Software Product Description

PRODUCT NAME: DECserver 500 for VMS, Version 2.1 **SPD 26.97.03**

DESCRIPTION

The DECserver 500 series server is an Ethernet Communications Server for Ethernet Local Area Networks (LANs). The DECserver 500 series server can provide up to 128 EIA-423-A or 64 RS-232 asynchronous port connections to Digital asynchronous terminals. Both RS-232, via the 8 port CXY08 communication option card, and EIA-423-A, via the 16 port CXA16 communication option card and EIA-422 16 port CXB16 communication option card can be mixed together in any combination from two to eight cards in one server. The DECserver 500 series server provides a convenient method to connect logically up to 128 Digital asynchronous terminals to one or more service nodes (hosts) on an Ethernet. Once the terminal is connected, a user can use application programs and utilities as though the terminal was directly connected to a host via a DZ11, DMF32, or DHU11 device, with a few exceptions. Thus, it may be possible to use the DECserver 500 series server to connect all terminals to service nodes in place of traditional interfaces, except for host console terminals. Remote connection via dial-in modems is fully supported. See the *Restrictions* section for limitations.

The DECserver 550 server provides the additional support of IBM® 3270 CUT type displays through the use of the CXM04 option card (refer to the product description SPD 25.G5.xx for more details on the CXM04).

The DECserver 500 series server also 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 DECserver 500 series 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. This special print symbiont is included in the software distribution kits for VMS V5.0 to V5.4.

The DECserver 500 series server also provides the capability to connect host systems that do not support the LAT protocol, Digital personal computers, and dial-out modems directly to ports on the server. Interactive server users can issue commands to connect to services that are offered on such ports. Port-to-port connections on the same server are also supported.

The DECserver 500 series server implements the Local Area Transport (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 500 series servers as opposed to direct terminal connections.

The DECserver 500 series server implements the On-Demand Loading (ODL) font loading protocol, which allows Asian terminals that implement the ODL protocol to communicate with a suitable VMS host via a terminal server. The Asian terminals will be able to request font definitions from a suitable VMS host when connected to a DECserver 500 series server.

The DECserver 500 series server also implements and supports the Terminal Device/Session Management Protocol (TD/SMP) to manage multiple sessions at the device level. The DECserver 500 series servers provide the ability to communicate with devices that also implement this protocol, and assist in the management of multiple sessions for these devices. By implementing this protocol, the DECserver 500 series servers can permit attached devices to maintain screen and keyboard context for multiple LAT sessions, as well as allow these devices to run multiple LAT sessions concurrently.

Software that runs on the DECserver 500 series server is downline loaded over the network from a Phase IV DECnet load host. Terminal access using the DECserver 500 series server does not require DECnet running in the same service node; LAT uses the Ethernet addressing mechanism to transport terminal messages.

For wide area network (WAN) communications, terminal users can connect to a LAN service node running DECnet where they can "SET HOST" to a remote system via the DECnet network terminal protocol. If this system has the prerequisite X.29 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 500 series 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 and 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 protocol on the same Ethernet LAN. 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 500 series server users. Services and nodes are identified by name. Users usually connect to services, not to nodes, although often one of the service names will be the node name. Users can optionally specify a node and/or a port name when they connect to a service.

In a VAXcluster environment, the DECserver 500 series server 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 to a service associated with a particular cluster node.

Non-LAT Host Support

The DECserver 500 series server can be used to provide logical terminal connections to hosts that do not implement the LAT protocol. In this type of configuration, the server becomes the Ethernet connection and protocol support for these hosts. This expands the LAT network accessibility to the terminal user to include LAT hosts directly connected to the same Ethernet, and hosts connected to the LAT network via the DECserver 500 series server. Non-LAT host support should be implemented through the use of the CXY08 hardware option only.

A host that supports XON/XOFF, ASCII standards, and EIA RS-232-C/CCITT V.24/V.28 interfaces can be connected to the DECserver 500 series server. This provides the terminal user with a transparent connection to the non-LAT host. It is strongly recommended that the server port and the host-side port use the modem control signals to signal the host automatically on session disconnection. In this application the server port appears to the host as a dial-in modem. However, hosts that require more than one transition of the RING signal are not supported.

