

# Software Product Description

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**PRODUCT NAME: DECnet-RT, Version 1.0**

**SPD 10.72.1**

## **DESCRIPTION:**

DECnet-RT, Version 1.0, allows a suitably configured RT-11 system to participate as a Phase II DECnet node in point-to-point computer networks. DECnet-RT offers task-to-task communications, network file transfer and network resource-sharing capabilities, using the DIGITAL Network Architecture (DNA) protocols. DECnet-RT communicates with adjacent nodes over synchronous and asynchronous communication lines, and parallel interfaces. Access to DECnet-RT is supported for RT-11 user programs written in MACRO-11 and FORTRAN.

DECnet-RT is a Phase II network product and is warranted for use only with Phase II DECnet products supplied by DIGITAL.

The functionality available to an RT-11 user depends, in part, on the configuration of the rest of the network. Each DECnet product offers its own level of functionality and its own set of features to the user. Networks consisting entirely of DECnet-RT (a two node network because DECnet-RT supports one communication line) nodes have the full functionality described in this SPD. Networks that mix DECnet-RT nodes with other DECnet products may limit the functions available to the DECnet-RT user because some DECnet-RT features may not be supported by all DECnet products.

The Phase II products and functions available to users on mixed networks can be determined by comparison of the SPDs for the component products. An overview of DECnet and common functionality available with mixed networks can be obtained from the General Phase II DECnet SPD (10.78).

### *Task-to-Task Communication*

Using DECnet-RT, an RT-11 user program written in MACRO-11 or FORTRAN can exchange messages with other programs using Phase II DECnet DNA protocols. The two user programs must be adjacent DECnet nodes. (Adjacent nodes control opposite ends of a point-to-point communication line.) If on adjacent nodes, the second node can be any Phase II DECnet System that supports synchronous or asynchronous communication lines.

### *Network File Transfer Utilities*

Using DECnet-RT utilities, a user can transfer sequen-

tial ASCII files between Phase II DECnet nodes. Files can be transferred in both directions between locally supported RT-11 File System device and the file system of an adjacent DECnet node.

In addition, other types of files may be transferred where formats between the Phase II DECnet nodes are compatible.

Additional facilities allow system command files or batch files to be submitted to a remote node where the list of commands must be in the format expected by the node responsible for the execution. DECnet-RT does not support system command or batch files to be submitted from other systems.

### *Network Resource Access*

#### *File Access*

File access is supported to and from remote DECnet systems by explicit subroutine calls in FORTRAN and MACRO tasks.

READ, WRITE, OPEN and CLOSE, and DELETE operations can be initiated by local FORTRAN and MACRO tasks for sequential files residing at remote DECnet systems. Other nodes supporting File Access can exercise this capability for files located on the RT-11 node. Fixed and variable length record formats are supported. Further, files accessed remotely can contain either ASCII or binary information.

### *Network Information Program*

Using the DECnet-RT NIP utility, a user can set node name and password, and display statistics related to the communication lines, including data on traffic and errors. Output can be directed to the terminal or to a log file.

### *Terminal Communication Utility*

The DECnet-RT TLK utility allows a user at a DECnet-RT node to send messages to adjacent DECnet nodes that support the same feature. Messages can be directed to a specific terminal or to the operator's console at the destination node. TLK dialogue mode allows users on the two systems to type messages to one another.

### *Communications*

- DECnet-RT Version 1.0 supports the DIGITAL Data Communications Message Protocol (DDCMP) for full or half-duplex transmission in point-to-point operation using serial synchronous or asynchronous facilities. DDCMP provides error detec-

tion/correction and physical link management facilities.

- one point-to-point link can be supported by a RT-11 node. Only one link may connect any pair of nodes.

