Software Product Description

PRODUCT NAME: **X25router 2000, Version 1.1 (Formerly X25router)** **SPD 28.86.01**

DESCRIPTION

The X25router 2000 is a communications product that provides routing and X.25 communications services for a Local Area Network (LAN). It allows communications with nodes outside the LAN within a Wide Area Network (WAN). By using an X25router 2000, the routing load on other nodes on the LAN is reduced, releasing resources for other applications.

Note: The X25router 2000 software product runs on the DEC MicroServer (DEMSA) hardware unit or the DEC MicroServer-SP (DEMSB) hardware unit. The X25router 2000 software license is available as part of two packages:

- The X25router 2000 package includes the X25router 2000 software license and the DEC Microserver (DEMSA) hardware unit.
- The X25router 100 package include the X25router 2000 software license and the DEC MicroServer-SP (DEMSB) hardware unit.

The X25router 2000 software running on the DEC MicroServer (DEMSA) or DEC MicroServer-SP (DEMSB) provides the following services to Phase IV DECnet nodes on a IEEE 802.3 or ISO 8802/3 Local Area Network (LAN):

- DECnet routing services
- X.25 communications services

DECnet Routing Services

For DECnet routing purposes, Phase IV DECnet networks consist of a number of linked areas. Each area is not limited to a specific geographic region, but is often localized (such as a LAN in a building). DECnet routing is handled by specified routing nodes, which may have to do this task in addition to providing services to users. DECnet routing works on two levels:

- Level 1 routers provide routing services between nodes within an area. This is called intra-area routing.
- Level 2 routers provide routing services between areas. This is called inter-area routing.

The X25router 2000 running on the DEC MicroServer is a routing system that can act as a level 1 and/or a level 2 router. The system routes data over a LAN (Ethernet) circuit, synchronous DDCMP circuits, and DECnet circuits established across X.25 PSDNs. This gives other DECnet nodes on the LAN access to remote nodes, and also relieves them of the routing overhead.

The X25router 2000 running on the DEC MicroServer-SP is a routing system that can act only as a level 1 router. The system routes data over a LAN (Ethernet) circuit and DECnet circuits established across X.25 PSDNs. This gives other DECnet nodes on the Ethernet access to remote nodes, and also relieves them of the routing overhead. If required, the system can also route data over a single synchronous DDCMP circuit.

X25 Communication Services

For X.25 communications purposes, the X25router 2000 allows DECnet users to reach remote DECnet nodes across a supported PSDN. This facility is called Data Link Mapping (DLM). The X25router 2000 also acts as a connector node to provide access to supported PSDNs for any system on the LAN running a supported VAX P.S.I. Access product. (Note that VAX P.S.I. Access is available only on VMS or MicroVMS systems.)

The X25router 2000 can be used in several different ways. For example, running on the DEC MicroServer, the X25router 2000 can:

- Act as a level 1 router to route data to nodes in the same area
- Act as a level 2 router to route data to nodes in other areas
- Connect to a DECnet node in another area via DDCMP
- Act as an access point to a PSDN for nodes on a LAN
- Connect to remote DECnet nodes in other areas via a public PSDN
- Connect to remote DECnet nodes by means of a private PSDN
- Provide a point-to-point ISO 8208 connection

November 1989
AE-KP96B-TN

System Overview

The X25router 2000 system is a combination of hardware and software. The X25router 2000 software runs on either the DEC MicroServer (DEMSA) or the DEC MicroServer-SP (DEMSB) communications server.

The major features of the X25router 2000 software running on the DEC MicroServer (DEMSA) are:

- Physical Characteristics
  - A table top unit, which can also be rack or wall mounted
  - Status display
  - Ethernet and four synchronous ports
  - The four synchronous ports can be used as either DECnet DDCMP connections or X.25 connections
- Synchronous Line Capabilities
  - Line speeds of up to 384K bits per second
  - Supports the following interchange circuits and electrical interfaces:

