DEC Network Integration Server

Introduction and Glossary

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Preface

This manual introduces the DEC™ Network Integration Server. Throughout the manual, the term DECNIS is used to refer to the DEC Network Integration Server. This manual gives an overview of:

- The DECNIS software functions
- The DECNIS hardware
- Loading and managing the DECNIS
- The contents of the DECNIS documentation set

It also includes a glossary of terms used throughout the DECNIS documentation.

Audience

This manual is for all DECNIS users.

This manual assumes that you understand and have some experience of:

- Local Area Networks (LANs)
- Wide Area Networks (WANs)
- Public Network Services (X.25, Frame Relay, SMDS if using these services)
- OpenVMS™ (if using an OpenVMS load host)
- DIGITAL UNIX® (if using a DIGITAL UNIX load host)
- Windows NT™ or Windows 95® PCs (if you are using one of these as a load host)

Associated Documentation

Product Documentation

The contents of the documentation kit depends on which load host you are using.

- *DEC Network Integration Server Management*
- *DEC Network Integration Server Installation and Configuration for OpenVMS and DIGITAL UNIX*
- *DTF (DIGITAL Trace Facility) User Guide*
- *clearVISN DECNIS Configurator User Guide.*
- *DEC Network Integration Server Problem Solving*

  This is only available on line, as follows:

  - On DECnet-Plus systems, in Bookreader™ format.
  - On Windows 95/NT PCs, as a Windows® help file.
- *DEC Network Integration Server Event Messages* (supplied on line as a text file)
- *DEC Network Integration Server Release Notes* (supplied on line as a text file)

Hardware Documentation

The following documents are supplied with the DECNIS hardware:

- *Installation and Service Manual*
- *Configuration Card*

The following documents are supplied with each Network Interface Card:

- *Cabling Instructions and Specifications* card
- *Problem Solving* card
- *Configuration* card

Related Documentation

- NCL online help

  This describes the NCL commands that you can use to manage the DECNIS.
- Network management documentation for the load-host operating system you are using.

- *Common Trace Facility (CTF) Use* manual

  This manual is part of the VMS™ documentation set, and describes how to use the Common Trace Facility for problem solving.

- *Network Information* (supplied on line)

  This supplies profile information about all the public Packet Switching Data Networks that DIGITAL supports.

- *X.25 Security* manual

  This manual explains the underlying concepts of X.25 security. You can order this manual through your local DIGITAL office.

- *Bridge and Extended LAN Reference* manual

  This manual provides a general description of bridging and extended LANs. You can order this manual through your local DIGITAL office.

- RFCs (for IP routing)

  RFCs are the working notes for the internet research and development community. These notes are available in a three-volume set, the *DDN Protocol Handbook*, which can be ordered from the following address:

  Network Solutions, Inc.
  Attn: InterNIC Registration Service
  505 Huntmar Park Drive
  Herndon, VA 22070
  Tel. 1-800-444-4345 or 619-455-4600 (USA only)

Returning Comments About this Documentation

We would like to know what you think about the DECNIS documentation set and online help.

If you have any comments, or suggestions, please return them in any of the following ways:

- Send an electronic mail message to the Internet address books@reo.mts.dec.com
- Send an electronic mail message to the X.400 address S=IDC BOOKS; O=digital; OU1=reo; P=digital; A=CWMail; C=gb
- Send a fax to (+44)118 9206018

1

What Is the DECNIS?

The DECNIS is a networking product which provides multiprotocol routing, bridging and X.25 functions. It consists of both software and hardware.

This chapter gives a brief overview of the software functions of the DECNIS and the hardware on which the software runs. It also includes a table describing the documentation you will require to perform tasks on the DECNIS.

1.1 DECNIS Functions

The DECNIS provides multiprotocol routing, bridging and X.25 over many types of network connection. The DECNIS operates in multivendor environments to provide communications between DIGITAL and non-DIGITAL systems. It provides a network service over Local Area Networks (LANs) and Wide Area Networks (WANs).

Multiprotocol Routing

The DECNIS provides multiprotocol routing of the following types of traffic:

- IP (including OSPF, RIP, BGP and EGP)
- NetWare IPX (Native and tunneled in IP packets)
- DECnet
- OSI
- AppleTalk (Native and tunneled in IP packets)

The DECNIS implements Integrated IS–IS to simultaneously control OSI routing and IP routing. Integrated IS–IS is an extended form of the OSI routing protocol, IS–IS.[1] The extension provides support for IP routing, as defined in RFC 1195.

[1] OSI Intermediate System to Intermediate System (IS–IS) Intra-Domain Routing Exchange Protocol, as specified in ISO/IEC 10589.

Use of Integrated IS–IS means that the DECNIS does not have to run two separate routing protocols. As a result, the DECNIS uses less memory, has lower routing costs, and can support larger networks.

Bridging

The DECNIS acts as a bridge for any traffic that cannot be routed, for example:

- LAT
- Banyan Vines
- Apollo Domain

The DECNIS will also bridge the following protocols if routing is not enabled for them:

- OSI
- DECnet Phase IV
- IP
- IPX
- AppleTalk

X.25

The DECNIS can act as an X.25 gateway and an X.25 relay. The DECNIS can also route IP and OSI protocols over X.25 circuits.

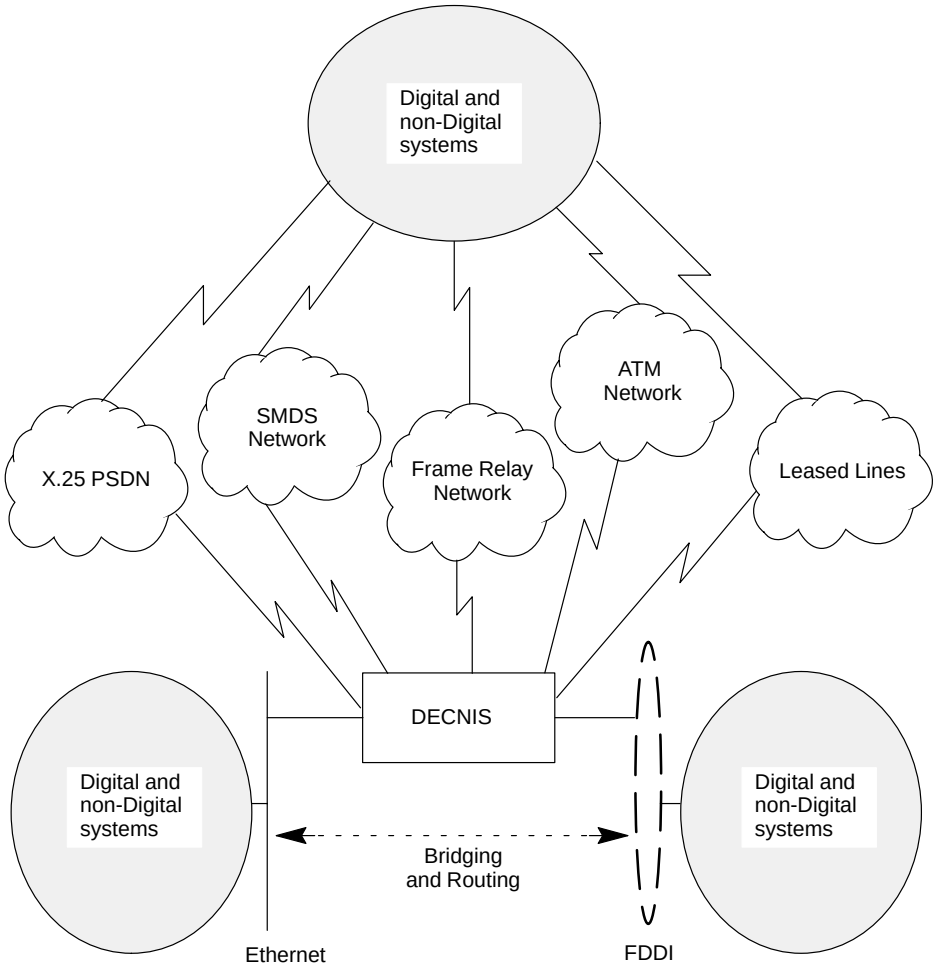
Network Connections

Multiprotocol routing, bridging and X.25 can be used over various network connections on the DECNIS, including:

- Ethernet
- FDDI
- Leased lines
- SMDS networks
- X.25 Packet Switched Data Networks (PSDNs)
- ATM networks
- Frame Relay networks

Figure 1–1 represents the different types of network connections that can be used on the DECNIS.

Figure 1–1 Network Connections on the DECNIS



1.1.1 Licenses

The functions you can use on the DECNIS depend on the type of licenses you have and how you configure your system. Refer to the *DEC Network Integration Server Software Product Description* (SPD) for details of licensing.

1.2 Hardware Information

The DECNIS software runs on any DECNIS hardware unit.

The DECNIS hardware consists of the following components:

- An enclosure, which can be either a 4-slot (DECNIS 500) or a 9-slot (DECNIS 600) unit. The enclosure includes a power supply and a fan tray.
- A management processor card, which can be one of the following:
  - An MPC–I with 8MB of dynamic memory and 2MB of nonvolatile memory.
  - An MPC–II with a console port, 16MB of dynamic memory and 4MB of nonvolatile memory.
  - An MPC–III with a console port, and either 16MB of dynamic memory and 8MB of nonvolatile memory or 32MB of dynamic memory and 8MB of nonvolatile memory.
- A pool memory card with either 2MB (DECNIS 500) or 8MB (DECNIS 600) of dynamic memory.
- Network Interface Cards.

For full information about the DECNIS hardware, refer to the *Installation and Service* manual for your hardware system.

1.2.1 MPC–II/MPC-III Functions

An MPC–II or MPC–III is required for the following functions on the DECNIS:

- ATMcontroller 631 Network Interface Card
- HSSIcontroller 641 Network Interface Card
- Telnet
- BGP4
- IP Multicasting
- Modifying flash memory dynamically

All other DECNIS functions can be run on an MPC–I, an MPC–II, or an MPC–III.

1.2.2 Network Interface Cards

The DECNIS hardware units connect to LANs and WANs using Network Interface Cards (NICs). The Network Interface Cards you slot into the DECNIS determine the type and number of connections to LANs and WANs.

The DECNIS 500 supports up to two Network Interface Cards and the DECNIS 600 supports up to seven Network Interface Cards.

There are nine types of Network Interface Card:

1. DEC LANcontroller 601

   This has one Ethernet port.

2. DEC LANcontroller 602

   This has two Ethernet ports.

3. DEC WANcontroller 614

   This has four synchronous ports, each running at up to 64 kbits/s.

4. DEC WANcontroller 618

   This has eight synchronous ports, each running at up to 64 kbits/s.

5. DEC FDDIcontroller 621

   This has one FDDI port running at up to 100 Mbits/s. This Network Interface Card occupies two slots in the DECNIS.

6. DEC WANcontroller 622

   This has two synchronous ports, each running at between 9.6 kbits/s and 3.1 Mbits/s (T1/E1 ports).

7. DEC WANcontroller 622/HS

   This has two synchronous ports, each running at between 64 kbits/s and 12 Mbits/s (T2/E2 ports).

8. DECNIS ATMcontroller 631. This has one port, and occupies two slots in the DECNIS. It has three variants providing ATM connectivity:

   - ATMcontroller 631/E3, running at E3 (34Mbits/s)
   - ATMcontroller 631/T3, running at T3 (45Mbits/s)
   - ATMcontroller 631/OC-3, running at OC-3 (155Mbits/s)

9. DECNIS HSSIcontroller 641. This has one synchronous port running at between 1 Mbit/s and 52 Mbits/s. This Network Interface Card occupies two slots in the DECNIS.

