Software Product Description

PRODUCT NAME: DECserver 300 for VMS, Version 2.0 **SPD 25.J1.01**

DESCRIPTION

DECserver 300 for VMS software provides concurrent Local Area Transport (LAT) and Telnet TCP/IP protocol support from a DECserver 300 terminal server to enable connectivity to host systems that utilize LAT or TCP/IP protocols. The TCP/IP protocol suite is used to connect to UNIX® host systems and other host systems that support the TCP/IP protocol suite.

The DECserver 300 Terminal Server is an Ethernet Communications Server for Ethernet Local Area Networks. The DECserver 300 provides a convenient method to logically connect up to sixteen Digital asynchronous terminals to one or more service nodes (hosts) on an Ethernet. Once the terminal is connected, a user can utilize application programs and utilities as though the terminal was directly connected to a host via a DMF32, DHU11 or DHV11/DHQ11 device, with a few exceptions. Thus, it may be possible to utilize the DECserver 300 to connect all terminals to service nodes in place of traditional interfaces, except for host console terminals and remote connection via dial-in modems which is not supported.

The DECserver 300 uses MMJs (Modified Modular Jacks) for the attachment of serial devices. The MMJ segregates a Data from a Voice connection. The DECserver 300 utilizes the EIA 423-A electrical interface standard for local connections. EIA 423-A is compatible with the EIA 232-D interface and supports DTR/DSR (Data Terminal Ready/Data Set Ready) signals. EIA 423-A supports longer cable runs and higher signaling speeds.

The DECserver 300 does not support connections to wide-area networks via modems. However, it does provide the capability for connections to non-LAT hosts.

The DECserver 300 also allows for host-initiated connections to serial printers. A print symbiont on service nodes can initiate connections to serial printers connected to DECserver 300 ports. This allows the printers to be distributed throughout a facility and accessed transparently by service node users. Incoming host-initiated connect requests may be queued FIFO at the server.

Port-to-port connections on the same server are also supported.

The DECserver 300 implements the LAT protocol for communication with service nodes that implement this protocol on the same Ethernet. This interface has been optimized for high terminal I/O performance over an Ethernet, while reducing host CPU cycles required to handle interrupts. Hence, under most I/O loading conditions, a significant performance gain may be realized by using the DECserver 300 versus direct terminal connections via traditional asynchronous backplane communications interfaces.

The DECserver 300 also implements the TCP/IP protocol suite for communication with host systems that implement TCP/IP. The TCP/IP protocols are based on the University of California's 4.3 Berkeley Software Distribution (BSD). The following TCP/IP protocols are supported and adhere to the Defense Data Network (DDN) Request for Comments:

- Transmission Control Protocol (TCP) is the internet standard transport level protocol that provides the reliable, end-to-end full duplex, stream service that supports many application protocols. (RFC 793).
- User Datagram Protocol (UDP) is an internet protocol that provides datagram service to application programs, allowing an application program on one machine to send a datagram to an applications program on another machine. UDP is necessary for the Domain Name System and other applications. (RFC 768).
- Internet Protocol (IP) is an internet standard protocol that defines the internet datagram as the unit of information that gets passed across the internet, and provides the universal addressing scheme for hosts and gateways for internet connection-less, best effort packet delivery services. IP includes ICMP as an integral part. (RFC 791).
- Internet Control Message Protocol (ICMP) is an internet network protocol that specifies error and control messages used with the internet protocols. (RFC 792).

- Address Resolution Protocol (ARP) is an internet protocol used to perform dynamic address resolution to dynamically map or translate an internet address into the correct physical hardware address. (RFC 826).
- Telnet is the standard internet application level protocol for remote terminal connection service. Telnet is a virtual terminal facility that allows a user at one site to establish a TCP connection to a remote system. Telnet makes the local terminal appear as a direct extension of the remote system, allowing the user to conduct a session and run application programs as if the user's terminal was directly connected to the remote system. (RFC 854).

