Software Product Description

PRODUCT NAME: MUXserver 320/380/90 Remote Terminal Server, Version 2.0 **SPD 32.94.03**

DESCRIPTION

The MUXserver 320/380/90 Remote Terminal Server is a wide area terminal switch for Ethernet Local Area Networks. It has been designed to support interactive asynchronous terminal users, using data compression, background priority, and statistical multiplexing to optimize the network performance.

When used in conjunction with a DECmux 300, the MUXserver 320/380/90 provides concurrent Local Area Transport (LAT) and Internet (Telnet/TCP/IP) support to enable connectivity to host systems that utilize LAT or Internet protocols. The Internet protocol suite is used to connect to UNIX® host systems and other host systems that support the Internet protocol suite. In general, the MUXserver 320/380/90/DECmux 300 provides the same terminal services to a remote workgroup as the DECserver products give to local users.

MUXserver 320/380/90 features include:

- LAT protocol
- Internet protocols (Telnet/TCP/IP)
- Statistical multiplexing and data compression
- Background transfer ports
- Optimized for remote echo terminals
- Multiple sessions
- Host load balancing (LAT only)
- Connection queuing (LAT only)
- Printer support
- Data transparency control
- Security
- Online Help
- Remote server management using DECnet, LAT, Telnet, or SNMP

MUXserver 90

- 384 concurrent sessions
- 96 concurrent users
- One link: 2400 bps up to 64K bps
- Three remote stations, each with up to 32 devices
- Supports the backplane management of the DEChub 90

MUXserver 320

- 128 concurrent sessions
- 32 concurrent users
- One link: 2,400 bps up to 64K bps; one link: 2,400 bps up to 19.2K bps
- Six remote stations, each with up to 32 devices

MUXserver 380

- 512 concurrent sessions
- 128 concurrent users
- Two links: 2,400 bps up to 64K bps; six links: 2,400 bps up to 19.2K bps
- Sixteen remote stations, each with up to 32 devices

Features

Terminal Connection Management

Through the use of a simple command, users can establish a logical connection, called a session, to any LAT service node on the same Ethernet LAN or to any Internet host on the same Ethernet LAN or via an Internet gateway. This connection makes the terminal appear as if it were physically connected to the LAT service node or Internet host, and the terminal user can use standard system utilities and applications supported by that system. Each terminal connected to the DECmux 300 remote terminal multiplexer can connect to the same or a different LAT service node or Internet host.

Multiple Sessions

The MUXserver 320/380/90 allows each user to establish and maintain up to eight sessions to one or more service nodes or Internet hosts, up to a maximum of 128 sessions per MUXserver 320, 384 sessions per MUXserver 90, and 512 sessions per MUXserver 380. Only one session per user can be active at a time. Through simple switching commands, the user can access the different sessions without repeating a login dialogue each time. Some operating systems may impose limits on the number of LAT or Telnet sessions such a host will support.

Session Management Terminals

The MUXserver 320/380/90 allows direct communication with devices that support the Terminal Device/Session Management Protocol (TD/SMP) protocol. This protocol provides the ability for the attached device to maintain screen and keyboard context for multiple LAT sessions.

Remote Access Sessions

The MUXserver 320/380/90 allows sessions to be established by remote LAT service nodes or Internet hosts to asynchronous devices. Such remote access sessions are useful for printers and asynchronous ASCII hosts.

Access Contention

Fully configured MUXservers can provide the following connections:

MUXserver	DECmux	Device-Support	Active-Users	Sessions
90	3	96	96	384
320	6	192	32	128
380	16	512	128	512

MUXservers provide access to users on a first-come-first-served basis. The MUXserver 90 will provide access to 96 users. Permanent logical connections can be assigned to specific ports to ensure access at all times. When a logical connection is not available, a status message is relayed to the port requiring access.

Data Transparency

Data is normally passed transparently between the port on the DECmux 300 and the current session's associated LAT service node or Internet host. Exceptions to this are:

- If XON/XOFF flow control is specified for the port, these characters are interpreted by the DECmux 300.
- Certain characters can be specified as session switch characters. When these are input from the port, they are interpreted by the MUXserver 320 /380/90 and not passed to the LAT service node or Internet host.
- When using Telnet, certain characters can be specified as invoking certain Telnet functions. When these are input from the port, they are interpreted by the MUXserver 320/380/90 and not passed to the Internet host.

The data transparency can be controlled on a session-by-session basis:

- Session switch characters can be disabled and thus passed to the LAT service node or Internet host. For LAT sessions, that is referred to as pass-through mode and can be controlled by the port user or the LAT service node. For Telnet, switch characters are disabled if the session is in binary mode, which can be controlled by the port user or the Internet host. This is appropriate for ASCII file transfers from/to personal computers.
- XON/XOFF flow control characters can be disabled. For LAT sessions, that is referred to as pass-all mode and can be controlled by the port user or the LAT service node. For Telnet, XON/XOFF characters are disabled if the session is in binary mode, which can be controlled by the port user or the Internet host. This is appropriate for binary data file transfers from /to personal computers.
- Telnet request characters can be disabled at the request of the port user. They are also disabled if the Telnet session is in binary mode, which can be controlled by the port user or the Internet host.

Network Configurations

The MUXserver 320/380/90 network is built from two basic options: the MUXserver 320/380/90, which connects to the Ethernet, and the remote unit. Supported remote units are the DECmux 308, 316, and 332.