Note the following:

- The FDDIcontrollers, ATMcontrollers and HSSIcontrollers are not supported on a DECNIS 500.
- The ATMcontrollers and HSSIcontrollers require an MPC–II or MPC–III.
- The ATMcontrollers and HSSIcontrollers do not support Agent loading and dumping (see Chapter 3).

You can add new Network Interface Cards to the DECNIS without interrupting its other operations. This is called Live Insertion.

1.3 Useful Documentation

Table 1–1 contains information on the DECNIS software documentation. It indicates which manuals you should read to perform tasks on the DECNIS. It also shows which manuals are shipped with each load host operating system.

For information about the DECNIS hardware, refer to the *Installation and Service* manual for your hardware system. For further network management information, refer to the on-line NCL help and the NCL documentation for your load host system.

Table 1–1 DECNIS Software Documentation

This document...	Gives you...	And is supplied with...
DECNIS Introduction	A general overview of the DECNIS functions and hardware.	All load hosts
DECNIS Installation and Configuration for Open VMS and DIGITAL UNIX	Instructions on how to: • Install the DECNIS software on an OpenVMS or DIGITAL UNIX load host. • Configure the load host. • Configure the DECNIS software, using the DECNIS text-based configurator.	OpenVMS and DIGITAL UNIX load hosts

(continued on next page)

Table 1–1 (Cont.) DECNIS Software Documentation

This document...	Gives you...	And is supplied with...
clearVISN DECNIS Configurator User Guide	Instructions on how to: • Install the DECNIS software on a Windows 95 or Windows NT load host. • Use the clearVISN DECNIS configurator to configure the DECNIS. • Use the clearVISN DECNIS configurator to start and use NCL. • Load the DECNIS from a Windows 95 or Windows NT PC.	Windows 95/NT load hosts
DECNIS Management	Instructions on how to manage all functions of the DECNIS, and load the DECNIS.	All load hosts
DECNIS Problem Solving (on-line only)	Possible solutions for problems with a DECNIS system.	All load hosts
DECNIS Event Messages (on-line text) only	An explanation of the event messages generated by the DECNIS.	All load hosts

2
DECNIS Functions

This chapter describes in more detail the functions provided by the DECNIS.

2.1 Network Connections

This section describes the different types of network connection that the DECNIS supports. Each connection type is identified by the data link protocol which is used over the link.

2.1.1 LAN Network Connections

2.1.1.1 CSMA/CD Type

The supported CSMA/CD (Carrier Sense, Multiple Access with Collision Detect) type protocols include Ethernet and IEEE 802.3.

2.1.1.2 FDDI

FDDI (Fiber Distributed Data Interface) is 10 times faster than Ethernet. FDDI can be used for metropolitan LANs (with up to 2 kilometers between stations).

2.1.2 Leased Line Network Connections

2.1.2.1 PPP

PPP (Point-to-Point Protocol) is supported over synchronous connections.

2.1.2.2 HDLC

The HDLC (High-level Data Link Control) protocol is supported over synchronous point-to-point connections.

2.1.2.3 DDCMP™

DDCMP (Digital Data Communications Message Protocol) links are supported over synchronous and asynchronous point-to-point connections.

2.1.2.4 CHDLC

CHDLC (Compatibility High-level Data Link Control) protocol is supported over synchronous connections for compatibility with the DECbrouter 90™.

2.1.3 Public Network Connections

2.1.3.1 Frame Relay

You can create connections to a frame relay network, and run routing and bridging circuits over them using PPP, CHDLC or MPI data links. The DECNIS supports the Frame Relay Bearer Service (FRBS) protocol and interface standards, which have been, and continue to be, developed by the American National Standards Institute (ANSI) T1 S1 committee.

FRBS provides:

- High-speed packet transmission
- Minimal network delay
- Efficient use of the wide area network bandwidth
- A packet switched service allowing data transfer over both public and private networks

The DECNIS uses a DEC WANcontroller 622, DEC WANcontroller 622/HS or a DECNIS HSSIcontroller 641 Network Interface Card to provide frame relay bearer connections. However, over each single, physical line on the card, the software supports multiple, simultaneous connections. This multiplexed interface allows you to communicate without requiring:

- Dedicated lines to each destination
- Preallocated fixed bandwidth

The DECNIS frame relay implementation supports the following, per individual PVC:

- Assigning DLCIs to individual PVCs.
- Rate limiting to the Committed Information Rate (CIR) and Committed Burst Size.
- Bursting beyond the CIR until reaching a predefined limit or receiving a BECN.
- Prioritizing packet types for Discard Eligibility.
- RFC 1490 multiprotocol encapsulation.

2.1.3.2 X.25

The DECNIS supports routing over statically and dynamically assigned X.25 virtual circuits. Static X.25 circuits are established when the routing circuit is enabled and remain established until the routing circuit is disabled. Dynamically assigned X.25 circuits are established only when there is information to send over the routing circuit. They are disconnected when there is no further information to send.

The DECNIS supports routing over either Permanent Virtual Circuits (PVCs) or Switched Virtual Circuits (SVCs). Each X.25 virtual circuit can run only one routing protocol. However, different routing protocols can be run over separate virtual circuits on the same X.25 DTE connection.

2.1.3.3 SMDS

SMDS (Switched Multimegabit Data Service) is supported over synchronous connections. It is defined by BELL Communications Research, Inc. (Bellcore), in a series of Technical References and Technical Advisories.

The SMDS Service is a connectionless, public, packet-switched data service. The operation and features of the SMDS Service are similar to those found in high-speed data networks such as LANs:

- The SMDS Service provides a datagram packet transfer. Each data unit contains the full destination SMDS address, so each one is handled and switched separately without the prior establishment of a network connection.
- The Digital implementation of SMDS on the DECNIS exhibits high throughput and low delay, providing the transparent transport and delivery of up to 4500 octets of user data per packet. The Bellcore SMDS specification provides for up to 9188 octets of user data per packet.
- Both individually and group-addressed (multicast) packets can be transferred.

  Group addressing is similar to LAN multicasting, since the network will deliver copies of group addressed packets to all members of the group. The set of members of a group is established at subscription time, and is assigned a unique network group address. Group addressing cannot be controlled dynamically.

In addition to these LAN-like features, a set of addressing-related service features (source address validation, source and destination address screening) are provided to enable a subscriber or set of subscribers to create a logical private network, or closed user group, over the SMDS service.

The DECNIS SMDS facility provides a LAN interface to Routing, similar to CSMA/CD and FDDI. It uses a DEC WANcontroller 622 or DEC WANcontroller 622/HS synchronous device to interface to the SMDS network.

On the DEC WANcontroller 622, SMDS services are usually provided using 2 Mbits/s or 1.544 Mbits/s interfaces to the public network.

On the DEC WANcontroller 622/HS SMDS services are provided using up to 10Mbits/s interfaces to the public network.

At such speeds, SMDS can be used as a LAN-to-LAN interconnection service.

2.1.3.4 ATM

The DECNIS provides ATM connectivity as shown in Figure 2–1.

For T3/E3 leased line connections, the DECNIS ATM Interface provides multiprotocol routing between DECNIS routers over a clear channel T3/E3 leased line service.

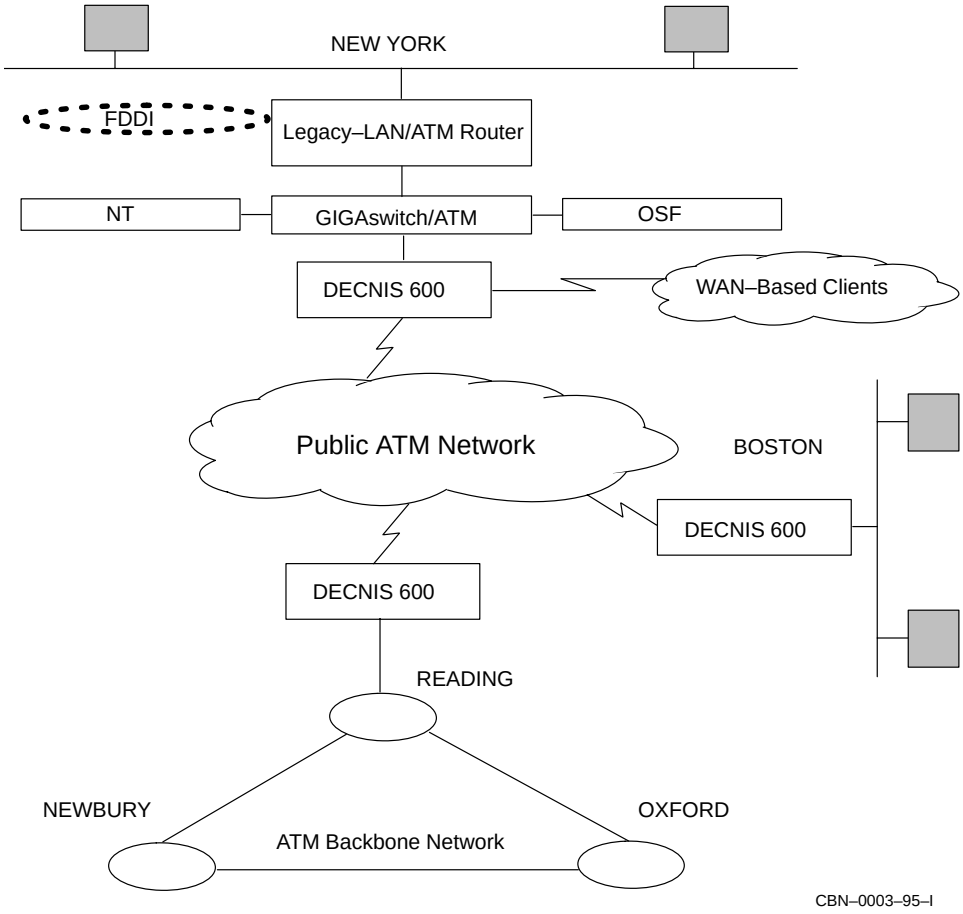
For T3/E3 and OC3 ATM connections, the DECNIS ATM Interface provides LLC encapsulation according to RFC 1483 using AAL5 over multiple Permanent Virtual Circuits (PVCs) up to a maximum of 127 PVCs.

For wide area ATM connectivity, the DECNIS supports multiprotocol routing and bridging between DECNIS routers over wide area services, either via a direct connection to a public network or via Digital Premises ATM switches.

FLOWmaster™ Flow Control

The DECNIS FLOWmaster feature implements Digital's credit-based flow control, and supports the ATM Forum's Available Bit Rate (ABR) class of service. FLOWmaster provides credit based flow control, per hop, and per virtual circuit (VC), on ATM data links. As well as delivering high performance, FLOWmaster ensures that no cells are lost because of congestion in the ATM switching network; this can help avoid throughput collapse. It also enables flow-controlled VCs to use the full link bandwidth when the link becomes idle.

Figure 2–1 ATM Functions of the DECNIS 600



2.1.4 IP Switching

IP switching is a method for implementing high-speed forwarding of IP packets on ATM switches. IP switching devices - that is, IP Switches and IP Switching Gateways - identify and label **flows**, and map each flow onto an ATM virtual circuit. Flows are streams of IP packets with similar characteristics. In addition, IP Switches provide direct ATM hardware switching of packets identified as part of a flow.

The DECNIS implements IP Switching Gateway functions, which enable it to create, manage, monitor and pass on information about flows.

2.2 IP Routing

The DECNIS can be configured as an IP router.

2.2.1 Definition of IP Routing

An IP router is a system that routes IP packets within an IP network (often referred to as an internet). IP routers are sometimes called IP gateways.

