Software Product Description

PRODUCT NAME: **MUXserver 100 Remote Terminal Server for VMS, Version 2.3** **SPD 28.45.02**

DESCRIPTION

The MUXserver 100 Remote Terminal Server is a statistical multiplexer server for connecting remote terminals to Ethernet Local Area Networks. The MUXserver 100 Remote Terminal Server provides a convenient method to logically connect up to sixteen remotely located Digital asynchronous terminals by means of wide area telecommunications services to one or more service nodes (hosts) on an Ethernet.

The MUXserver 100 Remote Terminal Server allows for VMS host initiated connections to asynchronous printers. A special print symbiont on VMS service nodes can initiate connections to asynchronous printers connected to DECmux IIs located at remote sites. This allows certain asynchronous printers to be distributed throughout the LAN/WAN network and accessed transparently by service node users. Incoming host-initiated connect requests are queued in a First-in-First-Out (FIFO) priority scheme.

The MUXserver 100 Remote Terminal Server implements the Local Area Transport (LAT) protocol for communication with service nodes that implement this protocol on the same Ethernet. Remote terminal data streams are concentrated at a DECmux II statistical multiplexer device and connected back to the LAN-site MUXserver 100 on a single leased phone line using an HDLC based, synchronous data transmission, statistical multiplexer protocol. Response time at the remote terminal is a function of the Ethernet loading, the LAT protocol performance, the synchronous link speed and the I/O loading requirements of the remote terminals.

Software that runs on the MUXserver 100 Remote Terminal Server is downline loaded over the Ethernet network from a Phase IV DECnet load host.

Terminal access using the MUXserver 100 Remote Terminal Server does not require DECnet running in the same service node. LAT uses the Ethernet addressing mechanism to transport terminal messages.

Features

- Login load balancing
- Multiple terminal sessions
- Automatic login failover
- Remote printer support

Terminal Connection Management

Through the use of a simple terminal command, users can:

- Establish a logical connection, called a session, to any local service node that implements the LAT protocol on the same Ethernet.
- Connect to the same or a different service node on the Ethernet.
- Several servers can be used to connect many terminals to one or more service nodes.

A service node can have one or more services that are offered to MUXserver 100 Remote Terminal Server 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, each VAXcluster on the Ethernet is seen as a collection of service nodes offering a common service.

Load Balancing

When a connection is made to a service, the actual node for the connection is determined by load balancing. Load balancing is a process the server uses when more than one node offers the same service. Service nodes do not have to be configured as a VAXcluster in order for load balancing to be used. Service nodes with the same names may 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, memory available, CPU class, and the number of users on the nodes that offer the service.

Multiple Sessions

- Allows each user to establish and maintain up to six sessions to one or more service nodes.
- Up to a maximum of 28 sessions per MUXserver 100 depending on the number of nodes in the server database.
- Only one session 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 sessions such a host will support.

Local Mode and Service Mode

For the most part, the environment provided by the MUXserver 100 Remote Terminal Server is identical to the environment the user would experience if attached through stand-alone multiplexers to the service node. When operating in this mode, the user is in Service Mode. Occasionally, during connection establishment, the user interacts directly with the MUXserver 100. When operating in this mode, the user is in Local Mode.

Local Mode - The terminal input is interpreted directly by the MUXserver 100 as commands to be performed by the server.

- Two different levels of operation: nonprivileged and privileged.
- Nonprivileged commands allow the terminal users to control their service sessions, set terminal characteristics, and show server information.
- Privileged mode is provided for the Server Manager to control the environment of the server and of the terminal users. Access to this mode is password protected.
- The Terminal Server Manager environment is a logical extension of the user environment.
- The Server Manager is treated as a server user with a privileged status.
- The Server Manager sets a terminal to this status using a command which requires a password. This privileged status allows the Server Manager to enter commands not usually available to server users. These commands set server characteristics, provide control over server port usage, and provide the ability to control the user's access to the server and network services.

  The MUXserver 100 also has a dedicated supervisory port that allows the Server Manager to control the environment of the server and of the terminal users. Access to this mode is password protected.

Service Mode - The terminal input is passed directly to the connected service node with several exceptions. One exception, the Local Switch Character, allows the user to enter Local Mode from Service Mode.

Note: The BREAK Key can also be used for this function.

Another exception, the Forward and Backward Switch Characters, allows the user to switch between sessions without entering Local Mode. The Switch Characters are disabled by default but can be enabled by command. Both CTRL/S and CTRL/Q are usually interpreted locally, however flow control using these characters can be disabled.