In this configuration there is a one-to-one correspondence between the port on a DECserver 500 series server and the connection on the host. The server manager assigns service names to individual ports or groups of ports that connect the host interface to the server.

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.

Multiple Sessions

The DECserver 500 series server allows a single user to establish and maintain up to eight sessions to one or more service nodes (up to 64), up to a maximum of 512 sessions per DECserver 550 unit. The DECserver 500 supports up to 256 sessions. The DECserver 500, when equipped with the optional upgrade, will support up to a maximum of 512 sessions. Only one session can be active at a time on each port. Through simple switching commands, the user can access the different sessions without repeating a login dialog each time. The number of simultaneous LAT sessions supported by a service node depends on the type of operating system running on that node.

Multiple Session Management

The DECserver 500 series servers allow direct communication with devices that support TD/SMP protocol. This protocol provides the ability for the attached device to maintain screen and keyboard context for the multiple LAT sessions that the DECserver 500 series servers provide. By implementing the ability to communicate with this protocol directly to the attached device, the DECserver 500 series servers can now assist in the management of context of these multiple sessions, as

well as allow for simultaneous output to multiple LAT 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 may opt to have the connection request 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. The connection request is queued at the service node end and is processed first-in/first-out until the user's connection request can be completed. This feature assists in the fair management of limited resources. Once queued for connection, the user also has the option to cancel the queue entry and proceed with other sessions.

Welcome Identification

The DECserver 500 series servers standard welcome banner, which includes terminal server type, version number, 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 500 series server 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 500 series unit. When operating in this mode, the user is in Local Mode.

In Local Mode, the terminal input is interpreted directly by DECserver 500 software as commands to be performed by the server.

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 the terminal users. Access to this mode is password protected. Nonprivileged commands allow the terminal user to control that user's service sessions, set 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 that 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 that 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.

The LIMITED VIEW port characteristic is a mechanism by which the server manager can prevent certain ports from executing SHOW NODES and SHOW SERVICES commands.

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 failure occurs, the server will automatically try every 30 seconds to re-establish a connection to the desired service.

If a dedicated service is specified for a port, the DECserver 500 series server will attempt to connect the port 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 per port. As this mode is designed to simulate a direct terminal connection, no local mode commands or messages are available to the terminal user.

If a preferred service is specified for a port, the DECserver 500 series server will attempt to connect the port to the service as with the dedicated service mode of operation. However, the terminal user can enter local mode and establish other sessions.

Node/Database Improvements

With the increasing size of LAN's, servers on some networks may temporarily find themselves in the situation of having more nodes available to them than they can store in server memory. This feature will purge all unused nodes and allow the server to update its node

database, eventually allowing the user to connect to the desired service.

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. However, the user's context at the time of failure is not automatically restored and login to the new service is required.

Line Card Redundancy

This feature provides the server manager with the ability to redirect an active line card to a stand-by line card already installed in the server without bringing the server down. There are a few restrictions associated with the Line Card Redundancy feature:

- Stand-by line cards must be previously defined using the Terminal Server Configurator(TSC) or Terminal Server Manager(TSM).
- The physical stand-by line card must be present in the server at initialization time.
- Source and target line cards must be of the same type.
- Once a stand-by card becomes active as a result of a MOVE command, it can not go back to stand-by without reloading the server.

For security, the line card redundancy feature does not attempt to preserve any sessions that the source (failed) line card users may have had before the move.

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 groups 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 can also be used by the server manager to tune the server's usage of its available memory.

Security

The DECserver 500 software provides functions that enhance security features already available in the service nodes. Security features include 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 on a per-port basis or on a server-wide basis.

Each terminal port can be set on the server to operate in a secure mode that causes all commands that relate to other users to be disabled for that port. The server manager can also define a unique password for each set of server ports offered as a service. This is useful for restricting access to devices like dial-out modems.

Login password protection 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. The login password is changeable, but is a server-wide password.