2.2.2 Example IP Network

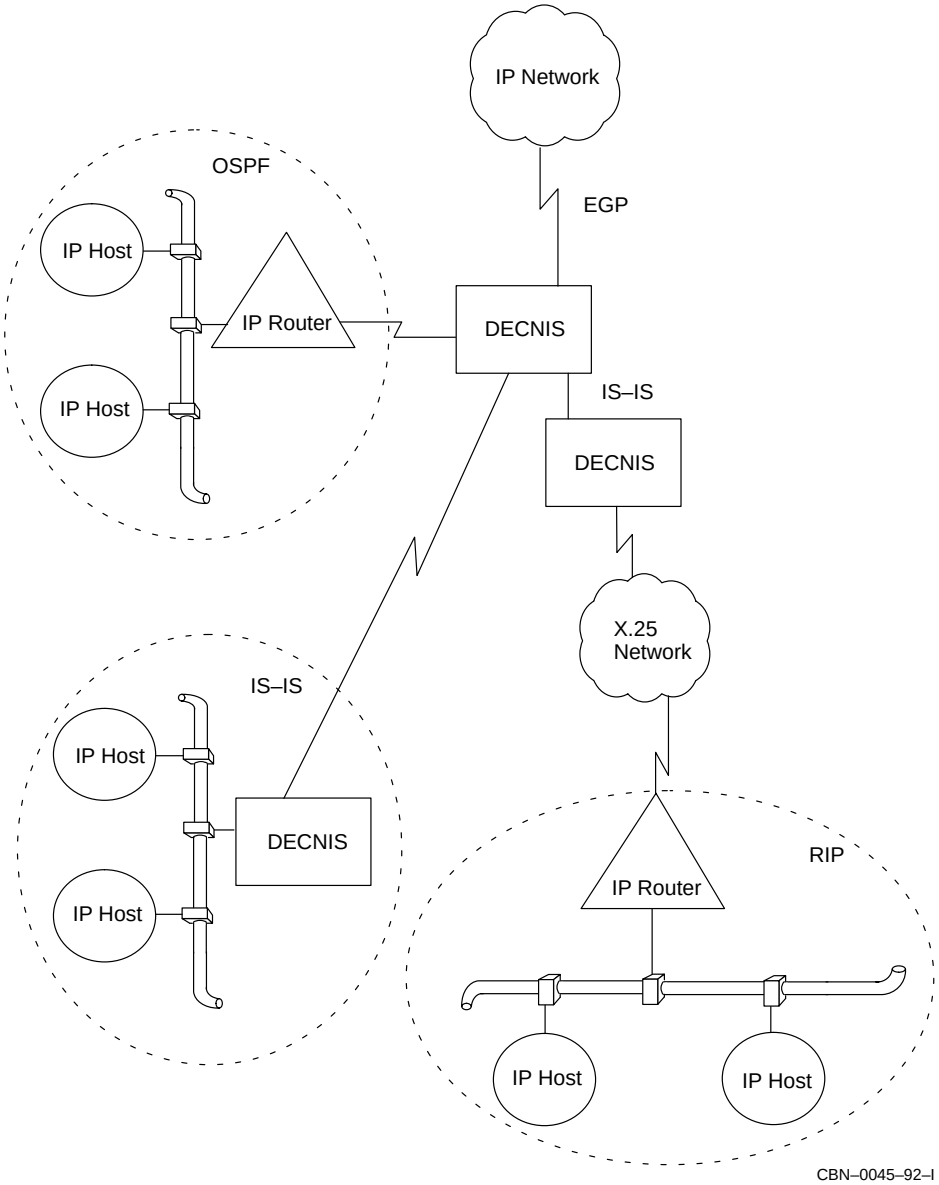
Figure 2–2 shows an example IP network using DECNIS systems as IP routers. The DECNIS systems communicate with each other and with non-Digital IP routers using various IP routing protocols. All the IP hosts (systems running IP software) in this network can communicate with each other.

2.2.3 Supported Circuits For IP Routing

The DECNIS can forward IP packets over all circuit types.

Note however, over X.25 static and HDLC or DDCMP serial circuits, the DECNIS can only forward IP packets to other Digital IP routers.

Figure 2–2 Example IP Network



2.2.4 Internet Protocols

The DECNIS supports the following Internet protocols:

- Internet Protocol (IP)
- Internet Control Message Protocol (ICMP)
- Address Resolution Protocol (ARP)
- User Datagram Protocol (UDP)

The DECNIS supports the following IP routing protocols:

- U.S. Department of Defense Routing Information Protocol (RIP) as defined in RFC 1058, but not over X.25 DA circuits.
- Integrated IS–IS as defined in RFC 1195 but not over X.25 DA circuits.
- Open Shortest Path First (OSPF®, as defined in RFC 1247, but not over X.25 DA circuits.
- Exterior Gateway Protocol (EGP) as defined in RFCs 827, 888, and 904, but not over X.25 DA circuits.
- Border Gateway Protocol (BGP) as defined in RFC 1771, but not over X.25 DA circuits.

The DECNIS supports IP Reachable Addresses ("static routes") as defined by DECnet-Plus (formerly known as DECnet/OSI) management:

- Over CSMA/CD or FDDI LANs to a Digital or non-Digital IP router
- Over an HDLC link to a Digital IP router
- Over a DDCMP link to a Digital IP router
- Over X.25 DA circuits to an IP host, or a Digital or non-Digital IP router (RFC 877)
- Over PPP (RFC 1332), ATM Permanent, and CHDLC links to a Digital or non-Digital IP system

2.2.5 IP Route Propagation and Filtering

IP route propagation and filtering controls how IP routes are received and advertised by the DECNIS.

The DECNIS supports full propagation of routes between the different IP routing protocols: OSPF, Integrated IS–IS, RIP, BGP and EGP. This allows the DECNIS to advertise routes learnt by different IP protocols. For example, the DECNIS could use RIP to advertise a route learnt by IS–IS.

IP route filtering can be used to include or exclude routes from single nodes, subnets, or collections of subnets. For RIP and EGP, controls can be set up between multiple instances of each protocol.

2.2.6 IP Standby

The DECNIS has a facility called IP Standby that enables DECNIS IP routers on a LAN to act as backup (or standby) routers to each other.

If an IP Standby router fails, or its connection to the LAN fails, another IP Standby router will rapidly take over.

IP standby is sometimes referred to as Virtual Router Cluster.

2.2.7 IP Multicasting

The DECNIS can act as an IP multicast router. IP multicasting is a way of forwarding data to a group of host systems simultaneously. Each member of the group has the same Class D IP address.

A system registers that it wants to receive packets of a certain type by joining a host group. Systems can join or leave a host group at any time.

IP multicasting is useful for supervisor type applications, for example a "supervisor" system might send out regular status requests. All systems that are members of the host group at that time will respond with a status report.

The DECNIS uses IGMP (Internet Group Management Protocol) and the Dense-mode PIM (Protocol Independent Multicast) protocol to control IP multicasting.

2.2.8 IP Packet Filtering

IP packet filtering allows you to control the access between IP hosts on your network. This allows you to provide security on your network and also gives you some control over the bandwidth used on your network.

For example, you might use packet filtering to:

- Prevent Telnet sessions from specific systems.
- Prevent file copies from specific systems.
- Restrict the access to a World-Wide Web server.

The DECNIS can block or pass IP packets according to the characteristics of the packet.

2.2.9 UDP Broadcast Forwarding

The DECNIS can be configured to forward broadcast UDP packets received on one circuit to one or more UDP servers on other circuits, or on the same circuit but in a different subnets. This is known as UDP Broadcast Forwarding. It is also known as the IP helper function.

UDP Broadcast Forwarding is useful in situations where IP hosts on different circuits are all members of the same destination subnet, or the server process for the UDP packet is on an IP host in a different subnet from the destination.

2.3 Novell NetWare IPX

The DECNIS supports native IPX on the following links:

- CSMA/CD
- FDDI
- PPP
- CHDLC

IPX is also supported over wide area links using IP encapsulation (tunnel circuits) according to RFC 1234.

The DECNIS also supports native IPX over leased line circuits using the PPP datalink protocol but with no negotiated options.

The following Novell NetWare protocols are supported:

- Novell NetWare Routing Information Protocol (NetWare RIP), which provides the reachability of Novell NetWare routers and end systems.
- Novell NetWare Service Access Protocol (NetWare SAP), which provides information about the services available in the Novell NetWare network.

If you have a PC LAN license, you can set up the DECNIS as an IPX router.

2.4 AppleTalk

Native AppleTalk is supported on Ethernet and FDDI links using CSMA/CD protocols. AARP is supported for mapping between the AppleTalk Node Address and the Ethernet or FDDI hardware address.

AppleTalk is supported over wide area links using IP encapsulation (tunnel circuits) according to RFC 1234.

The following AppleTalk protocols are supported:

- AppleTalk Routing Table Maintenance Protocol (RTMP), which provides reachability information to other AppleTalk nodes (routers and end systems).
- AppleTalk Zone Information Protocol (ZIP), which provides mapping between AppleTalk networks and zones.
- AppleTalk Name Binding Protocol (NBP), which provides numeric address mapping.
- AppleTalk Echo Protocol (AEP). The DECNIS can reply to an AppleTalk echo request as specified by the AppleTalk echo protocol.

If you have a PC LAN license, you can set up the DECNIS as an AppleTalk router.

2.5 OSI Routing

The DECNIS supports Level 1 and Level 2 routing using Link State (Phase V) or Routing Vector (Phase IV) algorithms.

2.5.1 OSI Routing Definitions

Level 2 routers forward data between routing domains and between areas within routing domains. Level 1 routers forward data within their own area.

A routing domain is a set of systems which communicate using the same routing procedures or algorithms. To support large routing domains, you can divide a network into subdomains called areas.

2.5.2 Examples of OSI Routing Over LANs and WANs

The DECNIS routes data over Local Area Networks (LANs) and Wide Area Networks (WANs).

Figure 2–3 shows an example of the DECNIS routing over a WAN.

In this example, the WAN can be anything from a simple leased line to a complex OSI network. Router Z can be another DECNIS, a DEC WANrouter, or any other vendor's router that conforms to the OSI protocols.

The term OSI network can refer to a network that uses OSI routing over a variety of connections, including: frame relay networks, SMDS networks, X.25 networks and leased lines.

Figure 2–4 shows an example of the DECNIS routing over two LANs.

The DECNIS also communicates with Phase IV DECnet nodes, and integrates them into the Phase V network. This is often referred to as backwards compatibility.