Autoconnection

- Automatically connects a user terminal to a service node when connection failures occur or upon user login to the server.
- A dedicated or preferred service can be specified for each terminal user.

Dedicated Service

- The MUXserver 100 Remote Terminal Server will attempt to connect to that service when a character is typed on the terminal keyboard or when an existing connection fails.
- Only one session is available.
- No Local Mode commands or messages are available to the terminal user.
- Ports with dedicated service can be automatically logged out of the server when the user logs out of the service node.

Preferred Service

- The MUXserver 100 Remote Terminal Server will attempt to connect to that service the same as with the dedicated service mode of operation.
- The terminal user can also enter Local Mode and establish other sessions.

Automatic Session Failover

If a 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. Autoconnection must be enabled for this feature to work. The user does not have to be already connected to that service node. Furthermore, the user's context at the time of failure is not automatically restored and login to the new service is required.

Groups

Every terminal and service node in a LAT network is a member of one or more groups. These groups are identified by numbers called group codes. Group codes are 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).

- A privileged user can change the group(s) in which a terminal is a member.
- Group codes 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.

Security

MUXserver 100 Remote Terminal Server security includes:

- The ability to lock a terminal's keyboard from another user's keyboard.
- Optional login protection and nonprivileged Local Mode of operation as a default.

Terminal Locking

A user can lock the terminal using a lock password. A lock password allows the user to leave sessions running on 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.

Password

Login passwords can be enabled on a per-line basis by the privileged user. If enabled, the terminal user must enter a login password to access server functions. If a dedicated service is specified, login protection is not available.

Terminal users usually have access to the non-privileged Local Mode. In Local Mode, users can issue commands that affect their own terminal environment. The server itself has a privileged mode for Server Manager's use. The mode is password protected.

On-line HELP Facility

A limited on-line HELP facility is available to remind users of command syntax. The HELP facility is not intended as a replacement for the documentation set.

Directory Service

Any MUXserver 100 Remote Terminal Server user can obtain a directory of services available with a SHOW SERVICES command. Unauthorized Services will not be displayed.

Port Parameter Configuration

Parameters governing the operation of an individual terminal can be modified and displayed by a nonprivileged terminal user interactively from their terminal. In the privileged mode, a Server Manager can modify parameters for other users' ports or for the server as a whole, and can also specify the composite, synchronous link parameters.

Permanent characteristics are maintained in the MUXserver 100 Remote Terminal Server memory (even maintained if the power is disconnected). Permanent characteristics are maintained for server-wide parameters as well as per-terminal parameters. Permanent characteristics can be reset to factory defaults by pressing the software reset button on the MUXserver 100 hardware unit while plugging in the power cord. Terminal parameters that can be set and displayed include: speed, character size, group codes, parity, and terminal type.

Port Access Characteristics

A port on a MUXserver 100 Remote Terminal Server, Version 2.3 can be set up in different ways depending on the device attached to the port and its intended use. The MUXserver 100 Remote Terminal Server supports RS-232-C asynchronous devices operating at speeds up to 9.6K bps (19.2K bps for interactive terminals) and supports XON/XOFF flow control.

Port access is the characteristic which determines how a port can access or be accessed by interactive users and service nodes.

1. Access Local - Designed for interactive terminals. This allows the device (typically an interactive terminal) attached to the port to CONNECT to LAT services.
2. Access Remote - Designed for application driven devices such as asynchronous printers which are allocated by a service node process by request. This allows the implementation of certain shared, remote printers by multiple service nodes.
3. Access Dynamic - Designed for devices (such as personal computers or printers with keyboards) which require both Local and Remote access.
4. Access None - Designed to allow the Server Manager to disable the use of a port.

Printers

With printer support capabilities, the setup procedure of remote printers needs to be performed once and is automatically reconfigured on system startup. The particular server port must be configured for remote access and set up to match the characteristics of the printer.

The system startup command file must be modified to call the two command files provided with the service node software. Finally, the command files themselves must be customized to reflect the environment of their node. The server can optionally queue remote connects if these connects cannot be satisfied immediately. This queue management can be enabled for the server by the server manager. Note that this is a connection queue only.

Network Configuration

The MUXserver 100 Remote Terminal Server is connected to an Ethernet using a DELNI, DECOM, DESTA, or H4000 Transceiver and a transceiver cable. Two synchronous, composite data link connections are supported, each of which can connect to a remote, eight line DECmux II concentrator. Two DECmux II concentrators can also be connected together using the route-through mode of operation. In this case, only a single MUXserver 100 composite link connection can be utilized.