#### DECnet-RT Operation

DECnet-RT is implemented as a driver under RT-11 FB/XM and subroutines that would be linked with the Foreground or Background RT-11 program. Minimum memory residency requirements for a driver and network code are 7K words (14K bytes), and at least 1K words (2K bytes) for temporary data storage. Consequently, the user should plan to dedicate at least 8K (16 bytes) words of memory storage to network control functions. Additional memory will be required for a user written network task or any DECnet utility functions to be invoked (file transfer, TLK).

#### DECnet-RT Configuration

The process of configuring a DECnet-RT node is based primarily on trade-offs of cost, performance, and functionality, within the realm of satisfying the user's application requirements. It can be readily expected that network applications will run the full gamut from low-speed, low-cost situations to those of relatively high performance and functionality. The performance of a given DECnet node is a function not only of the expected network traffic and resultant processing ("global" conditions), but also of the amount of concurrent processing peculiar to that node ("local" conditions). Thus, node performance depends on many factors, including:

- CPU power
- number of device interrupts per unit time
- communication line characteristics
- number and size of buffers
- message size and frequency
- "local" applications

It is important to note that the rate at which user data may be shipped ("throughput") over a communications line may sometimes approach, but will never equal or exceed, the actual line speed; the same may be said for multiple lines as well. The reason, simply stated, is that the actual throughput is a function of many factors, including the user application(s), network topology, protocol overhead, and the factors cited at the beginning of this section.

There are basically two groups of communications interfaces presented in the tables below. They differ in many respects, particularly in their effect upon CPU utilization.

- The DMC11 is a direct memory access (DMA) device. Also the DDCMP line protocol is executed in microcode by the DMC11 communication controller, thus off-loading the PDP-11. Thus, the only DECnet load the processor sees is completed incoming and outgoing messages.
- With character interrupt devices such as the DUP11, CPU cycles are required for not only the DDCMP processing, but also each character sent and received.

The following tables describe what physical hardware configurations are supported by DECnet-RT in terms of CPU class and communication interface. It should be noted that the attachment of such devices as A/D converters and multiple terminals may reduce the line speed which can effectively be supported.

#### DECnet-RT

##### Maximum Line Configurations On 11/03 CPUs

Device Group	Max. No. of Lines	Maximum Linespeed (Kilobits/sec)	Maximum Device Bandwidth (Kilobits/sec)	Mode
DUV11, DLV11-E	1	2.4	2.4	FDX, HDX

#### DECnet-RT

##### Maximum Line Configurations On 11/04-11/70 CPUs

Device Group	Max. No. of Lines	Maximum Linespeed (Kilobits/sec)	Maximum Device Bandwidth (Kilobits/sec)	Mode
DL11				
DU11, DUP11	1	9.6*	9.6*	FDX, HDX
DMC11-AR, -DA	1	19.2	19.2	FDX, HDX
DMC11-AL, -MD	1	56.0	56.0	FDX, HDX
DMC11-AL, -MA	1	1000.0	1000.0	FDX, HDX

\* restricted to maximum of 4.8 on PDP-11/10 or 11/04

In order to achieve a viable configuration, the user and/or a DIGITAL software specialist must perform a level of application analysis which addresses the factors above. In the preceding tables, the columns have the following meanings:

#### Maximum Number of Lines

The largest number of physical lines which can be attached and driven by the DECnet-RT system.

#### Maximum Device Bandwidth

The maximum total number of bits per second which can be handled by a CPU for a given communication device. For example, DECnet-RT on a PDP-11/04 can accommodate one full-duplex character-interrupt device at 4.8KB.

#### Maximum Line Speed

The fastest clock rate at which the device can be driven under DECnet-RT. This means that even if specific devices have the ability to operate at a maximum rate, they must be configured subject to the "maximum device bandwidth" restriction above.

#### Mode

This indicates whether the line is operating in either half-duplex (a single-bit stream) or full-duplex (two concurrent bit streams) mode. In some instances in the tables, a half-duplex line is quoted as having maximum bandwidth approximately double that of the comparable full-duplex line. This reflects the single bit stream character of half-duplex lines, and the fact that two of them place a load on the CPU roughly

equivalent to one full-duplex line with traffic in both directions.