Figure 2–3 Routing over WANs

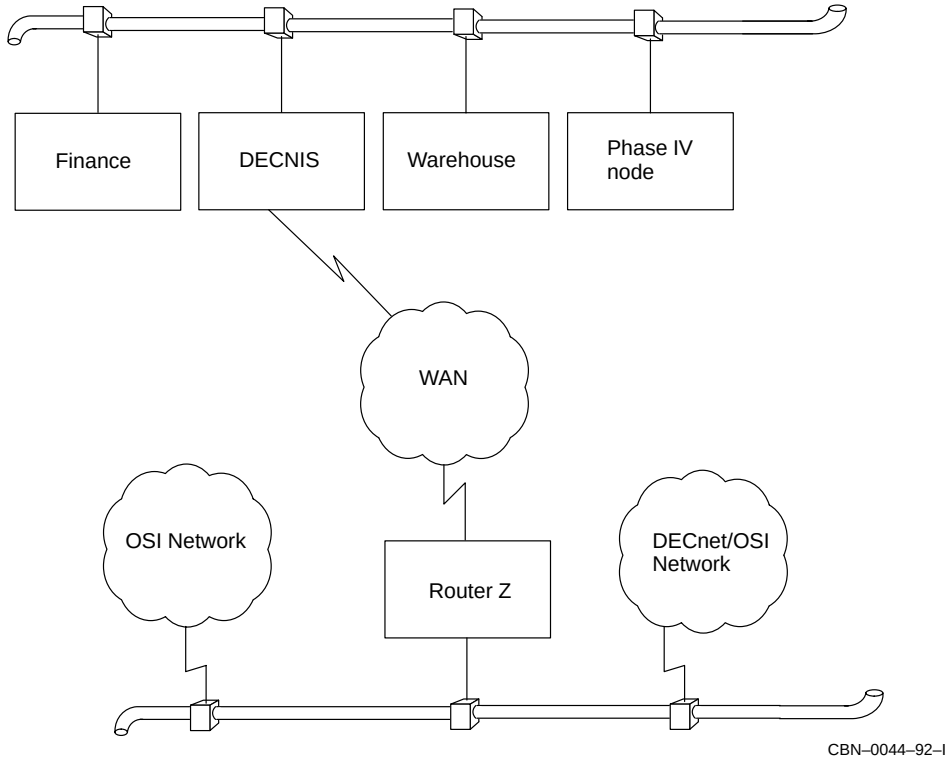
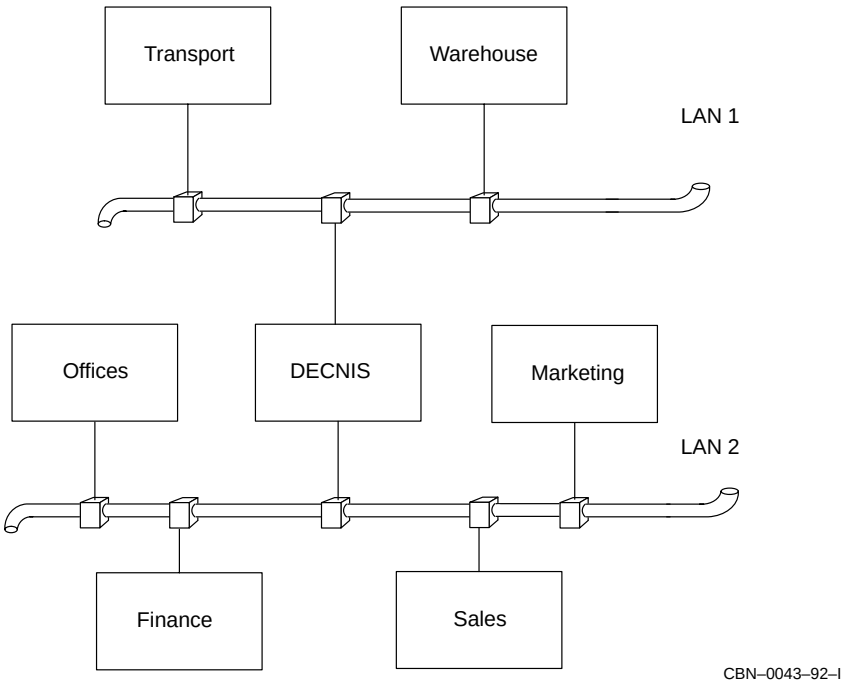


Figure 2–4 Routing over LANs



2.6 Bridging

The DECNIS supports local and remote bridging in accordance with the IEEE 802.1d standard and Digital's LAN Bridge 100 standard. It acts as a bridge for any data that is not set up to be routed. It also acts as a bridge for any data that cannot be routed, for example, LAT.

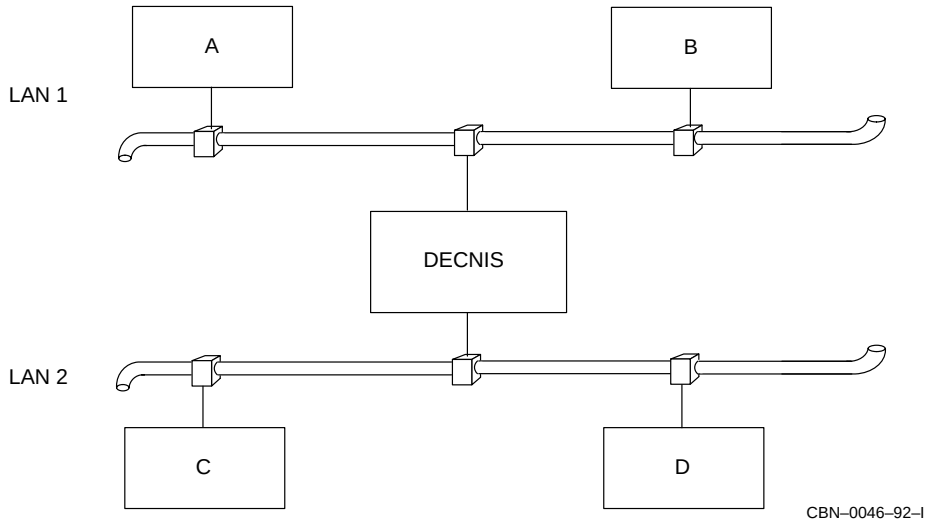
2.6.1 Bridge Filtering

Bridges filter traffic between two LANs. This has the following benefits:

- It reduces the amount of traffic on each LAN.
- It lets you limit traffic to defined areas.

Figure 2–5 shows an example of the DECNIS acting as a local bridge between two LANs.

Figure 2–5 Local Bridging Between LANs



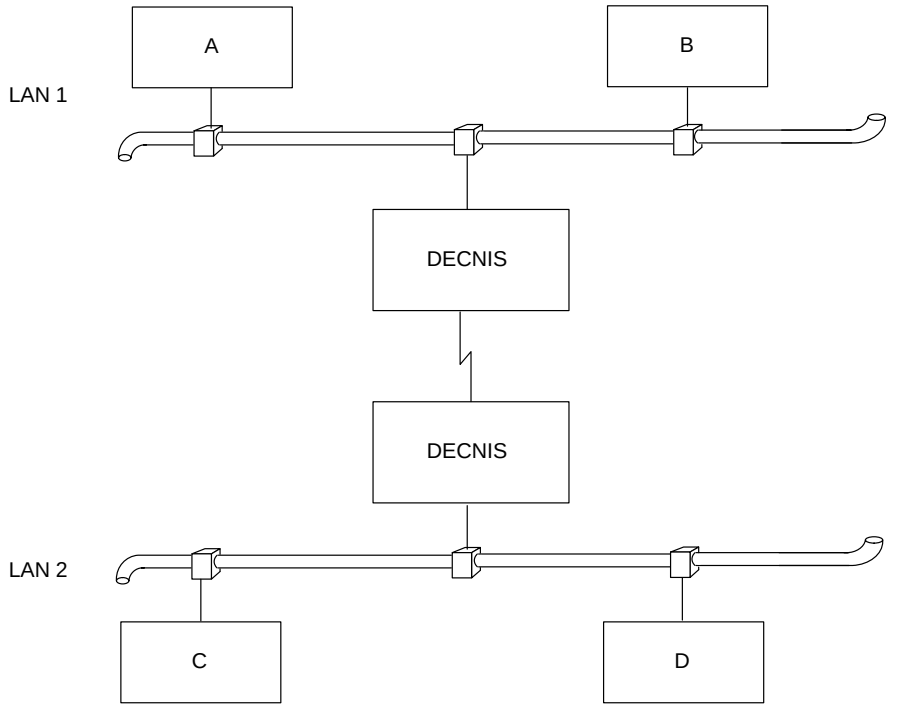
The bridge reduces the amount of traffic by only retransmitting data addressed to destinations on the attached LAN. For example, in Figure 2–5, the bridge recognizes whether data is addressed to LAN 1 or LAN 2. If system A sends a packet to system D, the bridge retransmits the packet to LAN 2. If system A sends a packet to system B, the bridge confines the packet to LAN 1.

In the example in Figure 2–5, you could set up the bridge to only allow communication between systems B, C, and D. This is an example of limiting the traffic between two LANs. You might do this for security reasons or simply to reduce the amount of traffic on the LAN.

2.6.2 Remote Bridging

Figure 2–6 shows the DECNIS acting as a remote bridge. The remote bridge filters traffic in the same way as a local bridge, but does not have a direct connection to both LANs. It forwards data over one synchronous line, through another DECNIS to the remote LAN. The DECNIS can connect over the synchronous line using the HDLC, PPP, ATM Permanent, CHDLC or frame relay.

Figure 2–6 Remote Bridging Between LANs



The DECNIS also supports VCP (Vitalink® Communications Protocol) links which allow you to form connections to Vitalink systems.

The VCP link uses a variant of the CSMA-CD station running over modem connect to transfer data. This station runs the VCP keepalive protocol on the synchronous line and is also responsible for adding and removing the Vitalink headers from the frames on the line. The keepalive protocol ensures that both ends of the connection are up before any data is transferred.

The VCP link is configured and managed in a similar manner to Ethernet connections. You can only set up VCP links on the DEC WANcontroller 622.

VCP links can also be used to set up IP circuits. Refer to the *DECNIS Management* manual for full details on using VCP.

2.7 X.25 Gateway and X.25 Relay

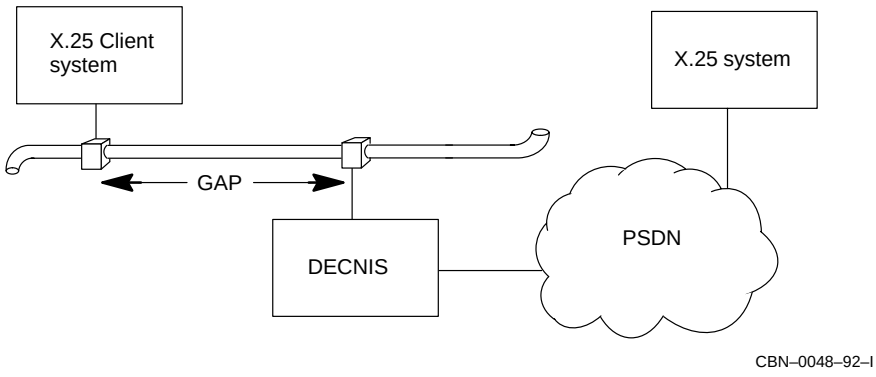
The following sections describe the X.25 functions of the DECNIS.

2.7.1 X.25 Gateway

The DECNIS can act as an X.25 gateway allowing Digital Client systems to connect to PSDNs. Digital Client systems are VAX™ P.S.I. Access systems and DEC X.25 for Digital UNIX Gateway Client systems.

The gateway function allows the Client systems to communicate with other X.25 systems (Digital or non-Digital) over PSDNs. The Client systems communicate with the DECNIS using Gateway Access Protocol (GAP). Figure 2–7 shows an example of the DECNIS acting as a gateway.

