

Software Product Description

**PRODUCT NAME: Ethernet Terminal Server for VMS and MicroVMS,
Version 3.0**

SPD 27.39.02

DESCRIPTION

The Ethernet Terminal Server is a network terminal switch for Ethernet Local Area Networks. The Ethernet Terminal Server provides a convenient method to logically connect up to 32 DIGITAL RS-232 asynchronous terminals to one or more service nodes (hosts) on an Ethernet. Once the terminal is connected to the service node, a user can utilize application programs and utilities as though the terminal was directly connected to a host via a DZ11, DMF32, or DHU11 device, with a few restrictions. Thus, it may be possible to utilize the Ethernet Terminal 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.

The Ethernet Terminal 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 Ethernet Terminal Server 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.

The Ethernet Terminal 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 which are offered on such ports. Port-to-port connections on the same server are also supported.

The Ethernet Terminal 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 Ethernet Terminal Server, versus direct terminal connections via DZ11s.

Software that runs on the Ethernet Terminal Server is down-line loaded over the network from a Phase IV DECnet load host. Terminal access to a service node from the Ethernet Terminal Server does not require

DECnet to be running in the same service node; LAT uses the Ethernet addressing mechanism to transport terminal messages. Refer to the Prerequisite Software section for more information.

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 a local service node running DECnet, where they can "SET HOST" to a remote system via the DECnet network terminal protocol. Note, too, that if this system has the requisite 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. An Ethernet Terminal Server 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 Ethernet Terminal 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 Ethernet Terminal Server sees each VAXcluster on the Ethernet as a

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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.

Non-LAT Host Support

The Ethernet Terminal 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 Ethernet Terminal Server.

A host that supports XON/XOFF, ASCII standards and RS-232-C interfaces can be connected to the Ethernet Terminal Server. This provides the terminal user with a transparent connection to the non-LAT host. It is strongly recommended that server port and the host side port utilize modem control signals to automatically signal the host upon 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 an Ethernet Terminal 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 typically based on the current loading on the nodes that offer the service.

Multiple Sessions

The Ethernet Terminal Server allows each user to establish and maintain multiple sessions to one or more service nodes, up to a maximum of 128 per Ethernet Terminal Server. Only one session can be active at a time on each port. Through simple switching commands, the user can access his or her sessions without repeating a login dialog each time. Some operating systems may impose limits on the number of LAT sessions such a service node will support.

Local Mode and Service Mode

For the most part, the environment provided by the Ethernet Terminal 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 Ethernet Terminal Server. When operating in this mode, the user is in Local Mode.

In Local Mode, the terminal input is interpreted directly by Ethernet Terminal Server 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 their service sessions, set their 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 port 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. Another exception, called the Forward Switch Character, allows 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

In conjunction with this function, a dedicated or preferred service can be specified for each terminal user.

If a dedicated service is specified, the Ethernet Terminal Server 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 Ethernet Terminal Server 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. However, 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, 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 groups for the server. This filtering feature permits the Server Manager to control the amount of memory used by the server to maintain its node database. The Server Manager can also enable the server's own service node groups if the server is offering its own ports as services. The user can specify groups for his or her port that are a subset of the server group codes.

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.

Security

The Ethernet Terminal Server provides functions which enhance security features already available in the service nodes. Ethernet Terminal Server 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, but not on a per-port basis.

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.

Ethernet Terminal Server 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. This mode is password protected.

Ethernet Terminal Server Services may be established with password protection.

Hot Swap of Line Cards

Server line cards can be replaced individually while the server is running without affecting other ports. This increases uptime for users and provides an easy means of correcting certain hardware problems without taking down the entire server. Additional line cards (up to the limit for the hardware configuration) may be added while the server is running.

On-line HELP Facility

A full on-line reference HELP facility is available. The server's HELP command provides information on the correct syntax and details about each command. It also presents information on topics not directly related to commands such as creating/switching multiple sessions.

Directory Service

Any Ethernet Terminal Server user can obtain a directory of services available to that user with a SHOW SERVICES command. Services offered by nodes that do not share at least one group code with the server and user's port will not be displayed to the user.

Permanent Characteristics

Each Ethernet Terminal Server has a unique software image on its host. A database of permanent characteristics is kept within each image. These characteristics can be changed prior to down-line load by the Server Manager or Load Host Manager. Permanent characteristics are maintained for service and server parameters as well as per-port parameters.

Port Parameter Configuration

Parameters governing the operation of an individual port can be modified and displayed by a nonprivileged user (logged into that port) interactively (from the user's terminal). In the privileged mode, a Server Manager can modify parameters for other users' ports or for the server as a whole.

A System/Network Manager can also use the Terminal Server Configurator (TSC) utility to make changes in a host-based Terminal Server image before being down-line loaded to a server. Both server and port parameters can be modified interactively or by using TSC. Port parameters that can be set and displayed interactively and by TSC include: speed, character size, group codes, parity, terminal type, autobaud, modem, and password protection. The TSC utility is provided with the Ethernet Terminal Server distribution kit.