Four LAN/WAN configurations are supported with the default, factory-set, MUXserver 100 parameters. Default MUXserver Network configurations are:

- Eight users (one DECmux) at ONE Remote Site
- Sixteen users (two DECmuxes) at ONE Remote Site
- Sixteen users, with eight users (one DECmux) at each of TWO Remote Sites. Two composite links are run from the MUXserver.
- Sixteen users, with eight users (one DECmux) at each of TWO Remote Sites. Only ONE composite link is run from the MUXserver to the closest Remote Site. The link is then ''Routed-through'' on a second composite link from the first DECmux to the DECmux at the farther Remote Site.

The composite link is HDLC based with remote data link transfer rates of 2400, 4800, 9600, or 19.2K bps for RS-232 connections, with up to 38.4K for RS-422. The rate can be selected by the server manager in privileged mode.

Both RS-232-C/CCITT V.24 modem connections or RS-422-A long line (up to one kilometer) are supported on the two MUXserver 100 composite link interfaces. The same connectors are used for both RS-232 and RS-422 Long Line Drive. The MUXserver 100 has a default setting for RS-232 and requires internal DIP switches and program settings to change to RS-422. Any change in switch setting requires access to the inside of the MUXserver 100 and, as such, should be performed by Digital Field Service.

Terminal Operation

The MUXserver 100 Remote Terminal Server supports the simultaneous operation up to sixteen terminals connected over two DECmux II modules at speeds from 75 bps to 19.2K bps. The DECmux II modules also support:

- Split speed (transmit and receive) terminal operation
- Block Mode transfers
- Automatic line speed detection
- Digital Personal Computer file transfer
- XON/XOFF handling
- Data Transparency mode
- Ability to pass BREAK character and/or error notification

Server Management

Several facilities exist for managing and trouble-shooting MUXserver operation. A Server Manager connected in privileged mode by means of the supervisory port can establish the composite link parameters, set up server identification information, change port parameters, or fine tune the operating characteristics of the server. Trouble-shooting facilities include diagnostic tests and on-line statistics.

A privileged user can diagnose Ethernet communications problems by looping messages to an Ethernet host and through the Ethernet hardware interface at the server. Connections to remote DECmux II modules can also be made to test the composite link integrity. 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.

The server maintains the following variety of statistics and counters: Ethernet data link statistics, LAT protocol statistics, and composite link statistics. The Ethernet data can be displayed and zeroed by a privileged terminal user. Server parameters that can be modified and displayed include the server identification, circuit timer, session limits, and login limits.

Remote Server Management

The MUXserver 100 Remote Terminal Server implements the console carrier feature which enables access to the MUXserver 100 Local Mode from a Phase IV DECnet host on the same LAN. A restricted set of Local Mode functions are available to a console carrier user. This capability provides centralized server management and remote server diagnosis.

Communications Supported on the MUXserver 100

MUXserver 100 Remote Terminal Server software is designed to run on MUXserver hardware exclusively. This hardware includes an Ethernet interface for connection to an Ethernet transceiver cable, two composite link ports, and a single supervisory terminal port.

Ethernet-connection alternatives:

- H4000 Baseband Ethernet Transceiver
- DESTA ThinWire Ethernet Station Adapter
- DECOM Broadband Ethernet Transceiver
- DELNI Ethernet Local Area Interconnect

Composite Link-connection alternatives include the following with 1200, 2400, 4800, 9600, 19200 and 38400 being the only available transfer rates on the interfaces:

- Leased Line Modem — Non-dialup synchronous, full-duplex via BC22F RS232 cable (non-satellite links). Bell ™ compatibility: 202 FDX, 201B, 208B, 209. CCITT compatibility: V.23, V.26, V.27bis, V.29. (up to the highest speed supported by the modem used).
- Direct RS-422-A Cable — Customer-supplied RS-422-A cable up to 1 kilometer or 3280 feet in length.
- Digital Transmission — Full duplex, Synchronous RS232 interface (non-switched).

Supervisory Terminal port can accept directly connected asynchronous terminals with the following Comm. characteristics:

1. Asynchronous RS-232-C start/stop transmission, having eight data bits, 1 stop bit, no parity.
2. Full duplex with XON/XOFF flow control.
3. Speeds selected from one of the following: 300, 600, 1200, 2400, 4800, 9600 baud, or AUTOBAUD.
4. Physical connections includes data lines only on a DB25-P connector.