  Both Telnet client and server capabilities are provided:

  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.

  Telnet server provides the ability to accept connection requests from internet hosts on a LAN or WAN to DECserver 300 ports, such as printers, host systems, or other serial devices.

  Telnet character and binary profiles are supported for internet sessions. Telnet options supported include: status, end of record, remote flow control, echo, timing mark, binary and suppress go ahead.

- Internet Domain Name System (DNS) Support. The Domain Name System provides the translation from system name to internet address. The DECserver 300 will interface to user programs and send queries to domain name servers for translating domain names to internet addresses, and internet addresses to domain names. (RFC's 1034,1035).
- Subnet Addressing (RFC 950).

The DECserver 300 also implements and supports the Terminal Device/Session Management Protocol (TD/SMP) to manage multiple sessions at the device level. The DECserver 300 provides the ability to communicate with devices which also implement this protocol, and assist in the management of multiple sessions for these devices. By implementing this protocol, the DECserver 300 can permit attached devices to maintain screen and keyboard context for multiple LAT and/or Telnet sessions, as well as allow these devices to run multiple LAT and/or Telnet sessions concurrently.

The DECserver 300 implements the ODL (On Demand Loading) font loading protocol which allows Asian terminals that implement the ODL protocol to communicate with a VMS host via a terminal server. The Asian terminals will be able to request font definitions from a VMS host when connected to a DECserver 300. This feature is supported only for LAT connections.

Software that runs on the DECserver 300 is downline loaded over the network from a Phase IV DECnet load host. Terminal access using the DECserver 300 does not require DECnet running in the same service node; LAT uses the Ethernet addressing mechanism to transport terminal messages.

Features such as login load balancing, multiple terminal sessions, automatic failover, and remote printer support can lead to greater user productivity.

For wide area network communications, terminal users can connect to remote hosts via Telnet through a TCP/IP router or gateway. In addition, terminal users can connect to a local service node running DECnet, where they can "SET HOST" to a remote system via the DECnet network terminal protocol. If this system has the requisite X.25 or SNA 3270 access routines, a terminal user could communicate to a remote SNA or X.25 host through the appropriate gateway and this intervening host. A DECserver 300 terminal user cannot communicate directly to remote hosts through DECnet Routers or X.25/SNA Gateways. Wide area network traffic will not provide the same high level of performance as local terminal connections, due to the additional DECnet or internet protocol overhead.

Features

Terminal Connection Management

Through the use of a simple command, users can establish a logical connection, called a session, to any service node that implements the LAT or Telnet protocol on the same Ethernet LAN, or to a remote host that implements the TCP/IP protocol suite. This connection makes the terminal appear as if it were physically connected to the service node, and the terminal user can use standard system utilities and applications supported by that node. Each terminal connected to the server can connect to the same or a different service node on the Ethernet. Furthermore, 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 DECserver 300 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 DECserver 300 sees each VAXcluster on the Ethernet as a collection of service nodes offering a common service. Each cluster node may 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 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 in a cluster 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 on the nodes that offer the service.

This feature is supported only for LAT connections.

Multiple Sessions

The DECserver 300 allows each user to establish and maintain up to eight sessions to one or more service nodes, up to a maximum of 128 per DECserver 300. 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 which a host will support.

Multiple Session Management

The DECserver 300 server allows direct communication with devices which support the TD/SMP protocol. This protocol provides the ability for the attached device to maintain screen and keyboard context for the multiple LAT or Telnet sessions which the DECserver 300 provides. By implementing the ability to directly communicate with this protocol to the attached device, the DECserver 300 can now assist in the management of context of these multiple sessions, as well as allow for simultaneous output to multiple LAT or Telnet sessions being maintained by the device.

Outbound Connection Queues

If a terminal user requests a connection to a server, and the requested service is currently in use, the terminal server users may opt to have the connection requested queued to the remote service. If the user's port has been appropriately configured, this feature happens automatically whenever a connection fails for this reason. 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. This feature is supported only for LAT connections.