    CCITT - V.24, V.28, V.35, V.36, V.11, V.10

    EIA - RS232-C, RS232-D, RS449, RS422, RS423
  - Supports CCITT (1980) X.21 for leased line services only
  - Full modem control on all synchronous lines
- DECnet Routing Capabilities
  - DECnet Phase IV Level 1 and/or level 2 routing.
  - Provides routing services between 63 areas, each of up to 1023 nodes. These are the maximum values permitted by the Digital Equipment Corporation's Network Architecture. Note that satisfactory operation in large networks requires proper network planning.
  - Adaptive routing to and from the LAN, and using up to 63 other routing circuits (DDCMP or DLM) over the synchronous links.
  - Communicates with remote Phase III nodes in the same DECnet area.
  - Path splitting, where there are two or more equal-cost paths between the X25router 2000 and the destination DECnet node. For this feature, all the destination nodes must support out-of-order packet caching.
- DDCMP Capabilities
  - Communicates with all supported synchronous Digital DDCMP products, excluding the DMC11.
  - Works on point-to-point or multipoint links. However, on DDCMP multipoint links, the X25router 2000 can act only as a tributary.
  - Full- or half-duplex communications.
- X.25 Capabilities
  - Connects to multiple supported PSDN(s) on a per-line basis
  - Can have more than one connection to a PSDN. Each connection must have a unique DTE address. The X25router 2000 can share outgoing calls between all the DTEs connected to a PSDN.
  - Supports both Permanent Virtual Circuits (PVCs) and Switched Virtual Circuits (SVCs). PVCs and SVCs can be used either as DLM circuits (VMS and ULTRIX hosts) or as virtual circuits with VAX P.S.I. Access nodes.
  - Supports a maximum of 512 PVCs and/or SVCs, of which a maximum of 63 can be DLM circuits.

The major features of the X25router 2000 software running on the DEC MicroServer-SP (DEMSB) are:

- Physical Characteristics
  - A table top unit, which can also be rack or wall mounted
  - Status display
  - Ethernet and a single synchronous port
  - The synchronous port can be used as either a DECnet DDCMP connection or an X.25 connection
- Synchronous Line Capabilities
  - Line speeds of up to 19.2K bits per second
  - Supports the following interchange circuits and electrical interfaces:

    CCITT - V.24, V.28, V.35, V.36, V.11, V.10

    EIA - RS232-C, RS232-D, RS449, RS422, RS423
  - Supports CCITT (1980) X.21 for leased line services only
  - Full modem control on the synchronous line
- DECnet Routing Capabilities
  - DECnet Phase IV Level 1 routing only.
  - Provides routing services for up to 16 end nodes within its own area.
  - Adaptive routing to and from the LAN, and using up to 2 other routing circuits (2 DLM or 1 DDCMP) over the synchronous link.
  - Communicates with remote Phase III nodes in the same DECnet area.
- DDCMP Capabilities
  - Communicates with all supported synchronous Digital DDCMP products, excluding the DMC11.

- Works on point-to-point or multipoint links. However, on DDCMP multipoint links, the X25router 2000 can act only as a tributary.
- Full- or half-duplex communications.

• X.25 Capabilities

- Connects to a single supported PSDN.
- Supports both Permanent Virtual Circuits (PVCs) and Switched Virtual Circuits (SVCs). PVCs and SVCs can be used either as DLM circuits (VMS and ULTRIX hosts) or as virtual circuits with VAX P.S.I. Access nodes.
- Supports a maximum of 16 PVCs and/or SVCs, of which a maximum of 2 can be DLM circuits.

The X25router 2000 running on either the DEC MicroServer (DEMSA) or DEC MicroServer-SP (DEMSB) has the following management capabilities and tools:

- Configuration from a VMS or ULTRIX load host using a configuration program.
- Dynamic reconfiguration while the system is running from any suitable VMS node or ULTRIX load host using the Network Control Program (NCP).
- Remote management from any suitable VMS node or ULTRIX load host using the DECnet Network Control Program (NCP).
- Remote problem diagnosis from any suitable VMS node using the TRACE utility.
- Automatic dumping and reloading from a VMS or ULTRIX load host following a system failure.
- Event logging to any suitable VMS or ULTRIX node.

X.25 Capabilities

Some of the major X.25 capabilities of the X25router 2000 are:

• Can be used as a packet-mode DTE connected to a supported PSDN (Refer to Table I).

• Can be used as one end of a point-to-point connection that uses ISO 7776 and 8208 standard protocols. The X25router can act as either the DTE or DCE.