Figure 2–7 DECNIS as an X.25 Gateway



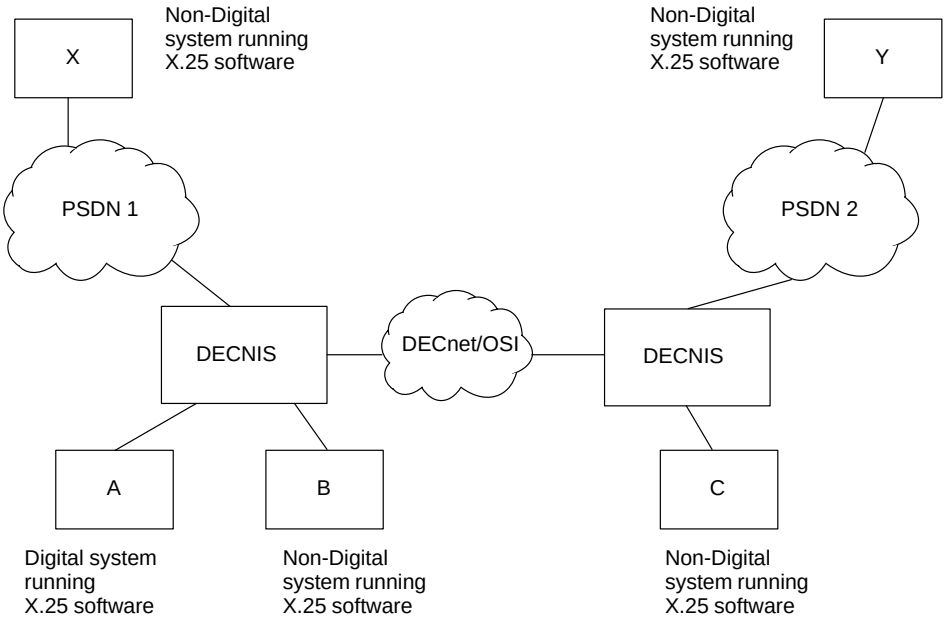
2.7.2 X.25 Relay

The DECNIS can act as a relay over PSDNs and DECnet-Plus networks. This means that Digital X.25 systems can communicate with non-Digital X.25 systems. For example, in Figure 2–8, system A can communicate with all the other systems (B, C, X, Y).

The relay function also lets non-Digital systems communicate with each other using X.25 software. For example, in Figure 2–8, system B can communicate with systems C, X, and Y.

Note, however, that systems X and Y cannot communicate through the DECNIS systems. The PSDN authorities allow X and Y to communicate only through an X.75 link.

Figure 2–8 DECNIS as an X.25 Relay



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2.7.3 CONS LAN/WAN Relay

The DECNIS uses CONS (Connection-mode Network Service) to allow LLC2 systems on a LAN to communicate over a PSDN with any X.25 system.

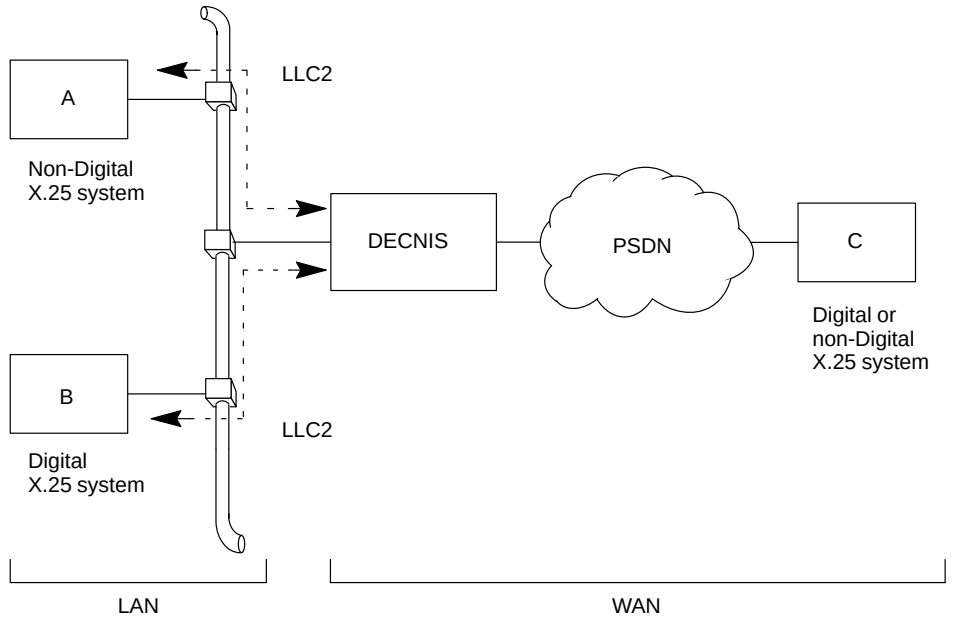
This is often known as a CONS LAN/WAN relay.

The connecting systems can be Digital or non-Digital systems.

The DECNIS supports the LLC type II protocols ISO 8881 and ISO 8802, and implements the recommendations in the ISO Technical Report 10029 for CONS LAN/WAN relays.

An example of a CONS LAN/WAN relay is shown in Figure 2–9.

Figure 2–9 A CONS LAN/WAN Relay



In Figure 2–9, systems A and B can communicate with system C using a CONS LAN/WAN relay. Systems A and B can also communicate with each other directly over the LAN using LLC2.

2.8 Multiprotocol and Multivendor Environments

This section describes how an international company might use the DECNIS to operate in a multiprotocol and a multivendor environment.

The example company has offices in the U.S. and in Europe. Figure 2–10 shows the connections between the offices using combinations of IP and OSI routing, bridging and X.25.

In Figure 2–10, the European Research and Development department use the IP function of the DECNIS to communicate with the universities in the Internet.

The systems in the U.S. Programming department communicate with the European Programming department by:

1. Using the DECNIS as an OSI router with:
    - HDLC on synchronous connections over the OSI network
    - PPP on synchronous connections over the IP network
    - Dynamically Assigned circuits over the X.25 PSDN
2. Using the DECNIS as an X.25 gateway to the X.25 PSDN

The U.S. Sales department uses the DECNIS as an OSI router to communicate with the European Sales and Administration departments.

Non-Digital UNIX systems in the Programming departments use the DECNIS as an X.25 relay, or as a CONS LAN/WAN relay, to communicate with each other.

The bridge function of the DECNIS carries LAN traffic between the European Research and Development department and the European Programming department.

In Figure 2–11, the U.S. Sales department use the DECNIS to communicate with their customers in Japan and Germany. They use message routing services including X.400 and Electronic Data Interchange (EDI) applications.

The WANs are a combination of OSI routing networks and X.25 PSDNs.

To set up the DECNIS in a multiprotocol/multivendor environment, refer to the *DECNIS Management* manual.

Figure 2–10 A Multiprotocol Environment

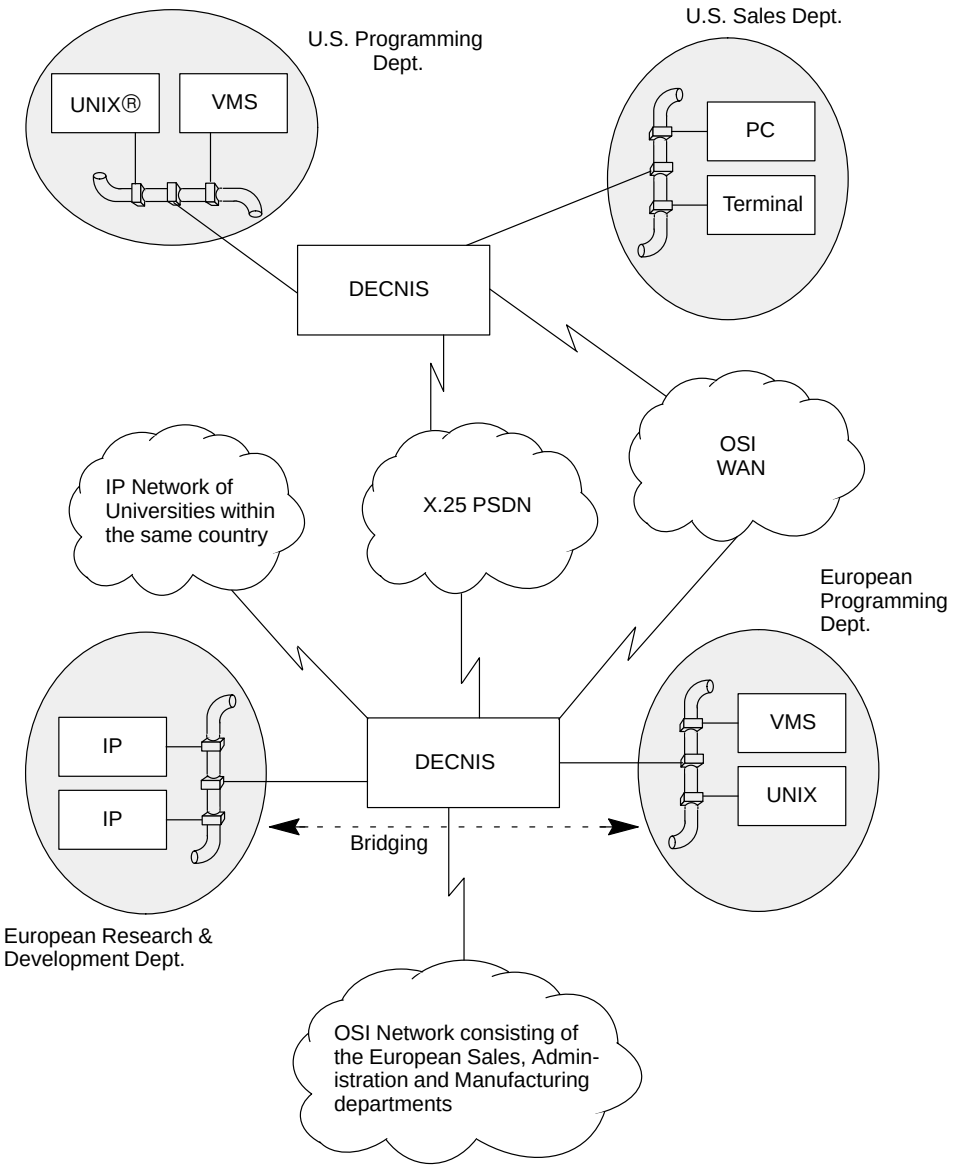
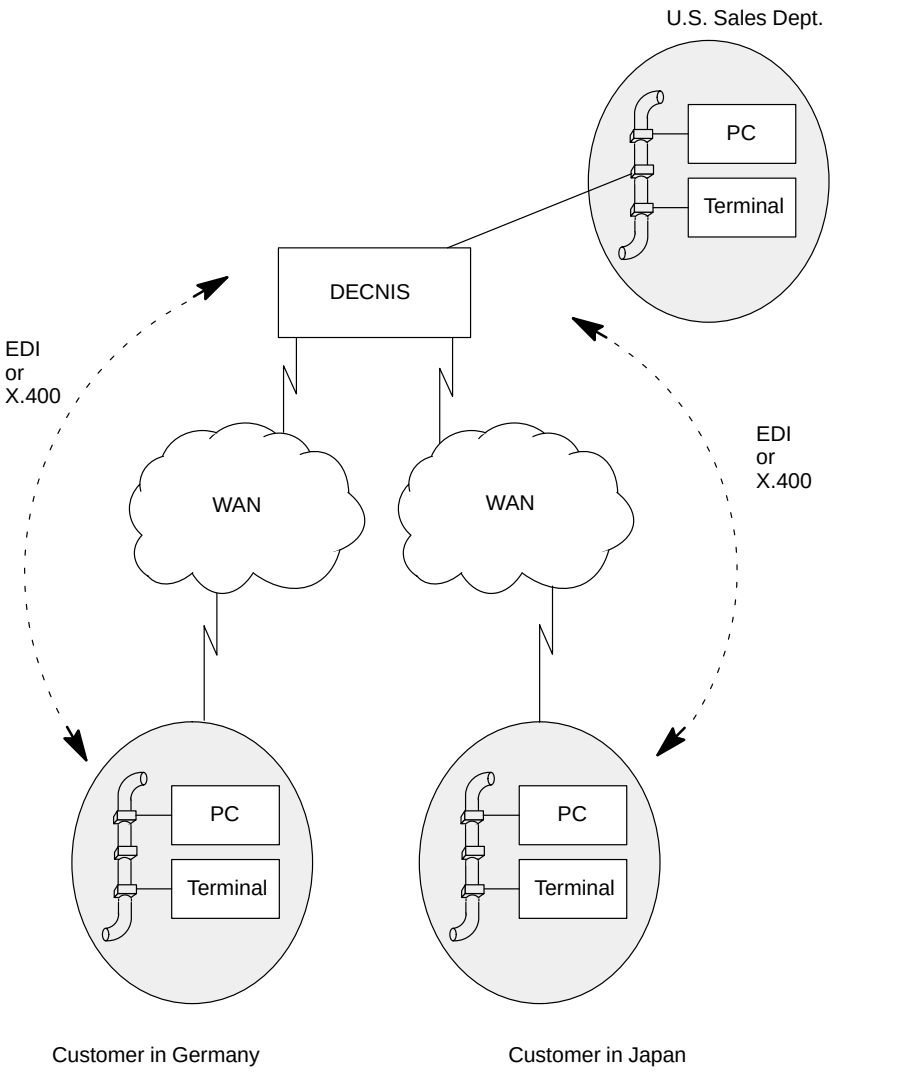


Figure 2–11 A Multivendor Environment



2.9 Backup Circuits

The backup circuit facility enables the DECNIS to detect the failure of a routing circuit on a serial line, and to establish an alternative routing circuit for the duration of the failure.