Synchronous Links

Each MUXserver 90 can support one synchronous communications line and support up to three DECmux 300s.

Each MUXserver 320 can support up to two synchronous communications lines, and each line can support up to three DECmux 300s.

The total aggregate bandwidth supported over the two synchronous links is 82.2K bps. This equates to one link operating at 64K bps and another link operating at 19.2K bps.

Each MUXserver 380 can support up to eight synchronous communications lines, and each line can support up to three DECmux 300s. However the maximum number of DECmux 300s that can be connected is limited to sixteen and the maximum aggregate synchronous link bandwidth is 128K bps full duplex.

The MUXserver 320/380/90 synchronous links use LAPB data link protocol and can be connected using the following physical link options. Network configuration, link types, and link speeds are automatically configured when the correct cables are used.

- EIA 232-D/CCITT V.28 at 2.4K, up to 19.2K bits per second
- CCITT X.21 bis/CCITT V.35 at 48K, up to 64K bits per second
- EIA RS-449/CCITT V.36, up to 64K bits per second
- CCITT X.21, leased line data leads only, up to 64K bits per second
- EIA RS-422, up to 64K bits per second

The MUXserver 320/380/90 EIA RS-422 synchronous link can be used to connect two units. Clocking signals are supplied by the MUXserver. Distances up to 1,200 meters or 4,000 feet are supported on suitable cable installations.

The MUXserver 320/380/90 network is designed to operate over wide area network links that provide no significant delay and a transparent data path. Synchronous composite links operating over multiplexing equipment or satellite links are not supported.

Ethernet LAN Interconnect

The MUXserver 320/380/90 provides both ThinWire and standard Thickwire Ethernet V2.0/IEEE 802.3 ports. Selection is by an accessible pushbutton switch.

DECmux 308/316/332

The DECmux 300 requires a synchronous connection to a MUXserver 320/380/90 for proper operation.

The DECmux units are available in the following configurations:

- Eight EIA 232-D/CCITT V.24 ports with modem control (DECmux 308)
- Sixteen EIA 232-D/CCITT V.24 ports with modem control (DECmux 316)
- Sixteen DEC423 ports, data leads only (DECmux 316-B)
- Thirty-two DEC423 ports, data leads only (DECmux 332)

The eight- and sixteen-port units are field upgradable using the following upgrade panels kits. After installation, the new configuration is automatically reconfigured and the DECmux is initialized to factory default settings.

- Eight EIA 232-D/CCITT V.24 ports with modem control
- Sixteen DEC423 ports, data leads only

The DECmux 300 EIA 232-D ports are compatible with Digital Equipment Corporation's family of modems and with Bell 100- and 200-series modems and their equivalents.

MUXserver 300 Compatibility

DECmux 300s previously used with a MUXserver 300 can be migrated to a MUXserver 380 without change. DECmux 300s used with a MUXserver 320/380/90 can be returned to use with a MUXserver 300, but some configuration information will not be used by the MUXserver 300.

Asynchronous Device Support

The MUXserver 320/380/90 software supports the simultaneous operation of asynchronous devices at speeds from 75 bps to 19.2K bps. The software also supports:

- Full modem control support (on DECmux 300 EIA 232-D ports only)
- Data leads only support (on DECmux 300 EIA 232-D and DEC423 ports)
- XON/XOFF flow control, except when session transparency prevents its use
- CTS/RTS or DSR/DTR flow control (on DECmux 300 EIA 232-D ports only)
- Split speed (transmit and receive) terminal operation
- Modem fallback features (on DECmux 300 EIA 232-D ports only)
- Automatic line speed detection (equal receive and transmit speed only)
- Ability to pass break character and error notification
- Ability to assist in multiple session management via TD/SMP

Port Access

A port on a DECmux 300 connected to a MUXserver 320/380/90 can be set up in different ways depending on the device attached to the port and its intended use.

- Access Local—Designed for interactive terminals. This allows the device (typically an interactive terminal) attached to the port to CONNECT to LAT services. This type of access is also used for dial-in modems.
- Access Remote—Designed for applications-driven devices such as asynchronous printers that are allocated by a service node process. This allows the implementation of certain shared printers by multiple service nodes. This type of access is also used for connections to dial-out modems and Asynchronous ASCII host systems.
- Access Dynamic—Designed for devices (such as personal computers or printers with keyboards) that require both Local and Remote access.
- Access None—Designed to allow the server manager to disable the use of a port.

Asynchronous Printer Support

The MUXserver 320/380/90 and DECmux 300 can be used to provide logical connections to printers that are asynchronous devices as previously described. Access is possible both from LAT service nodes and Internet hosts. Printers that support XON/XOFF, ASCII standards, and EIA 232D/CCITT V.24/V.28 interfaces can be connected to the DECmux 300. It is strongly recommended that printers supporting modem control signals be used, in which case connections will not be established to printers where modem control signals are not present, e.g., the printer is switched off.

The server manager can associate a LAT service name or a Telnet Listener with individual ports or groups of ports that connect to a printer(s). Alternatively, using the LAT protocol, a service node can request a connection to a named port that connects to a printer.

Asynchronous ASCII Host Support

The MUXserver 320/380/90 and DECmux 300 can be used to provide logical terminal connections to hosts that do not implement the LAT or Internet protocols. In this type of configuration, the server becomes the Ethernet connection and protocol support for these hosts. This expands the network accessibility to include hosts directly connected to the same Ethernet as the MUXserver and hosts connected via a DECserver terminal server port.