  Note that the X25router does not provide any packet-switching exchange facilities.

• Conforms to CCITT recommendations X.25 (1978, 1980, 1984), and to ISO standards 3309, 7776, and 8208 (Refer to the *Conformance to Standards* section for more information).

• Uses LAPB or LAPBE as the frame-level data link protocol.

• Can split and recombine messages that are longer than the packet size of a DECnet DLM circuit.

• Routes non-DECnet traffic from a PSDN to one or more VAX P.S.I. Access nodes on the Ethernet. The network manager has full control over which node the incoming call is routed to.

Supported Public Networks

Table I (at the end of this SPD) lists the public PSDNs that are supported by the X25router 2000. The product is supported only on the public PSDNs in the countries shown. Connections to public networks not listed in Table I are not supported by Digital at the time of publication of this SPD. Please consult your local Digital office for any questions you have concerning other public PSDNs.

In addition to the public PSDNs listed in Table I, certain private PSDNs are supported by the X25router 2000, and the appropriate profiles are included in the X25router 2000 product.

Conformance To Standards

The X25router 2000 conforms to the following international standards:

• CCITT recommendation X.25 (1978, 1980, or 1984) using the LAPB or LAPBE variants of the data link and X.25 packet protocols.

• ISO standards 7776 and 8208.

• ISO standard 3309 for HDLC frame generation and recognition (BSC framing is not supported) on the X.25 ports.

The hardware can operate with a number of electrical interface standards (refer to the *Line Support* section). The X25router 2000 provides only the electrical interface of a DTE rather than a DCE, and does not provide clock signals. An external clock source (such as a modem) is required for any X.25 or DDCMP synchronous port.

Optional X.25 Facilities Supported by the X25router 2000

The X.25 recommendation covers a wide range of optional facilities. Table II (located at the end of this SPD) lists these facilities and indicates which of these facilities the X25router 2000 supports. The central column in Table II indicates the paragraph number in the X.25 recommendation (1984) that defines the facility.

The features in Table II are those that the X25router 2000 is capable of supporting when used with a VAX P.S.I. Access product that also supports that feature. However, individual PSDNs may not support all of these features. The product documentation specifies the facilities available on each supported public PSDN.

Line Support

The DEC MicroServer (DEMSA) and the DEC MicroServer-SP (DEMSB) hardware units are packaged in LANbridge 100-type enclosures that contain an Ethernet interface port (IEEE 802.3 compatible). The DEC MicroServer has 4 synchronous communications ports, while the DEC MicroServer-SP has a single synchronous port. Both hardware units are supplied as table-top units, but can also be wall or rack mounted in a standard 19 inch rack.

The DEC MicroServer and DEC MicroServer-SP support the following interchange circuits and electrical interfaces:

• CCITT - V.24, V.28, V.35, V.36, V.11, V.10

• CCITT - X.21 (1980) for leased line services only.

• EIA - RS232-C, RS232-D, RS449, RS422, RS423

The number of lines supported depends on the hardware unit, the electrical interface type, and the maximum line speed in use:

DEC MicroServer — **Maximum Line Speed (Kbps)**

Interface Type		**19.2**	**64**	**256**	**384**
V.28/V.24	RS232-C/D	4	-	-	-
V.36/V.11	RS422/RS449	4	4	3	2
V.10	RS423	4	4	-	-
V.35		4	4	3	2
X.21 leased line		4	4	3	2

DEC MicroServer-SP — **Maximum Line Speed (Kbps)**

Interface Type		**19.2**
V.28/V.24	RS232-C/D	1
V.10	RS423	1
V.35		1
X.21 leased line		1

Adapter cables provide the necessary interchange circuits for each synchronous line. Refer to the System Support Addendum (SSA 28.86.02-x) for further information on the required adapter cables.

Note that an external clock source, such as a modem, is always required.

Installation and Configuration

The X25router 2000 has no file storage of its own and relies on a host system, called a load host, to load the software on the DEC MicroServer or DEC MicroServer-SP.

The minimum requirement is for one load host. However, the X25router 2000 software can be installed on a number of load hosts. This helps to protect against loss of service if a single load host is unavailable, or unable to load the system for any other reason.