A primary circuit and a backup circuit can be grouped so that one backup circuit can be shared between a number of primary circuits to reduce costs. For example, an ISDN connection can be used as a backup circuit for a number of leased line primary circuits. Backup circuits can also be cascaded such that a backup circuit of one group can be a primary circuit of another. This ensures flexibility and improves network availability.

Backup circuits are also known as resilient routing circuits.

2.10 Packet Prioritization

When there is a lot of traffic on the network, some applications may experience delays. For example, terminal users may suffer poor screen refresh rates whilst a file transfer is taking place.

The DECNIS supports packet prioritization so that different traffic types can be given the appropriate priority over LAN and WAN links. Traffic can be prioritized based on protocol type, for example, IP, DECnet or bridge traffic. Within IP, traffic can be prioritized based on TCP/UDP port number, protocol type or Type of Service. Bridge traffic can also be prioritized based on SAP value, PID value or Ethernet type.

The DECNIS supports up to eight levels of priority. Packets are assigned to priority groups which are then assigned to one of eight priority queues. The queues are then processed in order. This means that high priority packets are always transmitted first. The maximum queue length can be set for each queue to ensure that packets in each queue are processed. Packet counters allow packets to be monitored on a per interface basis.

Note that the DECNIS automatically prioritizes routing and bridge control traffic to ensure that network stability is maintained at all times.

2.10.1 Discarding Packets (Simple Packet Filtering)

Certain protocols, particularly bridged protocols, can use a lot of bandwidth unnecessarily and this can be a problem on low bandwidth WAN links. The ability to filter different types of bridge traffic greatly reduces network costs by stopping unnecessary traffic from crossing the network.

Packet prioritization allows the DECNIS to discard certain types of packet to provide basic packet filtering on a per interface basis. Packets are prioritized so that they are assigned to a zero length queue.

The DECNIS has a specific facility for filtering IP packets, see Section 2.2.8.

2.10.2 Pattern Match Prioritization

An extension to the packet prioritization mechanism also allows priority packets to be further classified by packet pattern matching. Specific bit fields of packets can be matched with masks. On the basis of a match, packets can be assigned to different priority queues. For example, LAT service groups can be filtered to allow only certain services to be advertised across the network.

2.10.3 Secure Connections

Secure Connections (also known as the Secure Connection Firewall) is a utility that enables the network manager to set up filtering to permit or deny network connect requests to or between network domains. Secure Connections can filter connect requests for IP, DECnet, and OSI.

You can only use Secure Connections in the clearVISN DECNIS configurator.

Secure Connections works by enabling you to:

- Combine nodes, circuits, applications, and users into groups that share the same security requirements.
- Define access rules that apply to each group.

For example, a remote access domain could be created for users at remote sites that connect into the central site using Frame Relay, with only certain users at the remote site being allowed access to resources in the multiprotocol backbone network domain, while others are only allowed to access mail or notes servers in the local domain. Users at remote sites connecting into the central site via the Internet could be restricted to access only the secure Intranet domain.

2.10.3.1 Secure Connections Capabilities

With Secure Connections, security managers can:

- Protect critical nodes or LANs from unauthorized network accesses.
- Enforce different access rules simultaneously for incoming and outgoing network traffic.
- Combine systems into groups to centralize network security and protect critical systems or LANs from unauthorized access to networks.
- Use access rules to control access to network circuits by network traffic.

2.11 Optimizing Routing Database Sizes

The DECNIS stores routing information in databases. The size of the databases determines the size of the network that the DECNIS can support.

The DECNIS allows you to change the size of these databases in order to make the most efficient use of its memory.

3
General Operation

This chapter briefly describes:

- Setting up a DECNIS.
- Managing a DECNIS.

3.1 Setting Up a DECNIS

Setting up a DECNIS for the first time involves:

- Installing the software on a load host.
- Configuring the load host so that it can load the DECNIS.
- Configuring the DECNIS features.
- Downline loading the software and configuration files from the load host onto the DECNIS hardware.

3.1.1 Types of Load Host

The DECNIS can use BOOTP/TFTP or MOP (Maintenance Operations Protocol) to load its software. This means that the DECNIS software must be installed on either a BOOTP load host or a MOP load host.

This section briefly describes the types of system you can use for MOP or BOOTP load hosts. For more details about operating system version requirements, refer to the *DEC Network Integration Server Software Product Description (SPD).*

3.1.2 BOOTP Load Hosts

You can install and configure the DECNIS software on, and use BOOTP to load from, the following types of system:

- DECnet-Plus (formerly DECnet/OSI) for DIGITAL UNIX hosts.
- Windows 95 or Windows NT personal computers.

In addition, you can load the DECNIS from any hosts whose operating system supports the BOOTP and TFTP protocols, provided that you first copy the DECNIS software and configuration load file to them.

A BOOTP load host must be on the same LAN as the DECNIS. A BOOTP load host does not have to run DECnet.

3.1.3 MOP Load Hosts

You can install and configure the DECNIS software on, and use MOP to load from the following types of system:

- DECnet-Plus (formerly DECnet/OSI) for OpenVMS VAX hosts
- DECnet-Plus for OpenVMS Alpha hosts
- DECnet-Plus for DIGITAL UNIX hosts

In addition, you can use the following types of system as MOP load hosts, provided that you first copy the DECNIS software and configuration load file to them:

- DECnet–VAX Phase IV hosts.
- MS–DOS PCs running PATHWORKS™ for DOS, Version 5.0 or later.

3.1.4 Configuring a Load Host

A load host needs to be configured so that it can downline load the DECNIS software.

There are two ways of configuring a load host, depending on the load host:

- On OpenVMS and DIGITAL UNIX hosts, you run a menu-based program called the load-host configurator which asks for information needed for loading, such as the DECNIS hardware address and the load circuit name.
- On Windows 95 or Windows NT PCs, you run the clearVISN DECNIS configurator, which includes the information needed to configure the load host.

3.1.5 Configuring the DECNIS Software

The DECNIS software must be configured to your specifications. For example, you need to specify your Network Interface Cards, the functions you want to use, for example: IP and bridging, which routing protocols you want to run, and which network connections you require.

There are two ways to configure the software, depending on the load host:

- On OpenVMS and DIGITAL UNIX hosts, you run the DECNIS text-based configurator.
- On Windows 95 or Windows NT PCs, you run the clearVISN DECNIS configurator.

Both configurators create a master NCL script file from the information you supply, and three user NCL scripts.

Some functions are not supported in the DECNIS configurator. For these functions you must add NCL commands to the user NCL scripts. You are supplied with example NCL scripts which you can edit to your needs and then add to the user NCL scripts.

The clearVISN DECNIS configurator allows you to edit the user NCL scripts within the configurator. You cannot do this with the DECNIS text-based configurator.

When the NCL scripts have been created, the configurator creates a configuration load file. This is the file that is downline loaded to the DECNIS hardware.

3.1.6 Downline Loading the DECNIS Software

The configuration load file created with the DECNIS configurator must be downline loaded to the DECNIS hardware from a load host.

A load host can be connected to the DECNIS in either of two ways:

- Directly. The load host is on the same LAN as the DECNIS, or is directly connected to it by a synchronous line. (Note that loading over a synchronous line is not supported by all load hosts.)
- Indirectly. The load host is connected through another DECNIS acting as a proxy load host or BOOTP gateway. This is also known as agent loading.

To load a DECNIS for the first time, you connect it to the LAN and plug in the power supply. The DECNIS will automatically load from a load host.

If you have previously loaded the DECNIS, you can reload it using the following methods:

- Entering NCL commands from a management host.
- Powering up the DECNIS.
- Entering DECNIS console commands.

3.1.6.1 Loading from the DECNIS Nonvolatile (Flash) Memory

The DECNIS can store its software and configuration file in its nonvolatile (flash) memory, once it is initially loaded. This means that for subsequent reloads, a load host is not required.

A load host is required for the first load, and for changes to the configuration of the DECNIS.

3.1.6.2 Agent Loading and Dumping

The DECNIS can act as a load host for other DECNIS systems and other routers, as follows:

- It can use MOP loading over HDLC or PPP synchronous lines.
- It can act as a BOOTP gateway over LAN circuits.

Note that agent loading and dumping is not supported on DECNIS ATMcontroller 631 and DECNIS HSSIcontroller 641 Network Interface Cards. A DECNIS 600 with a W631 or a W641 card installed should, therefore, also have at least one other Network Interface Card that does support loading and dumping.

3.1.7 Modifying Flash Memory Dynamically

You can use the DECNIS console to add new CMIP files (scripts) to nonvolatile memory dynamically, and to select which script is to be used at the next reboot. This feature saves having to reload the DECNIS from a host when testing new configuration scripts.

Note that the DECNIS console is only supported on the management processor cards MPC-II and MPC-III.

3.2 Managing a DECNIS

This section describes the tools you can use to manage the DECNIS.

For more detail about the management tools, refer to the *DECNIS Management* manual.

3.2.1 Console Terminal

The DECNIS MPC–II and MPC–III each have a console port which provides the following features:

- Support for a VT100-compatible console terminal.
- Full-duplex DEC Standard 052 modem control.

- An implementation of the Network Control Language (NCL), for managing local and remote nodes from the console terminal.
- A console break-in facility.
- Password protection.

You can use a console terminal to issue loading and dumping requests, to use NCL commands to manage the DECNIS, and to modify dynamically the contents of flash memory.

You can connect to the DECNIS console from a remote terminal using Telnet.

3.2.2 DECNIS Configurators

There are two DECNIS configurators provided to set up and make permanent changes to the configuration of the DECNIS:

- The DECNIS text-based configurator is a text-based menu-driven program, running on a VT220 terminal. It is supplied with OpenVMS and DIGITAL UNIX hosts.
- The clearVISN DECNIS configurator is a graphical user interface (GUI) Windows program that combines the functions of the load-host configurator and the DECNIS text-based configurator.

The *DECNIS Management* manual outlines how to use these configurators to alter the DECNIS configuration. The configurators are also described in more detail in the DECNIS installation and configuration documentation; refer to Table 1–1.

3.2.3 SNMP (Simple Network Management Protocol)

Any management station that complies with the SNMP standard (as specified in RFC 1157) can be used to manage the DECNIS, using both Set and Get SNMP requests.