Command Line Recall and Editing

The DECserver 300 server supports multiple command line entry recall and editing.

Welcome Identification

The DECserver 300 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 DECserver 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 DECserver 300. When operating in this mode, the user is in Local Mode.

In Local Mode, the terminal input is interpreted directly by DECserver 300 as commands to be performed by the server.

Additional commands and displays to support the features available with the TD/SMP protocol are usable in Local Mode. These commands will be used to enable or disable server recognition of the TD/SMP commands.

Local Mode has three different levels of privilege: privileged, nonprivileged and secure. 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. Nonprivileged commands allow the terminal user to control their service sessions, set the terminal characteristics and show server information. The Server Manager can set the server to secure mode on a per-terminal basis, which further limits the commands users can enter to only those which directly relate to the user's own terminal.

The 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 normally 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.

In Service Mode, the terminal input is passed directly to the connected service node with several exceptions. One exception, called the local switch character, allows the user to enter Local Mode from Service Mode. The <BREAK> key may 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 may 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 DECserver 300 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 automatically logged out of the server when the user logs out of the service node.

If a preferred service is specified, the DECserver 300 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.

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. 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. This feature is supported only for LAT connections.

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 - 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 that 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.

Security

The DECserver 300 provides functions which enhance security features already available in the service nodes. DECserver 300 security includes the ability to lock a terminal's keyboard from other users, optional login protection, and nonprivileged local mode of operation as a default.

A user may lock the terminal using a 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. The lock feature may be disabled by the Server Manager.

Each terminal port can be set to operate in a secure mode, which causes all commands that relate to other users to be disabled for that port.

Login passwords can be enabled on a per-line basis by the server manager. If enabled, the terminal user must enter a login password to access server functions.

DECserver 300 users normally have access to the nonprivileged local mode. In this mode, users may only issue commands that affect their own terminal environment. The server has a privileged mode for server manager's use. The mode is password protected.

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 quickly learn the basics of DECserver 300 operation. Tutorial HELP may be entered upon logging into the server.

Directory Service

Any DECserver 300 user can obtain a directory of services available to that user with a SHOW SERVICES command. Services for which the user is not authorized will not be displayed. Services apply only to LAT connections.

Permanent Characteristics

The DECserver 300 maintains permanent characteristics in non-volatile memory, which is 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 software reset button on the hardware unit while plugging in the power cord.

Port Characteristics Configuration

Characteristics governing the operation of an individual port can be displayed by a nonprivileged terminal user interactively from the user's terminal. Many of the characteristics may be set by the user, but certain characteristics are privileged and may 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, default protocol, and password protection.

Port Access

A port on a DECserver 300 may be configured in different ways depending on the device attached to the port and its intended use. DECserver 300 uses MMJs (Modified Modular Jacks) as the physical interface. The DECserver 300 utilizes EIA 423-A electrical interface standard for local connections, which is compatible with the EIA 232-D interface and supports sixteen asynchronous devices operating at speeds up to 19.2K bps with DTR/DSR (Data Terminal Ready/Data Terminal Set Ready) signaling.

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

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

With printer support capabilities, the configuration procedure of remote printers needs to be done once and will be 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.

Terminal Operation

The DECserver 300 software supports the simultaneous operation of up to sixteen asynchronous devices at speeds from 75 bps to 19.2K bps. The software also supports:

- Data leads only support
- DSR logout
- Signal check
- Signal control
- DSR/DTR flow control
- XON/XOFF flow control
- Split speed (transmit and receive) terminal operation
- Block Mode transfers
- Automatic line speed detection
- Digital personal computer file transfer
- Data transparency mode

- Ability to pass break character and error notification
- Ability to assist in multiple session management via TD/SMP

Server Management

Several facilities exist for managing and troubleshooting server operation. The Server Manager in privileged mode can set up server identification information, change port characteristics, or fine tune the operating characteristics of the server. Troubleshooting facilities include diagnostic tests, a remote console feature, and online 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. 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 capability also exists for the server manager to test a service connection by sending data from the initiating port to the service node and back again. The data is then compared and any discrepancies reported. At the service node, the data can be looped back by the LAT protocol, or internally or externally at the service port. This feature is supported only by DECserver 300 service nodes; VAX/VMS service nodes do not support this service loopback capability.