With printer support capabilities, the setup procedure of remote printers needs to be done once and is automatically reconfigured on service node 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 done local to the server by the Server Manager. Note that this is a connection queue only.

Terminal Operation

The Ethernet Terminal Server software supports the simultaneous operation of up to thirty-two asynchronous devices at speeds from 50 bps to 19.2K bps. The software also supports:

- Full modem control support
- Data leads only support
- XON/XOFF flow control
- CTS/RTS flow control
- DSR/DTR flow control
- Split speed (transmit and receive) terminal operation
- Block Mode transfers
- Automatic line speed detection for most of the supported line speeds
- DIGITAL Personal Computer file transfer
- Data transparency mode
- Ability to pass BREAK condition and port characteristics to service nodes.

Terminals Supported

The Ethernet Terminal Server software supports the following DIGITAL terminal devices that have keyboards:

- LA12, LA34, LA35, LA36, LA38
- VT52, VT101, VT102, VT125, VT131
- VT200, VT220, VT240, VT241

Supported terminal parameters are:

- Character size: 7 or 8 bits per character
- Parity: Even, Odd, or None

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 Ethernet Terminal Server software also supports the following DIGITAL Personal Computers in both terminal emulation mode and file transfer mode:

- Professional 325, 350, 380
- Rainbow 100, 100B, 100+, 190
- DECmate II
- DECmate III

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 Ethernet Terminal Server software supports the following DIGITAL asynchronous printers when accessed from VMS and MicroVMS systems:

- LA50, LA200, LA120, LA210
- LQP02, LQP03
- LXY12-DA, LXY22-DA
- LN01S, LN03S, LCP01

Modems Supported

The Ethernet Terminal Server Software supports the following full-duplex asynchronous modems for dial-in and/or dial-out use:

- DF01, DF02, DF03, DF112, DF124, DF224, DF242 and DF212

Ethernet Terminal Server also supports private or leased-line modem applications. However, connections to data switches are NOT WARRANTED but MAY operate with this product.

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 which are connected to non-LAT hosts or modems. Troubleshooting facilities include diagnostic tests, a remote console feature, and on-line statistics.

A privileged user can diagnose Ethernet communications problems by looping messages from an Ethernet host and through the Ethernet hardware interface at the server. To diagnose terminal or port 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 a variety of statistics and counters. These include the following: Ethernet data link statistics, LAT protocol statistics, and port error statistics. These 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 Ethernet Terminal Server implements the console carrier feature which enables access to the Ethernet Terminal Server Local Mode from a suitably configured Phase IV DECnet host on the same LAN. The usual set of Local Mode functions are available to a console carrier user. This capability provides a form of centralized server management and remote server diagnosis.

Communications

Ethernet Terminal Server software is designed to run on Ethernet Communications Server hardware exclusively which includes an Ethernet interface for connection to an Ethernet transceiver cable.

On the Ethernet Terminal Server, each port on the server can be set up by the Server Manager to operate using full-duplex modem control. The Ethernet Terminal Server is compatible with DIGITAL's 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 the Ethernet Terminal Server user to pass a BREAK indication to a service node. If the service node is an Ethernet Terminal Server, then BREAK can be asserted to a non-LAT host on the server connected via reverse LAT.

Terminal Server Operation

The Ethernet Communications Server hardware provides the necessary maintenance operation protocols for down-line loading Terminal Server software from an Ethernet Phase IV DECnet load host, over the Ethernet, and into server memory. All software, including diagnostics, is down-line loaded into the unit. In the event of certain hardware or software malfunctions, the unit will attempt to up-line dump the Terminal Server memory and automatically reload the server software.

Ethernet Terminal Server Configuration and Performance

The process of configuring the Ethernet Terminal 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 systems on the LAN
- Number of active connections to service nodes from the server
- Terminal speeds
- Terminal user applications
- Number and size of host buffers
- Terminal workload

The Terminal Server can sustain an aggregate character throughput of over 61000 characters per second running 32 terminals at 19200 bits per second (provided that no more than 4 service nodes are connected to the server concurrently).

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 Ethernet Terminal Server Usage

While terminal connections using the Ethernet Terminal Server 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
- For connections from a server to a host system, the LAT device created has an unpredictable name.
- For host initiated connections, application programming will not be supported

HARDWARE REQUIREMENTS

VAX, MicroVAX, or VAXstation configuration as specified in the System Support Addendum (SSA 27.39.02-x).

SOFTWARE REQUIREMENTS*

VMS Operating System or MicroVMS Operating System

OPTIONAL SOFTWARE*

Terminal Server Manager

- * Refer to the System Support Addendum for availability and required versions of Prerequisite/Optional software (SSA 27.39.02-x).

ORDERING INFORMATION

Software Licenses: QL-726A*-**

Software Media: QA-726A*-**

Software Documentation: QA-726AA-GZ

Software Product Services: QT-726A*-**

Users Documentation only: QA-726AB-GZ

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

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.