A host that supports XON/XOFF, ASCII standards, and EIA 232-D/CCITT V.24/V.28 interfaces can be connected to the DECmux 300. This provides the terminal user with a transparent connection to the host. It is strongly recommended that server port and host side port utilize modem control signals to signal the host automatically upon session disconnection.

In this configuration, there is a one-to-one correspondence between the port on a DECmux 300 and the connection on the host. The server manager can associate the LAT service name or Telnet Listener with individual ports or groups of ports that connect the host interface to the server.

LAT Protocol

The MUXserver 320/380/90 uses the Digital Local Area Transport (LAT V5.2) protocol to communicate with hosts on the same Ethernet. This protocol is specially optimized for remote echo terminal traffic over a LAN.

Services

A LAT service node can have one or more services that are offered to MUXserver 320/380/90 network users. Services and nodes are identified by name. Users always connect to services, not to nodes, although often one of the service names will be the node name.

In a VAXcluster environment, the MUXserver 320/380 /90 sees each VAXcluster on the Ethernet as a collection of LAT service nodes offering a common service. Each cluster node can also offer a service whose name is equivalent to its node name. In this case, a terminal user can connect either to the cluster service or a service associated with a particular cluster node.

Load Balancing

When a connection is made to a LAT service, the actual node for the connection is determined by load balancing. Load balancing is the process the server uses when more than one node offers the same service. Service nodes do not have to be configured in a cluster in order for load balancing to be used. Service nodes with the same names can be running different operating systems. Using the load balancing process, the server connects to the node with the highest rating for the service desired. This rating is based on the current loading on the nodes that offer the service.

Automatic Session Failover

If a LAT service is available on two or more service nodes and a connection to a service fails, the server will attempt to connect the user to another service node offering the same service. The user's context at the time of failure is not automatically restored, and login to the new service is required. This feature is supported for LAT connections only.

Groups

Every terminal and service node in a LAT network is a member of one or more groups, which are specified by a list of numbers from 0 to 255. Groups allow an easy means of subdividing the network into what appears to be many smaller networks. A terminal user is only aware of the services that are offered by nodes in the same group(s).

The server manager can specify the authorized group(s) in which a terminal is a member. The authorized groups define the set of services the user is allowed to access. In addition, a user can further restrict access to services by disabling some of the authorized groups using a non-privileged group command. The user-settable group codes are a subset of the authorized groups.

Groups provide a restrictive view of the network. This restricted view is mainly for user convenience and, although it also provides a form of security, it is not intended to be the primary form of access authorization or system security for a node. Groups apply only to LAT connections.

Outbound Connection Queues

If a terminal user requests a connection to a service and the requested service is currently in use, the terminal server users can opt to have the connection requested queued to the remote service. This feature will happen automatically whenever a connection fails for this reason if the user's port has been appropriately configured and the service node is queuable. The connection request is queued at the service node end and is processed first-in/first-out until such time as the user's connection request can be completed. This feature assists in the fair management of limited network resources. Once queued for connection, the user also has the option to cancel the queue entry and proceed with other sessions.

Local Services

The MUXserver 320/380/90 can offer DECmux 300 ports as services. A named service can be associated with one or more DECmux 300 ports, either on the same or multiple DECmux 300s. The rating of the service reflects the proportion of ports currently available. If a request is received for a connection to a service and all ports associated with that service are being used, the MUXserver 320/380/90 can offer a queuing facility for incoming connect requests, with connections being granted on a first-come-first-served basis.

Internet Protocols (Telnet/TCP/IP)

The Internet protocol suite was developed for use on the ARPANET and is specified by US Defense Data Network (DDN) Request for Comments (RFCs). The Internet protocols supported by the MUXserver 320/380 /90 are:

- Internet Protocol (IP) - RFC 791
- Subnet Addressing - RFC 950
- Internet Control Message Protocol (ICMP) - RFC 792
- Address Resolution Protocol (ARP) - RFC 826
- Transmission Control Protocol (TCP) - RFC 793
- User Datagram Protocol (UDP) - RFC 768 (used by Domain Name Services)
- Domain Name Services (DNS) - RFCs 1034, 1035, and 1101
- Telnet - RFC 854
- Telnet Options - RFCs 855 and 861

The following Telnet options are supported:

- Status - RFC 859
- End of record - RFC 885
- Toggle flow control - RFC 1080
- Echo - RFC 857
- Timing mark - RFC 860
- Linemode - RFC 1116
- Binary - RFC 856
- Suppress go ahead - RFCs 854 and 858
- Terminal type - RFC 1091

Telnet Client

Telnet client provides the ability to connect to any remote TCP port at an Internet address on a local area network (LAN) or a wide area network (WAN). Telnet client allows the user to specify a remote computer by Internet address as well as by domain name. The MUXserver 320 /380/90 maintains a translation table of domain names containing either or both domain names entered by the server manager or learned from Domain Name Servers on the Internet.

The port user can control characteristics of a Telnet session on a session-by-session basis. Profiles provide quick access to standard characteristics. Telnet character, line, and binary profiles are supported.