The X25router 2000 software image is installed and configured on an ULTRIX, VMS or MicroVMS load host on the same LAN as the DEC MicroServer or DEC MicroServer-SP hardware unit. During system initialization, this software image is down-line loaded to the hardware unit from the load host.

The load host and configuration databases contain information that defines the X25router 2000 configuration. The network manager can create and modify these databases by using utilities that are part of the load host software. The configuration database is down-line loaded to the X25router 2000 during system initialization.

Network Management

The network manager controls the system when it is running by using the DECnet Network Control Program (NCP) from any DECnet Phase IV node. For example, the manager can use the NCP utility from one of the systems on the LAN. Management of the X.25 part of this product is restricted to ULTRIX load host, VMS or MicroVMS systems.

The NCP utility provides three basic functions:

- Control the X25router 2000 (for example, starting and stopping lines, setting parameters, and loading the software).
- Display statistics and error information for the X25router 2000 (for example, statistics on line usage or errors).
- Test the components of the network (for example, loop messages through all or part of a communications path to isolate a defective component)

Accounting and Security

Each VAX P.S.I. Access node using the X25router 2000 can maintain accounting information for each virtual circuit in use. The X25router 2000 does not collect any additional accounting information.

The X25router 2000 can provide basic security mechanisms for all inbound calls. However, each VAX P.S.I. Access nodes can also provide further security checks for both inbound and outbound calls.

Problem Solving

The TRACE utility, which is available on VMS or MicroVMS systems only, assists problem-solving by tracing information at various stages in its path through the X25router 2000.

Event logging allows the network manager to monitor events generated by the X25router 2000 and also assists problem solving.

The X25router 2000 will attempt to dump to and reload automatically from a suitable load host following a system failure.

Path Splitting (DECnet routing only)

The X25router 2000 running on the DEC MicroServer performs path splitting provided the routing costs are set appropriately. Note that routing cost is an arbitrary network management parameter set by the network manager to control network traffic flow. If the cost between the X25router 2000 and the destination node is the same on multiple synchronous ports, then the X25router 2000 splits the traffic across the ports. As a result, the X25router 2000 provides higher data transfer rates and higher reliability due to redundant paths.

Performance

The actual packet rate will be less than that indicated by the aggregate synchronous line speed, and is determined by such factors as:

- Type of traffic (routing updates or data packets) and data rates.
- Proportion of DDCMP to X.25 traffic, and the packet-sizes and ratio of DLM to non-DLM traffic for X.25 links.
- The path of DDCMP messages through the X25router 2000 (LAN-to-LAN, synchronous-to-LAN, or synchronous-to-synchronous).

- Communications line characteristics
- Frequency and type of errors on the synchronous links
- Network topology
- Applications
- Protocol overhead

PREREQUISITE SUPPORT

A Network Profile and DECnet Customer Support Plan covering all intended network nodes and their support may be required by your Digital office.

INSTALLATION

Digital requires that a customer's first purchase of the product includes Digital Installation Services. These services provide for installation of the software product by an experienced Digital software specialist.

Only customers experienced with Digital's X.25 products should attempt second or subsequent installations. Digital recommends that all other customers purchase Digital's Installation Services.

The Digital installation service consists of:

- Installation of the X25router 2000 software on one load host.
- Configuration of one X25router 2000 unit on that load host.
- Installation verification using one connection to one supported PSDN.

Customer Responsibilities

In some cases, the X.25 network supplier (or PTT) may impose restrictions, limitations, or requirements on the proposed Digital network configuration. The customer must ensure that they understand and adhere to these controls for each and every network.

Before the software is installed, the customer must:

- Previously have installed all requisite software and hardware (including terminals needed for the installation)
- Obtain, install, and demonstrate as operational any modems and other equipment and facilities necessary to interface to Digital's communication equipment.
- Demonstrate where necessary that the modems used meet the appropriate interface standards.
- Designate one adjacent node to verify connectivity for any synchronous DDCMP circuits.
- Subscribe to the Open User Group and to at least two SVCs to be able to complete the product's installation checkout (this test loops information from the X25router 2000 to the PSDN and back to the X25router 2000). Systems that use PVCs or Closed User Groups only, or where the PSDN does not support calls to the same DTE address, require specially negotiated arrangements for Digital installation of the product.
- Make available for a reasonable period of time all the hardware (including terminals), software, and communications facilities needed during the installation. This period of time is mutually agreed between the customer and Digital.