The server maintains a variety of statistics and counters. These include the following: Ethernet data link statistics, LAT protocol statistics, and port error statistics. This data can be displayed and zeroed by the Server Manager. Server parameters that can be modified and displayed include the server identification, circuit timer, session limits, and login limits.

Internet statistics are also maintained by the server. Internet characteristics such as internet address and subnet mask can be modified and displayed. TCP, IP, ICMP, and UDP protocol statistics can be displayed.

Remote Server Management

The DECserver 300 implements the console carrier feature which enables access to the DECserver 300 local mode from a Phase IV 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.

Communications

DECserver 300 software is designed to run on DECserver 300 hardware exclusively, which includes an Ethernet interface for connection to an Ethernet transceiver cable.

The DECserver 300 hardware has sixteen Modified Modular Jacks (MMJ) integral to the box. Each port can be individually configured in various modes:

- Data leads only
- Signal Control
- Data leads with DSR logout (if a terminal is powered down the session is automatically disconnected)
- Data leads with signal check (checks signal status before and during a session)
- DSR/DTR flow control

DECserver 300 Operation

The DECserver 300 ROM-based firmware provides the necessary maintenance operation protocols for downline loading DECserver 300 software from a Phase IV DECnet load host over the Ethernet into server memory. All self-test diagnostics are in DECserver 300 ROM and are executed on power-up prior to downline loading the server. 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 host. Following this, the unit will automatically initialize itself and invoke a downline load.

DECserver 300 Configuration and Performance

The process of configuring the DECserver 300 is based primarily on tradeoffs of cost and performance within the realm of satisfying user application requirements. Network applications will range from low-speed/low-cost to those of relatively high performance (e.g., connecting high-speed local terminals to local hosts within a local area network). The performance of a given server is a function of the expected network traffic, the load on hosts to which terminals are connected, and resultant processing pursuant to the dedicated function of the unit. Thus performance depends on several factors:

- 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

The DECserver 300 can sustain an aggregate character throughput of 30,720 characters per second. This is equivalent to running sixteen ports at 19,200 bps.

In order to achieve a viable configuration, the user and/or a Digital software specialist should perform a level of application analysis which 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 already discussed in this section may reduce the actual throughput.

Restrictions on DECserver 300 Usage

While terminal connections using the DECserver 300 have been designed to simulate direct terminal connections as much as possible, a few differences necessarily 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 as with a direct connection:

- Applications that depend on reading or setting the terminal speed, character size and parity by manipulating system data structures
- Applications that depend on an 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

VAX, MicroVAX, VAXserver or VAXstation configuration as specified in the System Support Addendum (SSA 25.J1.01-x).

SOFTWARE REQUIREMENTS *

VMS Operating System

DECnet-VAX

* Refer to the System Support Addendum for availability and required versions of prerequisite/optional software (SSA 25.J1.01-x).

Refer to the following SPD for information on other supported DECserver 300 systems:

DECserver 300 for ULTRIX (SPD 25.J2.xx)

DECserver 300 for MS-DOS (SPD 34.87.xx)

ORDERING INFORMATION

Software Licenses: QL-VTUA9-AA
Software Media: QA-VTUAA-H*
Software Documentation: QA-VTUAA-GZ
Software Product Services: QT-VTUA*-**

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

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The DECserver 300 software license applies to the DECserver 300 on which the server software runs, not to service host node CPUs in the network.

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.

SOFTWARE PRODUCT SERVICES

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