Telnet Server

Telnet server provides the ability to accept connection requests from Internet hosts to MUXserver 320/380/90 ports with attached asynchronous devices such as printers or host systems. One or more ports can be associated with a particular Telnet Listener port number. Ports can be associated with both Telnet Listeners and with LAT local services. Alternatively, a LAT service name can be associated with a Telnet Listener port number, in which case a connection to that Telnet Listener port number will be interpreted as a connection to the specified LAT service. Queuing of connection requests is not supported via Telnet.

User Interface

Welcome Identification

The MUXserver 320/380/90 server standard welcome banner, which includes terminal server type, version number, internal baselevel, and protocol version number, is issued whenever a user successfully logs in to the server. The server will also print a server-manager settable identification string. This can be useful for automatic server identification or for small daily messages used for communication with the terminal server users.

Local Mode and Service Mode

For the most part, the environment provided by the MUXserver/DECmux 300 is identical to that the user would experience if attached directly to the service node. When operating in this mode, the user is said to be in service mode. Occasionally, such as during connection establishment, the user interacts directly with the MUXserver/DECmux 300. When operating in this mode, the user is in local mode.

In local mode, the terminal input is interpreted directly by MUXserver/DECmux 300 as commands to be performed by the server. The default prompt can be set by the manager.

In service mode, the terminal input is passed directly to the connected service node or Internet host with several exceptions. One exception, called the local switch character, allows the user to enter local mode from service mode. The BREAK key can also be used for this function.

Other exceptions, called the forward and backward switch characters, allow the user to switch between sessions without the need to enter local mode. The switch characters are disabled by default but can be enabled by command. Both CTRL/S and CTRL/Q are normally interpreted locally, but flow control using these characters can be disabled.

Autoconnection

Autoconnection is a function that automatically connects a user terminal to a service node when connection failures occur or upon user login to the server. In conjunction with this function, a dedicated or preferred service can be specified for each terminal user.

If a dedicated service is specified, the MUXserver 320 /380/90 will attempt to connect to that service when a character is typed on the terminal keyboard or when an existing connection fails. In dedicated service mode, only one session is available. As this mode is designed to simulate a direct terminal connection, no local mode commands or messages are available to the terminal user. Ports with dedicated service can be logged out of the server automatically when the user logs out of the service node.

If a preferred service is specified, the MUXserver 320 /380/90 will attempt to connect to that service as with the dedicated service mode of operation. However, the terminal user can enter local mode and establish other sessions.

Online HELP Facility

A full online reference HELP facility is available. The server's HELP command provides information on the correct syntax and details about each command. In addition, a tutorial HELP feature allows new users to learn quickly the basics of MUXserver 320/380/90 operation. Tutorial HELP can be entered upon logging in to the server.

Directory Service

Any MUXserver 320/380/90 user can obtain a directory of LAT services available to that user with a SHOW SERVICES command. Services for which the user's port is not authorized will not be displayed. Services apply only to LAT connections. The domain names of known Internet hosts can also be obtained using a SHOW Internet HOST command.

Security

The MUXserver 320/380/90 provides functions that enhance security features already available in the service nodes. These functions can be enabled as required by the server manager.

- Port login password.
- Port lock password. This allows the user to leave sessions running at the terminal without fear of security violations. When a terminal is locked, all input from the terminal is ignored until the lock password is re-entered.
- Secure Port allows a user to change only dynamic settings on that port.

- Nonprivileged User can change dynamic and permanent settings on that port.
- Privileged User can change all settings. This mode is password protected.
- Access to a local service can require a specified password to be supplied.
- Certain port users can be restricted from viewing available services (Limited View).
- Certain ports can be prevented from having their physical settings altered by a remote LAT service node or Internet host (Remote Modification).

Server Management

The principle means of managing the MUXserver 320 /380/90 is by using the local mode commands accessible via any Local or Dynamic access port, the console port, or a remote management facility. Alternatively, SNMP can be used.

Console Port

The MUXserver 320/380/90 console port can accept directly connected asynchronous terminals with the following characteristics:

- DEC423 asynchronous start/stop transmission, having 8 data bits, 1 start bit, 1 stop bit, and no parity
- Full duplex with XON/XOFF flow control
- Speed selectable from one of the following baud rates: 300, 600, 1,200, 2,400, 4,800, 9,600, or AUTOBAUD

Remote Server Management

The MUXserver 320/380/90 implements the console carrier feature, which enables access to local mode from a Phase IV or Phase V DECnet host on the same LAN. With the exception of remote console port configuration, the entire local mode user interface is accessible to the remote console carrier user. This includes the privileged commands if the user knows the server's privileged password. This capability allows centralized server management and remote server diagnosis.

The MUXserver 320/380/90 also enables access to local mode using the LAT or Telnet protocols. These capabilities allow centralized server management from another terminal server or from an Internet host.

Simple Network Management Protocol (SNMP)

The Simple Network Management Protocol (SNMP) agent allows the MUXserver 320/380/90 and the DECmux 300 to be managed by an SNMP network management system. Retrieving information from the terminal server is possible using the SNMP GET and GET-NEXT requests. The SNMP SET operation is fully supported, providing the ability to modify MUXserver parameters as well as create and delete applicable table entries. The terminal server can send unsolicited event alarms to specified SNMP management stations via the SNMP TRAP message. Terminal server variables accessible via SNMP (RFC1157), are defined by the following Internet documents: MIB II (RFC 1213), RS232-like MIB (RFC 1317), the Character MIB (RFC 1316), the LAPB MIB (RFC 1381), and the DECmux MIB (Private).