There is also a maintenance password for protecting unauthorized downline loads of the server or use of the Remote Console Facility (RCF) to manage the server remotely.

The DSRLOGOUT feature can be set for any terminal and is used with the CXY08 and BC22D, BC17D or BC22R cable to detect terminal power-down and enact an automatic port logout that disconnects all sessions established from that port. On modem controlled dial-in ports, the server will automatically disconnect an incoming call if the user does not successfully log in to the server within 60 seconds.

In Local Mode, DECserver 500 series users normally can use only the server's nonprivileged commands. In this mode, users may only issue commands that affect their own terminal environment. The server has a privileged mode for the server manager's use. This mode is password protected.

Online HELP Facility

A full online reference HELP facility is available. The server's HELP command provides information on correct syntax and details about each command. In addition, a tutorial HELP feature allows new users to learn quickly the basics of DECserver 500 operation. Tutorial HELP may be entered before logging in to the server by typing HELP at the username prompt.

A limited help characteristic is available. When this characteristic is enabled by TSM/TSC, an abbreviated help file will be loaded into the server freeing up more memory for session/nodes. When enabled, all help requests will result in the same abbreviated help screen, which lists the syntax of every server command available to the user. This characteristic could be enabled for DECserver 500's running with the KDJ11-SB processor to increase the number of sessions/nodes obtainable. Enabling LIMITED HELP on a DECserver 500 running with the KDJ11-SD processor will not result in any additional sessions/nodes.

Directory Service

Any suitable DECserver 500 series server 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. If limited view is enabled on the port, the user cannot perform a SHOW SERVICE.

Permanent Characteristics

Each DECserver 500 series server has a unique software image on its downline load host. A database of permanent characteristics is kept within each image. These characteristics can be changed prior to downline load by the server manager or load host manager. All permanent characteristics can be changed by using the Terminal Server Configurator (TSC) utility provided in the DECserver 500 software distribution kit.

TSC now supports the modification of CXM04 keyboard mapping tables from within the TSC program. Keyboard language table files are provided with the 3270 Terminal Software Option layered product. This product provides the firmware and keyboard tables needed to use the CXM04 line card on the DECserver 550.

The keyboard table files, one for each supported keyboard language, are used by the CXM04 firmware to translate IBM scan codes to Digital keys. Digital provides a default mapping that is described in the 3270 Terminal Option User's Guide. For example, by default, the 3270 ATTN key maps to the Digital VT220 BREAK (F5) key on the 3178 Models C1 and C2 keyboards.

Port Characteristics Configuration

Characteristics governing the operation of an individual port can be displayed by a nonprivileged terminal user interactively from that user's 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, parity, terminal type, access, autobaud, modem, and password protection.

Port Access

A port on a DECserver 500 series server may be set up in different ways depending on the device attached to the port and its intended use. Port access is the characteristic that determines how a port can 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 services. This type of access is also used for dial-in modems.
- Access Remote - Designed for applications-driven devices (like 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 non-LAT host systems by interactive users.
- Access Dynamic - Designed for devices (like dial-in/dial-out modems or printers with keyboards) that require both Local and Remote access, but not simultaneously.
- Access None - Designed to allow the server manager to disable the use of a port.

With printer support capabilities, the setup procedure of remote printers needs to be done once and is automatically reconfigured on server and/or 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.

Asynchronous Device Operation

The DECserver 500 software supports the simultaneous operation of up to 128 asynchronous devices at speeds from 50 bps to 38.4K bps under specified application conditions. The software also supports:

- Full modem control support (with CXY08 hardware option only)
- Data-leads-only support
- XON/XOFF flow control
- CTS/RTS and DSR/DTR flow control (with CXY08 hardware option only)
- Split speed (transmit and receive) terminal operation
- Block Mode transfers
- Automatic line speed detection
- Digital personal computer file transfer and terminal emulation
- Data transparency mode
- Ability to pass BREAK condition 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. The server manager can also assign service names to groups of one or more ports that are connected to non-LAT hosts or modems. Troubleshooting facilities include diagnostic tests, a remote console feature, online statistics and modem signal and flow control monitoring.