The DECNIS supports the following MIBs:

MIB-II (RFC 1213)
Bridge MIB (RFC 1493)
FDDI MIB (RFC 1285—draft)
DEC Vendor MIB elanext V2.7

3.2.4 clearVISN

The DECNIS can be managed using the clearVISN™ Router Manager.

clearVISN is DIGITAL's policy-based element manager. It consists of a suite of SNMP-based network management applications for managing devices within a network. The clearVISN Router Manager is an SNMP router management application with multivendor support for routers.

The clearVISN Router Manager includes the following features:

- **Device discovery**. When given an IP address, clearVISN discovers the appropriate IP device.
- **Path Tracing**. You can trace paths between IP devices in the network, to help find problems in network links.
- **Performance Monitoring**. clearVISN uses MIB information to determine bandwidth utilization on a per interface or per protocol basis, and automatically create a utilization graph.
- **Alarms and Reports**. You can set thresholds for automatic alarms and to show network events, for example, percentage line utilization thresholds. You can also generate periodic reports according to predetermined criteria.
- **Configuration Manager**. This provides management of multiple device configuration files, including DECNIS configuration and image files.
- **Telnet**. This allows you to connect to the DECNIS console and the NCL command line interface to manage running DECNIS systems.
- **Policy-based management**. This allows procedures to be set up to simplify the management of complex network devices and technologies.

3.2.5 NCL

The DECNIS can be managed using the Network Control Language (NCL) command line interface from:

- A console terminal (for out-of-band management).
- A Windows 95 or Windows NT PC with the DECNIS software installed.
- A DIGITAL UNIX system, using either DECnet-Plus (formerly called DECnet/OSI) or TCP to communicate with the DECNIS.
- A DECnet-Plus for OpenVMS system.

Refer to the NCL documentation and the NCL online help for more information about NCL commands. On Windows 95 or Windows NT PCs, NCL online help is supplied as a Windows help file.

3.2.6 POLYCENTER Manager on Netview

The DECNIS can be managed using the POLYCENTER™ Manager on Netview® and the POLYCENTER DECnet Manager.

POLYCENTER™ Manager on Netview lets you control the DECNIS using SNMP management. The POLYCENTER DECnet Manager lets you control the DECNIS in the same way as NCL, but it uses a DECwindows interface and provides graphical representations of the status of the system.

The POLYCENTER products also provide alarm notification and performance monitoring.

3.2.7 Problem Solving

Event logging and the data tracing utility CTF are available for DIGITAL UNIX and OpenVMS systems to aid in problem solving. The data tracing utility DTF is available for DIGITAL UNIX, OpenVMS, and Window 95/NT systems.

Refer to the *DECNIS Problem Solving* manual for more information about event logging, CTF and DTF. Refer to the *clearVISN DECNIS Configurator User Guide* manual for more information about running DTF from the clearVISN DECNIS configurator.

Glossary

This glossary describes terms that are used throughout the DECNIS documentation.

ATM Adaptation Layer (AAL)

The AAL provides the mapping of higher layer PDUs into the information field of cells and the reassembly of those PDUs.

AARP

See AppleTalk Address Resolution Protocol.

Access Control List (ACL)

An ACL consists of ACL entries (ACEs) that grant or deny access to a particular system object.

Adaptive Routing

Method of routing that uses the most cost-effective path available.

Address Filtering

In bridging, the process of preventing frames from being forwarded across a bridge, based on the source or destination address of that frame, or both.

Address Resolution Protocol

See ARP.

Addressing Authority

Authority responsible for assigning unique Network layer addresses.

Addressing Domain

Part of Network layer address. Every NSAP address is part of an addressing domain administered directly by one addressing authority.

Adjacency

A single connection to an adjacent node.

Adjacent Node

A node connected to the local node directly. All nodes on an Ethernet are considered adjacent.

Administrative Domain

Collection of end nodes, routers, and subnetworks operated by a single organization or administrative group. This domain can be divided into a number of routing domains.

AFI (Authority and Format Identifier)

An AFI is part of the Initial Domain Part (IDP), which is part of an NSAP address. The AFI specifies different addressing authorities.

Aging Process

The process a bridge uses to purge inactive learned address entries from its forwarding database. If the bridge does not see the address of an entry in the source address of a frame during the aging time, the bridge marks the entry inactive. The bridge removes inactive entries when it next purges the database.

AppleTalk

Apple's PC LAN protocol.

Area

Group of nodes or systems forming a Level 1 routing subdomain. The systems run as an independent subnetwork.

AppleTalk Address Resolution Protocol (AARP)

The protocol that maps AppleTalk node addresses with the address of the underlying datalink.

AppleTalk Echo Protocol (AEP)

The protocol that allows a node to send a packet to any other node within the Internet and to receive an echoed copy in return.

Area Address

The IDP and LOC-AREA fields of the NSAP address combined. A system can have more than one area address, but it must have at least one area address in common with its neighbors.

Area Router

A system that can send and receive packets from one system to another both within its own area and to other areas. Also known as a Level 2 router.

Area Routing

The forwarding of packets from one area to another using Level 2 routers.

ARP (Address Resolution Protocol)

A protocol used on LANs to determine the physical address of a system from its IP address.

AS

See Autonomous System.

Attenuation

The amount of energy that is lost by a signal between two points (for example, a transmitter and receiver). Expressed in decibels (dB).

ATM (Asynchronous Transfer Mode)

In ATM, all information to be transferred is packed into fixed-size slots called cells. Each cell contains user information and control information. Cells are received in the order transmitted and there is no recovery from cell loss.

Attribute

Software variable which is part of an entity. This is the controllable part of the entity, for example, sizes of packets and lengths of timers.

Authority and Format Identifier

See AFI.

Autonomous System (AS)

A collection of hosts and routers that fall within the same administrative domain, for example, one company. An Interior Gateway Protocol (IGP) is used to route within an autonomous system; an Exterior Gateway Protocol (EGP) is used between autonomous systems.

Backbone

The name sometimes given to the Level 2 routers that link together all the areas of a network.

Backup Circuits

This is a facility that enables the DECNIS to detect the failure of a routing circuit on a serial line, and to establish an alternative routing circuit for the duration of the failure.

Backup circuits are also known as resilient routing circuits.

Bandwidth

The range between the highest and lowest frequencies at which signals can pass over the transmission medium.

BCUG (Bilateral Closed User Group)

A Closed User Group (CUG) consisting of two DTEs.

Beacon

A specialized frame used by media access control to announce to other stations that the ring is broken.

BECN (Backward Explicit Congestion Notification)

A bit set in frame relay frames by the frame relay network to inform a source system that it is sending frames on a congested path.

BGP (Border Gateway Protocol)

An exterior gateway protocol used to link autonomous systems.

Bilateral Closed User Group

See BCUG.

BOOTP

The Bootstrap Protocol as defined by RFC 951. This protocol allows diskless systems to discover their own IP address, the server's address and the load file name.

Border Gateway Protocol

See BGP.

Bridge

Device that links two LANs together and filters traffic between them.

Broadcast

The ability to send a single message simultaneously to several systems.

Broadcast Addressing

Type of multicast addressing in which all systems receive the same message simultaneously.

Broadcast Circuit

Circuit connecting multiple systems on which a message can be transmitted to multiple receivers.

Buffer

Area of memory used for temporary storage. This compensates for the difference in the rate of data flow, when transmitting from one device to another.

Bypass

The ability of a station to be optically or electronically isolated from the network while maintaining the integrity of the ring.

Call

To make (or attempt to make) a connection with a remote system.

Carrier Sense, Multiple Access with Collision Detect

See CSMA/CD.

CCITT (Comite Consultatif International Téléphonique et Télégraphique)

The CCITT is a United Nations committee that makes recommendations on data communications services.

Channel

The logical path between a DTE and a DCE over which data is transmitted. Each channel is identified by a unique reference number, called a Logical Channel Number (LCN).

Channel Service Unit

See DSU/CSU.

Characteristics

Information about a component. This can include attributes defined for the component with NCL commands.

CHDLC

Compatibility HDLC mode for using the DECNIS with the DECbrouter 90. These links are similar to PPP connections.

Child Entity

Subordinate class of entity.

Circuit

Logical path providing connection between adjacent nodes.

Circuit Switching

The dynamic establishment of a physical connection prior to information exchange.

Claim Process

A technique used to determine which station will initialize the FDDI ring.

Clear

To stop a connection across a virtual circuit to a remote DTE by sending clear request packets.

Client System

In general terms, a Client system is a system which uses the services of another system. The other system is referred to as a Server system.

An X.25 Client system is a DECnet system running VAX P.S.I. Access or DEC X.25 for Digital UNIX Gateway Client. X.25 Client systems use the services of a Connector system to connect to PSDNs.

CLNS (Connectionless-mode Network Service)

A network service that operates on the datagram model. Each message is routed and delivered to the destination system independent of any other message.

Closed User Group

See CUG.

CMIP (Common Management Information Protocol)

ISO protocol used to exchange network management information.

Comite Consultatif International Téléphonique et Télégraphique

See CCITT.

Committed Burst Size

The maximum amount of data per DLCI that a frame relay service provider guarantees to be transmitted over a given time period.

Committed Information Rate

The maximum data throughput rate that a frame relay service provider is committed to supporting on a particular Data Link Connection Identifier (DLCI).

Common Carrier

An organization in the United States that offers standard and consistent communications services within a country. *See also* Post, Telegraph and Telephone Authority.

Common Management Information Protocol

See CMIP.

Common Trace Facility (CTF)

A diagnostic tool used for examining data generated by the network.

Communications Link

Physical medium connecting two nodes.

Concentrator

An FDDI node that provides attachment points through M-ports for stations that are not connected directly to the dual ring. The concentrator is the focal point of the dual ring of trees topology.

Congestion

When a network or part of a network is overloaded and has insufficient resources for the traffic volume.

Connectionless Network

A type of communications in which no logical connection is required between sending and receiving stations. Each data unit (datagram) is sent and addressed independently.

Connectionless-mode Network Service

See CLNS.

Connection-mode Network Service

See CONS.

Connector System

A DECnet system with a direct connection to a PSDN which provides an indirect connection to PSDNs for Client systems. These are also referred to as gateway systems.

CONS (Connection-mode Network Service)

Network service that operates according to a connection-oriented model. Before data can be exchanged, a connection must first be established. The OSI term is Connection-Oriented Network Service.

Cost

Value assigned to a circuit between two nodes. Packets are routed on paths of the lowest cost.

Counter Rotating Ring

An arrangement where two FDDI signal paths, whose directions are opposite to each other, exist in a ring topology.

Counters

Performance and error statistics kept for a component by network management. For example, line counters.

CPE (Customer Premises Equipment)

Hardware and software that is located within a customer's corporation. It is owned and operated by the customer to access an SMDS network.

CPU

Functional term for the system management processor.

CRC (Cyclic Redundancy Check)

A 16-bit or 32-bit error check polynomial that is used to verify that the bit content of a datagram is the same before and after transmission.

CSMA/CD (Carrier Sense, Multiple Access with Collision Detect)

The Data Link protocol used by Ethernet and ISO 8802-3 LANs. It allows multiple stations to access the broadcast channels at will. Each station awaits an idle channel before transmitting and can detect overlapping transmissions by other stations.

CSU/DSU

See DSU/CSU.

CUG (Closed User Group)

A group of DTEs that can communicate with each other only.

Customer Premises Equipment

See CPE.

Cyclic Redundancy Check

See CRC.

DA

See Dynamic Assignment.

DAC

See Dual Attachment Concentrator.

DAS

See Dual Attachment Station.

Database Sizing

Adjusting the sizes of the various databases used by routing and other DECNIS functions. It allows you to make the best use of the DECNIS memory for a given network configuration.