Server Characteristics

The Server Manager in privileged mode can set up server identification information, change port characteristics, or fine tune the operating characteristics of the server. The Server Manager can also assign service names to groups of one or more ports. Internet characteristics such as Internet address and subnet mask can be modified and displayed.

The MUXserver 320/380/90 and DECmux 300 maintain permanent characteristics in non-volatile memory, which are retained even when the power is disconnected. Permanent characteristics are maintained for service and server parameters as well as per-port parameters. Permanent characteristics can be reset to factory defaults by pressing the reset button on the hardware unit while plugging in the power cord.

Characteristics governing the operation of an individual port can be displayed by a nonprivileged terminal user interactively from their terminal. Many of the characteristics can be set up by the user, but certain characteristics are privileged and can only be changed by the Server Manager.

Port parameters that can be set and displayed include speed, character size, group codes, parity, terminal type, access, autobaud, modem, and password protection.

Troubleshooting

A privileged user can diagnose Ethernet communications problems by looping messages to an Ethernet host and through the Ethernet hardware interface at the server. To diagnose terminal problems, users can execute a command to transmit test data to their terminal, or the server manager can send test data to any terminal. A privileged user can also diagnose synchronous line problems by looping test messages between adjacent MUXserver 320/380/90 and DECmux 300 units.

The capability also exists for the server manager to test a service connection by sending data to the service node and back again. At the service node, the data can be looped back by the LAT protocol, or internally or externally at the service port. Not all LAT implementations support this facility.

The server maintains a variety of statistics and counters. These include the following: synchronous data link statistics, Ethernet data link statistics, LAT protocol statistics, and port error statistics. This data can be displayed and zeroed by the Server Manager.

Internet statistics are also maintained by the server. TCP, IP, ICMP, UDP, and SNMP protocol statistics can be displayed.

Multiplexing

Data to/from DECmux ports is multiplexed over the synchronous link or links between the MUXserver 320/380 /90 and the DECmux 300. Reliable communication is achieved using the industry-standard LAPB protocol. Channels are statistically multiplexed so the available link capacity is shared fairly among active ports. Idle ports do not use any link capacity.

Data Compression

Data compression is automatically enabled and disabled on a per-port basis. It is dependent on the type of data being transmitted and only effective on blocks of data. Data compression is automatically deactivated when the synchronous link is operating above 19.2 kbps. Data compression efficiency will vary with the application.

Background Priority

Background priority can be specified by the server manager on a per-port basis. Traffic to and from ports set to background is reduced in favor of other traffic. This feature is especially useful for ports that are used for printers.

Operational Software

The MUXserver 320/380/90 ROM-based firmware provides the necessary maintenance operation protocols for downline loading operational software from a DECnet Phase IV or Phase V load host, over the Ethernet, into server memory. Alternatively, the firmware can perform downline loading using BOOTP/TFTP from an OSF/1® load host. All self-test diagnostics are in MUXserver ROM; downline loading is not a precondition for MUXserver self-test. Once the MUXserver 320 /380/90 downline load is complete, the network will self configure and communications will be established with the remote DECmux 300.

In the event of a bugcheck caused by a fatal error, the unit will normally attempt to upline dump server memory to a DECnet Phase IV or Phase V host. Following this, the unit will automatically initialize itself, execute the self test routines, and, if still operational, invoke a downline load.

The remote DECmux 300 operates on ROM-based firmware. The remote DECmux 300 does not require downline loading but does require a connection to a MUXserver 320/380/90 for operation.

Performance

The performance of a given MUXserver 320/380/90 /DECmux 300 network depends on many factors, including:

- Synchronous link speed
- Number of route-through synchronous links
- Number of terminals
- Number of host systems with active connections to the server
- Terminal speeds
- Terminal user applications
- Number and size of host buffers
- Terminal workload
- Host workload

To achieve a viable configuration, the user and/or a Digital software specialist should perform a level of application analysis that addresses the factors above. The actual maximum data throughput cannot be calculated by multiplying the number of lines by the line speed, since many factors can reduce the actual throughput.

Restrictions on MUXserver 320/380/90 Usage

While terminal connections using the MUXserver /DECmux 300 have been designed to simulate direct terminal connections, a few differences exist because of the nature of the product. Under most circumstances, these differences are not noticed by terminal users or service node application programs. However, applications directly dependent on the following functions may not operate as with a direct connection:

- Setting the terminal speed, character size, and parity by manipulating system data structures
- Extremely fast response time (typically less than 200 ms) to operate
- Applications that utilize an alternate terminal driver in the service node
- Applications that expect incoming connections to have fixed device names

HARDWARE REQUIREMENTS

For OpenVMS VAX Load Host Systems

Processors Supported:

VAXft: VAXft Model 110, VAXft Model 310, VAXft Model 410, VAXft Model 610, VAXft Model 612

VAX: VAX 4000 Model 100, VAX 4000 Model 200, VAX 4000 Model 300, VAX 4000 Model 400, VAX 4000 Model 500, VAX 4000 Model 600

VAX 6000 Model 200 Series, VAX 6000 Model 300 Series, VAX 6000 Model 400 Series, VAX 6000 Model 500 Series, VAX 6000 Model 600 Series

VAX 7000 Model 600 Series

VAX 8200, VAX 8250, VAX 8300, VAX 8350, VAX 8500, VAX 8530, VAX 8550, VAX 8600, VAX 8650, VAX 8700, VAX 8800, VAX 8810, VAX 8820, VAX 8830, VAX 8840

