminate
>   Transfer-End
>   Write

OSI Applications Kernel (OSAK) API

The OSAK API provides a direct interface to services at ACSE and Presentation layer services.

The OSAK API supports the following OSI standards for the ACSE layer:

- ISO 8650: Information Processing Systems, Open Systems Interconnection, and Protocol Specification for the Association Control Service Element

- ISO 8649: Information Processing Systems, Open Systems Interconnection, and Service Definition for the Association Control Service Element

The OSAK API provides the interface to the ACSE associate and release services. The following services are provided:

>   Associate
>   Release
>   Abort
>   Redirect

The redirect service is not an ACSE service. It allows applications to redirect an incoming association to another process on the local system.

The OSAK API also includes support for the OSI Presentation layer with support for the following OSI standards:

- ISO 8823: Information Processing Systems, Open Systems Interconnection, and Connection-Oriented Presentation Protocol Specification

- ISO 8822: Information Processing Systems, Open Systems Interconnection, and Connection-Oriented Presentation Service Definition

- ISO 8327: Information Processing Systems, Open Systems Interconnection, and Basic Connection-Oriented Session Protocol Specification

- ISO 8326: Information Processing Systems, Open Systems Interconnection, and Basic Connection-Oriented Session Service Definition

The Presentation layer services supported by the OSAK API are:

>   Alter-Context
>   Data
>   Capability-Data
>   Expedited-Data
>   Typed-Data
>   Token-Please
>   Token-Give
>   Control-Give
>   Sync-Major
>   Sync-Minor
>   Resynchronize
>   Exception-Report
>   Activity-Start
>   Activity-Interrupt
>   Activity-Resume
>   Activity-Discard
>   Activity-End
>   Abort

The OSAK API also supports (by pass through) the OSI Session layer services.

Session Layer API

The Session layer API, called the OSAK Session Programming Interface (SPI), supports the following OSI standards:

- ISO 8327: Information Processing Systems, Open Systems Interconnection, Basic Connection-Oriented Session Protocol Specification

- ISO 8326: Information Processing Systems, Open Systems Interconnection, Basic Connection-Oriented Session Service Definition

The Session layer supports ISO Session Versions 1 and 2. Version 1 allows up to 512 octets of user data on a service. Version 2 supports the restrictions imposed by the National Institute of Standards and Technology, allowing up to 10,240 octets of data on a service.

The OSAK SPI provides the interface to the following connect and release services:

- Connect

- Release

- Abort

- Redirect

The redirect service is not a session service. It allows applications to redirect an incoming connected to another process on the local system.

The Session layer services supported by the OSAK API are:

> Data
> Capability-Data
> Expedited-Data
> Typed-Data
> Token-Please
> Token-Give
> Control-Give
> Sync-Major
> Sync-Minor
> Resynchronize
> Exception-Report
> Activity-Start
> Activity-Interrupt
> Activity-Resume
> Activity-Discard
> Activity-End

ROSE API

The Remote Operations Service Element (ROSE) supports the OSI standard ISO 9072: Information Processing Systems, Text Communication, and Remote Operations.

ROSE supports interactive applications in a distributed open systems environment. It is a service for multivendor distributed processing.

The ROSE functionality provides a mechanism that allows for encoding and decoding the remote operations protocol control information, as defined in ISO 9072, for the following services:

> Invoke
> Result
> Error
> Reject