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

Courtesy Installation Service

This software product will be installed by Digital at no additional charge if you purchase it concurrently with a Startup Service Package that includes installation service. This service may not be available in all countries.

HARDWARE REQUIREMENTS

VAX, MicroVAX or VAXstation configurations as specified in the System Support Addendum (SSA 28.86.02-x).

DEC MicroServer or DEC MicroServer-SP as specified in the System Support Addendum (SSA 28.86.02-x).

SOFTWARE REQUIREMENTS

For each VMS or MicroVMS system acting as a load host or dump receiver:

- VMS Operating System or MicroVMS Operating System
- DECnet-VAX

For each ULTRIX system acting as a load host or dump receiver:

- ULTRIX-32 Operating System or ULTRIX Worksystem Software including the ULTMOP subset
- DECnet-ULTRIX

Refer to the System Support Addendum (SSA 28.86.02-x) for availability and required versions of prerequisite/optional software.

ORDERING INFORMATION

For VMS and MicroVMS Load Hosts:

Software Licenses: QL-VIAA*-**
Software Media: QA-VIAA*-**
Software Documentation: QA-VIAAA-GZ
Software Product Services: QT-VIAA*-**

For ULTRIX Load Hosts:

Software Licenses: QL-VIAA*-**
Software Media: QA-VIAA*-**
Software Documentation: QA-VIAAB-GZ
Software Product Services: QT-VIAA*-**

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

SOFTWARE LICENSING

You will need a separate license for each DEC MicroServer or DEC MicroServer-SP unit on which you will be using the software product (except as otherwise specified by Digital).

The licensing provisions of Digital Equipment Corporation's Standard Terms and Conditions provide in part that the software and any part thereof (but excluding those parts specific to the load hosts) may be used only on the single DEC MicroServer hardware unit on which the software is operated, but may be copied, in whole or in part (with the proper inclusion of Digital's copyright notice and any proprietary notices on the software) between multiple load hosts on the same LAN.

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

LICENSE MANAGEMENT FACILITY SUPPORT
(VMS Systems Only)

This layered product supports the VMS License Management Facility. License units for this product are allocated on a per-CPU basis and are not dependent on CPU-capacity or User/Activity.

For more information on the License Management Facility, refer to the VMS Operating System Software Product Description (SPD 25.01.xx) or the License Management Facility manual of the VMS Operating System documentation set.

SOFTWARE PRODUCT SERVICES

A variety of service options are available. For more information on these or other services, please contact your local Digital office.

SOFTWARE WARRANTY

The X25router 2000 is warranted for use only with supported Phase III and Phase IV DECnet products supplied by Digital. Any system connected to one of the X25router's synchronous DDCMP links, or attempting DECnet communication via a PSDN, must run a current version of a DECnet Phase III/IV product using any supported synchronous interface, but excluding a DMC11 device.

Digital has designed or adapted the X.25 portion of this product to operate with:

- Equipment conforming to ISO standards 7776 and 8208
- The public networks in the appropriate countries listed in Table I
- Certain private PSDNs, for which Digital has included specific PSDN profiles in this product

Digital cannot offer its standard warranty for this product unless it has been configured appropriately for the PSDN. If the product has not been configured appropriately, the product will not be supported by Digital.

Each PSDN listed in Table I indicates Digital's commitment to supporting the X25router 2000 for that public service. However, it does not imply that the appropriate networking authority has granted network certification for the X25router 2000. Please contact your Digital sales office for up-to-date information on certification status.

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.