SOFTWARE LICENSING

This software is furnished under the licensing provisions of DIGITAL's Standard Terms and Conditions. For more information about DIGITAL's licensing terms and policies, contact your local DIGITAL office.

SOFTWARE PRODUCT SERVICES

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

System Support Addendum

**PRODUCT NAME: Ethernet Terminal Server for VMS and MicroVMS,
Version 3.0**

SSA 27.39.02-A

MINIMUM HARDWARE REQUIRED

Processor Support:

VAX: VAX 8200, VAX 8250, VAX 8300, VAX 8350,
VAX 8500, VAX 8530, VAX 8550, VAX 8600,
VAX 8650, VAX 8700, VAX 8800, VAX 8974,
VAX 8978

VAX-11/730, VAX-11/750, VAX-11/780, VAX-11/785,
VAX-11/782.

MicroVAX: MicroVAX II

Not Supported: VAX-11/725, MicroVAX I, MicroVAX
2000, VAXstation.

Note: An R80/RL02 configuration is required for
VAX-11/730 systems.

The Ethernet Terminal Server software runs on the fol-
lowing Ethernet Communications Server packaged hard-
ware:

- DECSA-DA Ethernet Communications Server hard-
ware, including up to sixteen DCSAX-LC line cards
(dual line RS-232-C asynchronous to 19.2K bps, full
duplex) 32 physical ports
- DECSA-CA Ethernet Communications Server hard-
ware, including up to eight DCSAX-LC line cards (dual
line RS-232-C asynchronous to 19.2K bps, full
duplex) 16 physical ports.

One of the following SHIELDED cables should be used
with each of the physical lines on the line card:

- BC17D -Null modem cable for local connections
requiring full modem control
- BC22D -Null modem cable for local connections
- BC22E -EIA extension cable for remote (modem)
connections
- BC22R -Recommended null modem cable for host
systems and other devices, including those
which utilize CTS/RTS flow control
- BC17L - EIA adapter cable (for customers who supply
their own terminal cables)

The Ethernet Communications Server hardware requires
both a transceiver drop cable and either an Ethernet

transceiver (H4000 for baseband or DECOM for broad-
band) or the Local Network Interconnect (DELNI) to con-
nect to the Ethernet physical channel.

All software that runs on the Ethernet Terminal Server is
down-line loaded over the network from a DECnet-VAX,
Version 4.0 load host. This node must be a valid VMS or
MicroVMS system.

Block Space Requirements (Block Cluster Size = 1):

Disk space required for installation: 2,300 blocks
(1,178K bytes)

Disk space required for use (permanent): 2,300 blocks
(1,178K bytes)

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

OPTIONAL HARDWARE

Spare Ethernet Communications Server line cards
(DCSAX-LC)

- DCSAX-LC - Dual line RS-232-C asynchronous to
19.2K bps, full-duplex. Use BC17D or BC22D (null
modem), BC22E (EIA extension) or BC17L (adapter
cables).

CLUSTER ENVIRONMENT

This layered product is fully supported when installed on
any valid and licensed VAXcluster* configuration without
restrictions. The HARDWARE REQUIREMENTS sec-
tions 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 (SPD
29.78.xx) and include LI, Ethernet, and Mixed Inter-
connect configurations.

SOFTWARE REQUIREMENTS

VMS Operating System V4.5 - V5.0 or MicroVMS Oper-
ating System V4.5 - 4.7

Host-initiated connect capability is only available with
VMS (at a minimum of Version 4.5) service nodes run-

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ning LATplus/VMS, Version 1.0. LATplus/VMS, Version 1.2 is included with the Ethernet Terminal Server distribution and documentation for VMS load hosts.

A DECnet Phase IV end node licensed load host on the Ethernet is required to down-line load Ethernet Terminal Server, Version 3.0 software.

The Terminal Server software license applies to the Terminal Server on which the server software runs, not to the host CPU upon which the server software is installed for down-line loading.

VMS Tailoring

For VMS V5.0 or later systems, the following VMS classes are required for full functionality of this layered product:

- BASE
- DRVR
- NET
- PROG
- UTIL

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

MicroVMS Tailoring

For MicroVMS V4.x systems, the following components of MicroVMS are required for full functionality of this layered product:

- Base System
- Secure User Environment
- Common Utilities
- Program Development

OPTIONAL SOFTWARE

Terminal Server Manager V1.2

GROWTH CONSIDERATIONS

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

DISTRIBUTION MEDIA

Disk: RX50 Floppy Diskette, RX01 Floppy Diskette.

Tape: 9-Track 1600BPI MagTape (PE), TK50 Streaming Tape, TU58 DECtape II Cartridge.

ORDERING INFORMATION

Software Licenses: QL-726A*-**

Software Media: QA-726A*-**

Software Documentation: QA-726AA-GZ

Software Product Services: QT-726A*-**

User Documentation Only: QA-726AB-GZ

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

The above information is valid at time of release. Please contact your local DIGITAL office for the most up-to-date information.