#### MINIMUM HARDWARE REQUIRED:

Any valid RT-11 FB/XM system configuration with:

- a minimum of 8K words (16K bytes) additional available memory for the DECnet-RT software and data storage
- PDP-11/04 through PDP-11/70 central processor with one or more of the following communications devices:
  - DU11-DA low speed synchronous interface
  - DUP11-DA low speed synchronous interface
  - DMC11-AR-DA high speed synchronous EIA interface
  - DMC11-AL-MD high speed local synchronous interface
  - DMC11-AL-MA high speed local synchronous interface
  - DL11-E asynchronous interface with modem control
  - DL11-C asynchronous interface, 20mA current loop (1)
  - DL11-WA asynchronous interface, 20mA current loop (1)

PDP-11/03 central processor with one of the following communications devices:

- DUV11-DA low speed synchronous interface
- DLV11-E asynchronous interface with modem control

#### NOTE:

(1) Requires either the H319 option for optical isolation or one side of the 20mA line to be in passive mode.

#### OPTIONAL HARDWARE:

None

#### PREREQUISITE SOFTWARE:

RT-11 FB/XM operating system, Version 3.0

#### OPTIONAL SOFTWARE:

None

#### TRAINING CREDITS:

None

#### SUPPORT CATEGORY:

A — Software Support will be provided as stated in the Software Support Categories Addendum to this SPD.

Installation under Category A support will convert the RT-11 system into a node with connection potential to a DECnet Phase II network. This installation does not include a demonstration of network connection.

The Customer may purchase DECnet-RT licenses with options that do not include support services. The category of support applicable to such software is Category C. When a DECnet-RT product option that does not include support services is connected to a DECnet network, the category of support applicable to all DECnet products in that network is Category C.

#### CUSTOMER RESPONSIBILITIES:

Before installation of the Software, the Customer must:

1. Install or have installed all hardware, including terminals, to be used on the system.
2. Make available to DIGITAL personnel all hardware, including terminals, to be used during installation for a reasonable period of time each day, as mutually agreed upon by DIGITAL and the Customer, until installation is complete.

Delays caused by any failure to meet these responsibilities will be charged at the then prevailing rate for time and materials.

#### PREREQUISITE SUPPORT:

A Network Profile and DECnet Customer Support Plan are required to be jointly prepared by the customer and DIGITAL covering all intended network nodes and their support.

#### UPDATE POLICY:

Software Updates, if any, released by DIGITAL during the one (1) year period following installation, will be provided to the customer for a media charge (includes no installation). After the first year, updates, if any, will be made available according to then prevailing DIGITAL policies.

#### ORDERING INFORMATION:

All binary licensed software, including any subsequent updates, is furnished under the licensing provisions of DIGITAL's Standard Terms and Conditions of Sale, which provide in part that the software and any part thereof may be used on only the single CPU on which the software is first installed, and may be copied, in whole or in part (with the proper inclusion of the DIGITAL copyright notice and any DIGITAL proprietary notices on the software) only for use on such CPU. All source licensed software is furnished only under the terms and conditions of a separate Software Program Sources Agreement between Purchaser and DIGITAL.

Standard options with no support services are only available after the purchase of one supported license. When a software license is ordered without support services, the category of support applicable to such software is Category C.

A single-use license only option is a license to copy the software previously obtained under license, and use such software in accordance with DIGITAL's Standard Terms and Conditions of Sale. The category of support applicable to such copied software is Category C.

Source and/or listing options are only available after the purchase of at least one binary license and after a source license agreement is in effect.

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The following key (D, E, F, R, T, Y, Z) represents the distribution media for the product and must be specified at the end of the order number, e.g., QJ685-AD = binaries on 9-track magnetic tape.