TABLE I

Public PSDNs Supported By The X25router 2000

Country	Public Network and CCITT Revisions	Comments and Restrictions
Argentina	Arpac	
Australia	Austpac	
Austria	Datex-P	
Belgium	DCS	
Brazil	Renpac	
Canada	Datapac (1976 or 1980)	
	Infoswitch	
Denmark	Datapak	
Eire	Eirpac (1980)	
Finland	Datapak	
France	Transpac	
Hong Kong	Datapak	
	Intelpak	
Indonesia	SKDP	
Italy	Itapac	
Japan	DDX (1976, 1980)	(See Note 1)
	Venus-P (1980)	
	Tymnet	
Luxemburg	LUXPAC	
Malaysia	Maypac	
Mexico	Telepac	
Netherlands	Datanet 1	
New Zealand	Pacnet	
Norway	Datapak	
Portugal	Telepac	
Singapore	Telepac	
South Korea	Dacomnet	
Spain	Iberpac	
Sweden	Datapak	
Switzerland	Telepac (1978, 1980)	
Taiwan	Pacnet	
United Kingdom	PSS	
United States	Accunet	
	Autonet	
	Bell Atlantic	
	Compuserve	
	ConnNet	
	IMPACS	
	Infonet	
	Mark*Net Extended Service	
	Pulselink	
	Telenet	
	Tymnet	
	Western Union PTN-1	
	Worldnet	
West Germany	Datex-P	

Note:

1. Digital offices in Japan can supply the mandatory additional information that explains the special use of the X25router 2000 with the DDX PSDN.

Unless otherwise acknowledged within the product's documentation, the trademarks under which services are offered are proprietary to the respective national PTT, the owning or operating companies, or equivalent organization.

TABLE II

Optional X.25 Facilities Supported by the X25router 2000

	Optional Facility	**Paragraph Number in CCITT X.25 (1984)**	**Supported**
1.	Extended packet sequence numbering	6.2	Yes
2.	Non-standard default window size	6.10	Yes
3.	Default throughput class assignment	6.11	n/a
4.	Packet re-transmission	6.4	(See Note 1)
5.	Incoming calls barred	6.5	n/a
6.	Outgoing calls barred	6.6	n/a
7.	One-way logical channel outgoing	6.7	n/a
8.	One-way logical channel incoming	6.8	Yes
9.	Closed user group (CUG)	6.14.1	Yes
10	CUG with outgoing access	6.14.2	Yes
11.	CUG with incoming access	6.14.3	Yes
12.	Incoming calls barred within CUG	6.14.4	Yes
13.	Outgoing calls barred within CUG	6.14.5	Yes
14.	CUG selection	6.14.6	Yes
15.	CUG with outgoing access selection	6.14.7	No
16.	Absence of both CUG selection facilities	6.14.8	Yes
17.	Bilateral CUG	6.15.1	Yes
18.	Bilateral CUG with outgoing access	6.15.2	Yes
19.	Bilateral CUG selection	6.15.3	Yes
20.	Reverse charging	6.18	Yes
21.	Reverse charging acceptance	6.19	Yes
22.	Local charge prevention	6.20	n/a
23.	Network user identification	6.21	Yes
24.	Charging information	6.22	Yes
25.	RPOA selection	6.23	Yes
26.	Hunt group	6.24	(See Note 2)
27.	Call redirection	6.25	n/a
28.	Called line address modified notification	6.26	Yes
29.	Call redirection notification	6.27	Yes
30.	Transit delay selection and indication	6.28	Yes
31.	On-line facility registration	6.1	No
32.	Non-standard packet size	6.9	Yes
33.	Flow control parameter negotiation	6.12	Yes
34.	Throughput class negotiation	6.13	Yes
35.	Fast select	6.16	Yes
36.	Fast select acceptance	6.17	Yes
37.	D-bit modification	6.3	No
38.	Abbreviated address	—-	n/a
39.	Datagram queue length selection	—-	No
40.	Datagram service signal logical channel	—-	No
41.	Datagram non-delivery indication	—-	No
42.	Datagram delivery confirmation	—-	No
43.	Call statistics (non-X.25)	—-	(See Note 3)

Notes:

1. This is not applicable to a DTE. This product does not support the reception of a level 3 Reject packet, and will not generate one.

2. Each DTE must be assigned a unique addresses independent of the hunt group address. The X25router 2000 can then ignore the hunt group. Alternatively, each line can be configured as if it were connected to a separate PSDN with each line having the same DTE address. In either case, all the lines must be connected to the same X25router 2000.

3. This product does not generate these statistics. However, a VAX P.S.I. Access node can obtain statistics supplied by the PSDN through the programming interface.

4. The X25router 2000 does not support the following items of the CCITT X.25 recommendation:
   - Multi-link protocol
   - Use of the D-bit in outgoing packets

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