VAX 9000 Model 110, VAX 9000 Model 210, VAX 9000 Model 300 Series, VAX 9000 Model 400 Series

VAX 10000 Model 600 Series

VAX–11/730, VAX–11/750, VAX–11/780, VAX–11/785

MicroVAX: MicroVAX II, MicroVAX 2000, MicroVAX 3100 Model 10/10E, MicroVAX 3100 Model 20/20E, MicroVAX 3100 Model 30, MicroVAX 3100 Model 40, MicroVAX 3100 Model 80, MicroVAX 3100 Model 90, MicroVAX 3300, MicroVAX 3400, MicroVAX 3500, MicroVAX 3600, MicroVAX 3800, MicroVAX 3900

VAXstation: VAXstation II, VAXstation 2000, VAXstation 3100 Model 30, VAXstation 3100 Model 38, VAXstation 3100 Model 40, VAXstation 3100 Model 48, VAXstation 3100 Model 76, VAXstation 3200, VAXstation 3500, VAXstation 3520, VAXstation 3540

VAXstation 4000 Model 60, VAXstation 4000 Model 90, VAXstation 4000 VLC

VAXserver: VAXserver 3100 Model 10/10E, VAXserver 3100 Model 20/20E, VAXserver 3300, VAXserver 3400, VAXserver 3500, VAXserver 3600, VAXserver 3602, VAXserver 3800, VAXserver 3900

VAXserver 4000 Model 200, VAXserver 4000 Model 300, VAXserver 4000 Model 500

VAXserver 6000 Model 210, VAXserver 6000 Model 220, VAXserver 6000 Model 310, VAXserver 6000 Model 320, VAXserver 6000 Model 410, VAXserver 6000 Model 420, VAXserver 6000 Model 510, VAXserver 6000 Model 520, VAXserver 6000 Model 610, VAXserver 6000 Model 620, VAXserver 6000 Model 630

Processors Not Supported:

MicroVAX I, VAXstation I, VAX–11/725, VAX–11/782, VAXstation 8000

For OpenVMS AXP Load Host Systems

Processors Supported:

Alpha AXP: DEC 3000 Model 300 AXP Workstation, DEC 3000 Model 300L AXP Workstation, DEC 3000 Model 400 AXP Workstation, DEC 3000 Model 400 AXP Server, DEC 3000 Model 500 AXP Workstation, DEC 3000 Model 500 AXP Server, DEC 3000 Model 500X AXP Workstation

DEC 4000 Model 610 AXP System

DEC 7000 Model 610 AXP System

DEC 10000 Model 610 AXP System

For ULTRIX Load Host Systems

VAX-Based Processors Supported:

VAX: VAX 6000 Model 200 Series, VAX 6000 Model 300 Series, VAX 6000 Model 400 Series, VAX 6000 Model 500 Series

VAX 8200, VAX 8250, VAX 8300, VAX 8350, VAX 8500, VAX 8530, VAX 8550, VAX 8600, VAX 8650, VAX 8700, VAX 8800, VAX 8810, VAX 8820, VAX 8830, VAX 8840

VAX 9000 Model 110, VAX 9000 Model 210, VAX 9000 Model 300, VAX 9000 Model 410 Series, VAX 9000 Model 420

VAX–11/750, VAX–11/780, VAX–11/785

MicroVAX: MicroVAX II, MicroVAX 2000, MicroVAX 3100, MicroVAX 3300, MicroVAX 3400, MicroVAX 3500, MicroVAX 3600, MicroVAX 3800, MicroVAX 3900

VAXstation: VAXstation II, VAXstation II/GPX, VAXstation 2000, VAXstation 3100, VAXstation 3200, VAXstation 3500, VAXstation 3520, VAXstation 3540

VAXserver: VAXserver 100, VAXserver 2000, VAXserver 3100, VAXserver 3300, VAXserver 3400, VAXserver 3500, VAXserver 3600, VAXserver 3602, VAXserver 3800, VAXserver 3900

VAXserver 6000 Model 210, VAXserver 6000 Model 220, VAXserver 6000 Model 310, VAXserver 6000 Model 320, VAXserver 6000 Model 410, VAXserver 6000 Model 420, VAXserver 6000 Model 510, VAXserver 6000 Model 520

RISC-Based Processors Supported:

DECstation: DECstation 2100, DECstation 3100, DECstation 3100s

Personal DECstation 5000 Model 20/25 HX, Personal DECstation 5000 Model 20/25 MX, Personal DECstation 5000 Model 20/25 TX, Personal DECstation 5000 Model 20/25 PXG+, Personal DECstation 5000 Model 20/25 PXG Turbo+

DECstation 5000 Model 120/125/133 CX, DECstation 5000 Model 120/125/133 HX, DECstation 5000 Model 120/125/133 MX, DECstation 5000 Model 120/125/133 PX, DECstation 5000 Model 120/125/133 TX, DECstation 5000 Model 120/125/133 PXG, DECstation 5000 Model 120/125/133 PXG+, DECstation 5000 Model 120/125/133 PXG Turbo, DECstation 5000 Model 120/125/133 PXG Turbo+

DECstation 5000 Model 200 CX, DECstation 5000 Model 200 HX, DECstation 5000 Model 200 MX, DECstation 5000 Model 200 PX, DECstation 5000 Model 200 TX, DECstation 5000 Model 200 PXG, DECstation 5000 Model 200 PXG+, DECstation 5000 Model 200 PXG Turbo, DECstation 5000 Model 200 PXG Turbo+