At least one dedicated, hardcopy, Supervisory Terminal is recommended per MUXserver 100 site for use in diagnostic trouble-shooting, re-configuration, or performance monitoring.

Devices Supported on the DECmux II

The DECmux II has four types of interfaces to which external equipment can be connected:

1. Two RS-232-C Modem Composite Link Ports
2. Two RS-422-A Composite Link Ports
3. A single Supervisory Terminal Port
4. Eight Asynchronous RS-232-C Device Ports

The RS-232-C Composite Link-connection alternatives include the following with 1200, 2400, 4800, 9600, and 19200 bps being the only available transfer rates on the interfaces:

- Leased Line Modem — Non-dialup synchronous, full-duplex via BC22F RS232 cable (non-satellite links). Bell compatibility: 202 FDX, 201B, 208B, 209. CCITT compatibility: V.23, V.26, V.27bis, V.29. (up to the highest speed supported by the modem used).
- Digital Transmission — Full duplex, Synchronous RS232 interface (non-switched).

The only RS-422-A Composite Link-connection alternative is direct wire connection (customer-supplied cable) with 1200, 2400, 4800, 9600, 19200 and 38400 bps being the only available transfer rates.

Supervisory Terminal port can accept directly connected asynchronous terminals with the following communication characteristics:

- Asynchronous RS-232-C start/stop, having 8 data bits, 1 stop bit, no parity.
- Full duplex with XON/XOFF flow control.
- Speeds selected from one of the following: 300, 600, 1200, 2400, 4800, 9600 baud, or AUTOBAUD.
- Physical connections include data lines only on a DB25-P connector.

MUXserver 100 Remote Terminal Server Operation

The MUXserver 100 ROM-based firmware provides the necessary maintenance operation protocols for downline loading MUXserver 100 software from a Phase IV DECnet load host over the Ethernet into MUXserver memory. All self-test diagnostics are in MUXserver ROM, therefore, downline loading is not a precondition for MUXserver self-test. In the event of a bug check caused by a fatal error, the unit will usually attempt to upline dump server memory to a DECnet Phase IV host. Following this, the unit will automatically initialize itself and invoke a downline load.

Restrictions on MUXserver 100 Remote Terminal Server Usage

While terminal connections using the MUXserver 100 Remote Terminal Server have been designed to simulate direct terminal connections as much as possible, 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 which are directly dependent on the following functions may not operate in the same manner as a direct connection:

1. Applications that depend on reading or setting the terminal speed, character size and parity by manipulating system data structures.
2. Applications that depend on an extremely fast response time (typically less than 200 ms) to operate.
3. Applications that utilize an alternate terminal driver in the service node.
4. Applications that expect incoming connections to have fixed device names.
5. Applications that directly receive and send BREAK signals and/or XON/XOFF flow control characters (since these characters are usually intercepted and processed locally by the MUXserver 100 and DECmux II).
6. Applications that require dial-up modems connected to the DECmux II. (Unauthorized connection could occur if a call is disconnected and the terminal session is NOT logged out first).
7. Applications that utilize asynchronous DECnet software or protocols are not supported on the MUXserver 100.

HARDWARE REQUIREMENTS

VAX, MicroVAX or VAXstation configuration as specified in the System Support Addendum (SSA 28.45.02-x).

SOFTWARE REQUIREMENTS

VMS Operating System

DECnet-VAX

Host initiated connect capability and shared printer support are only available on VMS service nodes running LATplus/VMS.

A DECnet Load Host is required.

Refer to the System Support Addendum (SSA 28.45.02-x) for availability and required versions of prerequisite software.

ORDERING INFORMATION

Software Licenses: QL-VE4A*-**
Software Media: QA-VE4A*-**
Software Documentation: QA-VE4AA-GZ
Software Product Services: QT-VE4A*-**

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

SOFTWARE LICENSING

The MUXserver 100 Remote Terminal Server software license applies to the MUXserver 100 hardware on which the MUXserver software runs, NOT to the host node CPUs which downline load the software image, or service node CPUs in the network.

The user will need a separate license for each MUXserver 100 CPU on which the user is using the software product (except as otherwise specified by Digital). Materials and Service Options are selected to utilize the product effectively.

This product does not provide support for the VMS License Management Facility. A Product Authorization Key (PAK) is not required for installation or use of this version of the product.

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SOFTWARE WARRANTY

Warranty for this software product is provided by Digital with the purchase of a license for the product as defined in the Software Warranty Addendum of this SPD.