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. The server manager can send test data to any terminal, optionally using internal or external loopback with data comparison.

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 by the DECserver 500 series service nodes; VAX/VMS service nodes do not support this service loopback capability.

The server maintains a variety of statistics and counters. These include: 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.

Remote Server Management

The DECserver 500 software implements the Maintenance Operations Protocol (MOP) console carrier protocol, which enables access to the DECserver 500 series server from a Phase IV DECnet host on the same LAN. The entire local mode user interface is accessible to the remote management port 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 500 software is exclusively designed to run on DECserver 500 series hardware that includes an Ethernet interface for connection to an Ethernet transceiver cable.

The CXY08 hardware option has eight EIA RS-232-C/CCITT V.24 asynchronous line interfaces for connecting terminals to the unit.

The CXB16 hardware option has sixteen EIA-422 asynchronous line interfaces for connecting terminals to the unit.

The CXA16 hardware option has sixteen DECconnect connections (EIA-423-A) for connecting terminals to the unit.

The CXM04 hardware option has eight coax A 3270 synchronous line interfaces for connecting 3270 CUT mode devices and Cluster Controllers.

Using the CXY08 hardware option, each port can be set up by the server manager to operate using full-duplex modem control. The CXY08 hardware option is compatible with the Digital family of modems and with Bell 100 and 200 series modems and their equivalents. A BREAK feature is available and can be set on a per-port basis. This allows a BREAK condition to be passed through from a terminal connected on the server to the non-LAT host connected to a port on a DECserver 500 series server.

DECserver 500 Series Server Operation

The DECserver 500 series server provides the necessary Maintenance Operation Protocol boot ROM support for downline loading DECserver 500 software from a Phase IV DECnet load host over the Ethernet into server memory and also for upline dumping. All self-test diagnostics are in DECserver ROM; downline loading is not a precondition for DECserver self-test. 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 500 Series Server Configuration and Performance

The process of configuring the DECserver 500 series server 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 situations (e.g., connecting remote terminals through low-speed modems), to those of relatively high performance (e.g., connecting high-speed local terminals to local hosts within a local area network or connecting to non-LAT systems). 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
- Number of active connections to non-LAT hosts
- Terminal speeds
- Terminal user applications
- Number and size of host buffers
- Terminal workload

The DECserver 500 series server can sustain an aggregate user-data output throughput (from server to port devices) of 173,000 characters per second using a 10 millisecond circuit timer. The DECserver can sustain an aggregate user-data input throughput (port device to server) of 16,500 characters per second using an 80 millisecond circuit timer.

In order 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 already discussed in this section may reduce the actual throughput.

Restrictions on DECserver 500 Series Server Usage

While terminal connections using the DECserver 500 series terminal servers 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 use an alternate terminal driver in the service node
- Applications that expect incoming connections to have fixed device names or to obtain information about the name of the server and/or port

Applications that depend on certain physical device response times or do their own modem signal handling are not supported.

There are two restrictions that should be noted; for connections from the server, the LAT device created has an unpredictable name, and for host initiated connections, application programming will not be supported.

The DECserver 500 terminal server does not support the CXM04 communications option card.

HARDWARE REQUIREMENTS

VAX, MicroVAX, VAXstation, or VAXserver configuration as specified in the System Support Addendum (SSA 26.97.03-x).

SOFTWARE REQUIREMENTS*

VMS Operating System

* Refer to the System Support Addendum for availability and required versions of prerequisite/optional software (SSA 26.97.03-x).

Refer to the following Software Product Descriptions (SPDs) for information on other supported DECserver 500 series servers for RSX-11M-PLUS and Micro/RSX (SPD 18.53.xx), and ULTRIX (SPD 33.54.xx).

ORDERING INFORMATION

Software Licenses: QL-03KA9-AA
Software Media: QA-03KAA-H*
Software Documentation: QA-03KAA-GZ
Software Product Services QT-03KA*-**
LAT Network Concept Guide AA-LD84B-TK

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

SOFTWARE LICENSING

The DECserver 500 software license applies to the DECserver 500 series servers on which the software runs, not the service host node CPU 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.

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