DECstation 5000 Model 240 HX, DECstation 5000 Model 240 MX, DECstation 5000 Model 240 TX, DECstation 5000 Model 240 PXG+, DECstation 5000 Model 240 PXG Turbo+

DECsystem: DECsystem 3100, DECsystem 5000 Model 25, DECsystem 5000 Model 200, DECsystem 5000 Model 240, DECsystem 5100, DECsystem 5400, DECsystem 5500, DECsystem 5810, DECsystem 5820, DECsystem 5830, DECsystem 5840, DECsystem 5900

For OSF/1® Load Host Systems

Processors Supported:

Alpha AXP: DEC 3000 Model 300 AXP Workstation, DEC 3000 Model 300L AXP Workstation, DEC 3000 Model 400 AXP Workstation, DEC 3000 Model 400 AXP Server, DEC 3000 Model 500 AXP Workstation, DEC 3000 Model 500 AXP Server, DEC 3000 Model 500X AXP Workstation

DEC 4000 Model 610 AXP System

DEC 7000 Model 610 AXP System

DEC 10000 Model 610 AXP System

Processor Restrictions:

A TK50 Tape Drive is required for standalone MicroVAX 2000 and VAXstation 2000 systems.

Supported Hardware

The MUXserver 320/380/90 software runs on the following packaged hardware options:

DSRZE-A*	MUXserver 320 Remote Terminal Server hardware, including: one Ethernet connection, two composite link ports, and a supervisory port
DSRZD-A*	MUXserver 380 Remote Terminal Server hardware, including: one Ethernet connection, eight composite link ports, and a supervisory port
DSRZF-A*	MUXserver 90 Remote Terminal Server hardware, including: one Ethernet connection, one composite link port; and a supervisory port

The remote DECmux is available in the following options:

DM308-**	DECmux 300 Remote Terminal multiplexer hardware, including: two composite link ports and eight EIA 232-D /CCITT V.24 asynchronous lines supporting speeds up to 19.2K bps and modem control
DM316-**	DECmux 300 Remote Terminal multiplexer hardware, including: two composite link ports and sixteen asynchronous lines supporting speeds up to 19.2K bps
DM332-**	DECmux 300 Remote Terminal multiplexer hardware, including: two composite link ports and thirty-two asynchronous lines supporting speeds up to 19.2K bps
DM308-A* + CKDM316-W7	DECmux 300 field reconfigured to provide a mix of eight EIA232-D ports with modem control and sixteen DEC423 ports, data leads only
DM316-B* +CK-DM308-A7	DECmux 300 field reconfigured to provide a mix of eight EIA232-D ports with modem control and sixteen DEC423 ports, data leads only

Other field upgrades will result in one of the above configurations and are also supported.

Disk Space Requirements:

For OpenVMS VAX Systems

Disk Space Requirements (Block Cluster Size = 1):

Disk space required for installation:	8,400 blocks (4,200 Kbytes)
Disk space required for use (permanent):	8,200 blocks (4,100 Kbytes)

For ULTRIX-Based Systems

Disk space required for installation:

Root file system:	0 Kbytes
Other file systems:	usr 4,200 Kbytes (VAX)
	usr 4,200 Kbytes (RISC)
	var 0 Kbytes

Disk space required for use (permanent):

Root file system:	0 Kbytes
Other file systems:	usr 4,100 Kbytes (VAX)
	usr 4,100 Kbytes (RISC)
	var 0 Kbytes

For OSF/1 Systems

Disk space required for installation:

Root file system:	0 Kbytes
Other file systems:	usr 4,200 Kbytes
	var 0 Kbytes

Disk space required for use (permanent):

Root file system:	0 Kbytes
Other file systems:	usr 4,100 Kbytes
	var 0 Kbytes

These counts refer to the disk space required on the downline load host system disk. The sizes are approximate; actual sizes may vary depending on the user's system environment, configuration, and software options.

OPTIONAL HARDWARE

Use the following shielded cables with each of the EIA 232-D asynchronous ports on the DECmux 300.

BC22D	Null modem cable for local terminal or printer connections
BC22E	Full modem straight-through cable for asynchronous modem connections
BC22F	Full modem straight-through cable for modem connections
BC22R	Recommended null modem cable for host systems and other devices, including those that use CTS/RTS flow control
BC17D	Null modem cable for host systems and other devices that do not use CTS/RTS flow control

Use the following DECconnect cables with the DECmux 300 DEC423 ports (DM3**-B*).

H3104-B	DS200 DEC423 CABLE KIT
H3125	DS200 DEC423 SHIELDED CABLE KIT

Use the following shielded adapter cables to connect the MUXserver 300 and DECmux 300 composite ports to the data communication device DCE. Choose the correct cable for the required interface standard.

BC19F-02	2-ft. V.35 Adapter Cable
BC23V-02	2-ft. V.24 Adapter Cable
BC19B-02	2-ft. RS449 Adapter Cable
BC19Y-10	10-ft. Null Modem Unit Interconnect Cable
BC19C-02	2-ft. X.21 Adapter Cable
BC22X-02	2-ft. British Telecom Adapter Cable

Shielded adapter cables shipped with the following MUXservers are:

BC23V-02	MUXserver 320—one cable
BC23V-02	MUXserver 380—two cables

No adapter cables are shipped with the MUXserver 90. These should be ordered separately when the desired connection is decided.