D = 9-track Magnetic Tape  
 E = RK05 Disk Cartridge  
 F = 7-track Magnetic Tape  
 R = Microfiche  
 T = RK06 Disk Cartridge  
 Y = Floppy Diskette  
 Z = No hardware dependency

**Standard Options**

QJ685 -A— Single-use license, binaries, documentation, support services (media: D, E, F, T, Y)  
 QJ685 -C— Single-use license, binaries, documentation, no support services (media: D, E, F, T, Y)  
 QJ685 -D— Single-use license only, no binaries, no documentation, no support services (media: Z)

**Source/Listing Options**

QJ685 -E— All sources (media: D, E, F, T, Y)  
 QJ685 -F— Listings (media: R)

**Miscellaneous Options**

QJ685 -G— Pre-delivery kit (media: Z)

**ADDITIONAL SERVICES:**

QS680 -S— DECnet Level I Services (media: Z)

Level II services are also available. Consult the DECnet Phase II Products SPD (10.78) for a description of Level I and Level II services.

**ADDENDUM****SOFTWARE SUPPORT CATEGORIES**

Each software product (hereinafter 'SOFTWARE') with a designated Support Category A or B in the applicable Software Product Description (SPD) existing at the time of order will be the current release at the time of delivery and will conform to the SPD. DIGITAL's sole obligation shall be to correct defects (nonconformance of the SOFTWARE to the SPD) as described below. Any SOFTWARE with a designated Support Category C will be furnished on an 'as is' basis.

For SOFTWARE with a designated Support Category A or B, DIGITAL will provide the services set forth below without additional charge.

**CATEGORY A**

1. Upon notification by customer to the nearest DIGITAL office that the computer system, including all required prerequisite hardware and software, is ready for the installation of the SOFTWARE, DIGITAL will install such SOFTWARE in any location within the contiguous forty-eight (48) United States, the District of Columbia, or a country in which DIGITAL or a subsidiary of DIGITAL has a software service facility. The notification must be received by DIGITAL and the system must be ready for installation within thirty (30) days after the delivery of the SOFTWARE to customer or DIGITAL will have no obligation to install. Installation will consist of: (1) verification that all components of the SOFTWARE have been received by customer, (2) loading the SOFTWARE, and (3) executing a DIGITAL sample procedure.
2. During the ninety (90) day period after installation, if the customer encounters a problem with the current unaltered release of the SOFTWARE which DIGITAL determines to be a defect in the SOFTWARE, DIGITAL will provide the following remedial service (on site where necessary): (1) if the SOFTWARE is inoperable, apply a temporary correction (TC) or make a reasonable attempt to develop an emergency by-pass, and (2) assist the customer to prepare a Software Performance Report (SPR) and submit it to DIGITAL.
3. During the one (1) year period following installation, if the customer encounters a problem with the SOFTWARE which his diagnosis indicates is caused by a SOFTWARE defect, the customer may submit an SPR to DIGITAL. DIGITAL will respond to problems reported in SPRs which are caused by defects in the current unaltered release of the SOFTWARE via the Maintenance Periodical for the SOFTWARE, which reports SPRs received, code corrections, temporary corrections, generally useful emergency by-passes and/or notice of the availability of corrected code. Software Updates, if any, released by DIGITAL during the one (1) year period, will be provided to the customer on DIGITAL's standard distribution media as specified in the applicable SPD. The customer will be charged only for the media on which such updates are provided, unless otherwise stated in the applicable SPD, at DIGITAL's then current media prices.

**CATEGORY B**

During the one (1) year period following delivery, the services provided to the customer will be the same as set forth in 3 above.

**CATEGORY C**

SOFTWARE is provided on an 'as is' basis. Any software services, if available, will be provided at the then current charges.

DIGITAL shall have the right to make additional charges for any additional effort required to provide services resulting from customer use of other than current unaltered release of the SOFTWARE operated in accordance with the SPD.