Use the following extension cables with the above adapter cables:

BC19L-xx	V.35 Extension Cable
BC22F-xx	V.24 Extension Cable
BC55D-xx	RS449 Extension Cable

For V.24 installations, a V.24/RS-232-C adapter (12-27591-01) must be fitted between the adapter cable and the extension cable, or between the adapter cable and the modem, if the modem/eliminator has any of the following:

- A signal with a DCE source on pin 18
- Signal quality implemented on pin 21
- Data Signal Rate Selector (DCE) on pin 23

The MUXserver hardware requires both a transceiver drop cable and Ethernet connection, H4000 or DELNI, to connect to the Ethernet physical channel. The following cabinet kits are available and are used to increase the number of physical connections of a DECmux 300 option.

Only one upgrade cabinet kit can be installed in the DM308-AA, DM308-AB, DM316-BA, and DM316-BB options.

The DM316-AA, DM316-AB, DM332-BA, and DM332-BB options are fully configured and cannot be upgraded.

CK-DM308-A7	Upgrade cabinet kit, adding eight EIA 232-D/CCITT V.24 asynchronous ports, with modem control
CK-DM316-W7	Upgrade cabinet kit, adding sixteen DEC423 asynchronous ports, data leads only

Terminals Supported:

The MUXserver/DECmux 300 software supports the following Digital terminal devices that have keyboards:

- LA34, LA35, LA36, LA38
- VT100, VT101, VT102, VT125, VT131
- VT200, VT220, VT240, VT241
- VT300, VT320, VT330, VT340, VT420

Supported Terminal Parameters:

- Character size: 7 data bits with Even, Odd, Mark, or None parity
- Character size: 8 data bits with Even, Odd, or None parity

The automatic line speed detection (Autobaud) feature is supported for either seven-bit characters with even parity or eight-bit characters with no parity.

The MUXserver/DECmux 300 software also supports Digital Personal Computers (PCs) in both terminal emulation mode and terminal file transfer mode:

Note: This product is NOT WARRANTED to support non-Digital terminal devices or personal computers. However, terminals supporting VT200-like characteristics and personal computers supporting IBM® PC, IBM PC/XT, and IBM PC/AT® characteristics may operate with this product.

Printers Supported:

The MUXserver/DECmux 300 software supports the following Digital asynchronous printers when accessed from VAX and MicroVAX systems:

- LA36, LA50, LA70, LA75, LA75 TURBO, LA100, LA120, LA210, LA324
- LJ250, LJ252
- LQP02, LQP03
- LN03, LN03R, LCG01
- LCG01, LFO1R, LJ250, LJ252
- LG01S, LG02, LG31
- DEClaser 1100/1500, DEClaser 2100/2150, DEClaser 2200/2250, DEClaser 3200/3250

Modems Supported:

For DECmux 300 asynchronous EIA 232-D ports: DF01, DF02, DF03, DF112, DF124, DF212, DF242, DF224, and DF296 full-duplex asynchronous modems for either dial-in or dial-out use. Also supported are private- or leased-line modem applications.

CLUSTER ENVIRONMENT

This layered product is fully supported when installed on any valid and licensed VAXcluster* configuration without restrictions. The *HARDWARE REQUIREMENTS* sections of this product's Software Product Description and System Support Addendum detail any special hardware required by this product.

* V5.x VAXcluster configurations are fully described in the VAXcluster Software Product Description (29.78.xx) and include CI, Ethernet, and Mixed Interconnect configurations.

SOFTWARE REQUIREMENTS

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

- OpenVMS VAX Operating System V5.0 - V5.5-2
- DECnet–VAX V5.0 or higher

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

- OpenVMS AXP Operating System V1.5

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

- ULTRIX Operating System V4.0 - V4.3A
- MOP V4.2 (Included with ULTRIX Operating System)

For each OSF/1 system acting as a load host or dump receiver:

- DEC OSF/1 Operating System V1.2A

OpenVMS Tailoring (OpenVMS only)

For OpenVMS V5.x systems, the following OpenVMS classes are required for full functionality of this layered product:

- OpenVMS Required Saveset
- Network Support
- Utilities

For more information on OpenVMS classes and tailoring, refer to the OpenVMS VAX Operating System Software Product Description (SPD 25.01.xx).

OPTIONAL SOFTWARE

- Terminal Server Manager V2.0

GROWTH CONSIDERATIONS

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

DISTRIBUTION MEDIA

9-track 1600 BPI Magtape, TK50 Streaming Tape, and CD-ROM

ORDERING INFORMATION

Software Media (OpenVMS): QA-YWLAA-**
Software Media (ULTRIX): QA-YWLAB-**
Software Media (OSF/1)
Layered Product CD-ROM: QA-054AA-H8
Software Documentation (OpenVMS and ULTRIX): QA-YWLAA-GZ
Software Documentation (OSF/1): QA-YWLAC-GZ
Software Product Services: QT-YWLA*-**

* Denotes variant fields. For additional information on available licenses, services, and media, refer to the appropriate price book.

SOFTWARE LICENSING

The MUXserver 320/380/90 software is licensed to execute on the MUXserver 320/380/90 hardware and the license is supplied with the hardware. No additional license is required for either a load host CPU or a service host.

This product does not provide support for the License Management Facility. A Product Authorization Key is not required for installation or use of the product.

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