Data Circuit-terminating Equipment

See DCE.

Data Exchange Interface

See DXI.

Datagram

The type of message sent over a connectionless network. Datagrams contain a source and destination address, along with the data.

Data Link

Logical connection between two stations on the same circuit.

Data Link Connection Identifier (DLCI)

The 10-bit address of a frame relay Permanent Virtual Circuit (PVC). It is used by the frame relay network to identify PVCs. Each PVC associated with a channel has a unique DLCI within that channel, but DLCIs are not necessarily unique within the frame relay network.

Data Link Layer

Layer of OSI that provides a path between two directly connected systems.

Data Link Mapping (DLM)

The software interface (defined by DNA™) that creates a path between DECnet and X.25 implementations residing in the same node. DLM allows DECnet nodes with an X.25 implementation to route over a PSDN to another DECnet node.

Data Network Identification Code (DNIC)

Usually the first four digits of the DTE Address. The DNIC identifies the country, and distinguishes the PSDN from other PSDNs within the same country.

Data Segments

This is a charging unit for PSDNs. For most PSDNs, a data segment is 64 octets.

Data Service Unit

See DSU/CSU.

Data Terminal Equipment

See DTE.

DCE (Data Circuit-terminating Equipment)

The CCITT X.25 term for the network switching exchange to which DTEs are connected. It provides the following functions:

- Establishing, maintaining and terminating connections between the DTE and the network.
- Signal conversion and coding between the DTE and the network.

DDCMP (Digital Data Communications Message Protocol)

A Digital Data Link layer protocol that operates over synchronous or asynchronous communications links.

DECdns (Digital Distributed Name Service)

Service that provides network applications with a means of assigning unique names to network resources so that a network application can find resources within the network.

DECdts (Digital Distributed Time Service)

Service that provides clock synchronization for local and wide area systems.

DEC FDDIcontroller 621

A Network Interface Card (NIC) with a single-port FDDI interface.

DEC LANcontroller 601

A Network Interface Card (NIC) with one Ethernet port.

DEC LANcontroller 602

A Network Interface Card (NIC) with two Ethernet ports.

DECnet

Collective name for the software products that allow various Digital operating systems to be connected to form computer networks. A network is a configuration of two or more independent computer systems linked together to share resources and/or exchange information.

DEC/OSI

(Now known as DECnet-Plus; see DECnet-Plus for further entries) Family of Digital hardware and software products that implements the Digital Network Architecture (DNA) Phase V, which integrates OSI and DNA protocols; compliant with OSI and compatible with DECnet Phase IV and TCP/IP.

DECnet/OSI Area

Area using DECnet/OSI protocols.

DECnet/OSI End Node

End node capable of transmitting and receiving DECnet/OSI packets.

DECnet/OSI Level 1 Router

Level 1 router capable of routing DECnet/OSI packets.

DECnet/OSI Level 2 Router

Level 2 router capable of routing DECnet/OSI packets.

DECnet Phase IV Area

Area in which all systems and routers are using Phase IV protocols.

DECnet Phase IV End Node

End node capable of transmitting and receiving Phase IV packets only.

DECnet Phase IV Level 1 Router

Level 1 router capable of routing Phase IV packets only.

DECnet Phase IV Level 2 Router

Level 2 router capable of routing Phase IV packets only.

DECNIS ATMcontroller 631

A Network Interface Card (NIC) with one synchronous port. It provides ATM connectivity at up to 155 Mbits/s.

DECNIS HSSIcontroller 641

A Network Interface Card (NIC) with one synchronous port running at up to 52 Mbits/s.

DEC WANcontroller 614

A Network Interface Card (NIC) with four synchronous ports each running at up to 128 kbits/s.

DEC WANcontroller 618

A Network Interface Card (NIC) with eight synchronous ports each running at up to 128 kbits/s.

DEC WANcontroller 622

A Network Interface Card (NIC) with two synchronous ports each running at between 9.6 kbits/s and 3.1 Mbits/s.

DEC WANcontroller 622/HS

A Network Interface Card (NIC) with two synchronous ports each running at between 64 kbits/s and 12 Mbits/s.

Default Route

In IP, a route to be used when no other matching route is found. This is a route with an address of 0.0.0.0.

Designated Bridge

The bridge with the shortest cost path to the root bridge. It connects that LAN with the next LAN closer to the root bridge. Each LAN in an extended network elects one designated bridge.

Designated Router

Router providing routing for end nodes.

Dial-up Line

Telephone communications circuit set up by dialing. Also called a switched circuit connection.

Digital Distributed Name Service

See DECdns.

Digital Distributed Time Service

See DECdts.

Digital Network Architecture (DNA)

DNA controls all data that travels throughout a Digital network. DNA is a set of protocols governing the format, control, and sequencing of message exchange for all Digital network implementations. DECnet/OSI is based on the fifth version (Phase V) of DNA.

Distance Vector Routing

One of the two widely used types of routing algorithm. Routers exchange reachability information with adjacent routers. DECnet Phase IV and RIP are examples of distance vector routing.

DLCI

See Data Link Connection Identifier.

DLM

See Data Link Mapping.

DNA

See Digital Network Architecture.

DNIC

See Data Network Identification Code.

DNS

See DECdns.

Domain

A collection of end nodes, routers, and subnetworks that all use the same routing procedures and are operated by a single organization, or administrative authority.

Domain Specific Part (DSP)

Part of the Network Service Access Point (NSAP) address defined by the networking authority.

Downline Load

Transferring a copy of a software product image from a load host to a target node.

Downstream

A term that refers to the relative position of two FDDI stations in a ring. A station is downstream of its neighbor if it receives the token after its neighbor receives the token.

DSP

See Domain Specific Part.

DSU/CSU (Data Service Unit/Channel Service Unit)

These devices use the lower two layers of the SIP protocol to segment and reassemble packets. They provide the interface between the CPE and the SMDS transmission facilities.

DTE (Data Terminal Equipment)

A CCITT term referring to the user's equipment (computer or terminal) connected to a DCE on a PSDN for the purpose of sending and/or receiving data.

DTE Address

A unique destination address given to a DTE.

DTE Class

A named class of DTEs. DTE Classes are used to determine which DTE to use when making outgoing calls.

Dual Attachment Concentrator

A concentrator that offers two connections to the FDDI network capable of accommodating the FDDI dual "counter rotating" ring, and additional ports for connection of other concentrators or FDDI stations.

Dual Attachment Station

An FDDI concentrator that offers two connections to the FDDI dual counter rotating ring.

Dual Homing

A method of cabling FDDI concentrators and stations that permits an alternative or backup path to the dual ring in case the primary connection fails Can be used in a tree or dual ring of trees topology.

Dual Ring of Trees

A topology of FDDI concentrators and nodes that cascade from concentrators on a dual ring.

DXI (Data Exchange Interface)

A specification developed by the SMDS Interest Group to define the interaction between internetworking devices and DSUs/CSUs. DXI splits the implementation of the SMDS Interface protocols between the Internetworking device and the DSU/CSU.

Dynamic Assignment (DA)

Term for providing routing over X.25 switched circuits. The circuits are created and timed out through usage.

EGP (Exterior Gateway Protocol)

A routing protocol that operates between autonomous systems.

Encapsulated Packet

IP packet used over IPX and AppleTalk WAN links.

Encapsulating Bridge

A proprietary hardware device that encapsulates packets in specialized frames.

End System

System that transmits data packets to and receives data packets from other systems but does not forward data packets from other systems.

Entity

Element in the network that can be managed.

Event

A network or system occurrence that is recorded. Network events inform you of what is happening on the network and where there are any problems.

Event Log

This contains a record of each event generated by the network.

Event Sink

A node designated to receive events.

Event Stream

Entity that collects events.

Excess Burst Size

Maximum amount of data in excess of the Committed Burst Size that a frame relay network will attempt to transmit over a given time period.

Executor Node

Node at which an NCL command is executed.

Extended LAN

Two or more LANs connected by bridges. The stations connected to these LANs can communicate with one another as if they were all on the same LAN.

Exterior Gateway Protocol

See EGP.

FCS (Frame Checking Sequence)

A 16-bit error check polynomial that checks that the bit content of a frame is the same before and after transmission.

FDDI

See Fiber Distributed Data Interface.

FDDI Port Type

One of four port types defined for FDDI. They are:

- A — connects to primary in, secondary out
- B — connects to secondary in, primary out
- M — connects a concentrator to a DAS or SAS, or to another concentrator
- S — connects an SAS or an SAC to a concentrator

FECN (Backward Explicit Congestion Notification)

A bit set in frame relay frames by the frame relay network to inform a destination system that there was congestion in the path from source to destination.

Fiber Distributed Data Interface

A set of ANSI/ISO standards that define a high-bandwidth (100 Mb/s) general-purpose LAN connection between computers and peripheral equipment in a timed-token passing, dual ring of trees topology.

Fiber-Optic Cable

A transmission medium designed to transmit digital signals in the form of pulses of light.

Filter

A filter is used to control the information that a system can receive. In X.25, a filter can determine which X.25 applications or Client systems receive incoming calls. In IP, a filter can determine which routes an IP router receives; *see also* Route Filtering.

Flag Sequence

A series of ones and zeros that indicate the start and end of a frame.

Flash

Region of DECNIS nonvolatile memory that contains the DECNIS image and (optionally) configuration. This allows the DECNIS to load without the use of a load host.

Flow Control

The mechanism that keeps traffic within limits acceptable by the end receiver or any intermediate receiver. At the terminal level, the flow control mechanism must guarantee that the flow of characters will stop if the buffer fills up.

Frame

A data unit that is used by the link level. It is used to exchange packets, control information, and error information, between the DTE and the DCE. A frame consists of data and a header, and it is delimited by flags.

Frame Checking Sequence

See FCS.

FRMR

A frame used by the DTE or DCE to report an error that cannot be recovered by the retransmission of the identical frame. Only used by LAPB/LAPBE.

Frame Relay

The forwarding of packets using the Frame Relay Bearer Service (FRBS) protocol and interface standards.

Frame Relay Bearer Service (FRBS)

A data service that provides packet-switched data transfer over public and private networks. FRBS protocol and interface standards are developed by the American National Standards Institute (ANSI) T1 S1 committee.

FRBS

See Frame Relay Bearer Service.

Full-Duplex Circuit

A circuit allowing simultaneous two-way independent transmission in both directions.

GAP (Gateway Access Protocol)

Protocol used between a host DNA system and a DNA system that is a DTE on a PSDN. It provides the X.25 gateway access facility to a user on the host.

Gateway

A system or device that allows different vendors' networks to be linked together. In IP, this is a widely used term for router. *See also* Connector system.

Gateway Access Protocol

See GAP.

Graded Index

A characteristic of fiber-optic cable in which the core refractive index is varied so that it is high at the center and matches the refractive index of the cladding at the boundary between the core and the cladding.

Half-Duplex Circuit

A circuit allowing transmission in either direction but only one direction at one time.

Hardware Address

Unique physical address for a node's Ethernet communications controller.

HDLC (High-level Data Link Control)

An ISO Data Link layer protocol that operates over synchronous, switched, or nonswitched communications links.

Header

The control information placed before the data in a frame or a packet. For example, source or destination code, priority, or packet or frame identification.

High-level Data Link Control

See HDLC.

High Speed Serial Interface

See HSSI.

Host Node

Node that provides a service for another node.

HSSI (High Speed Serial Interface)

HSSI is an interface which can pass data between a DTE and a DCE at up to 52 Mbits/s. Specifications for HSSI were published by the American National Standards Institute (ANSI) in the standard: TIA/EIA–613.

The DECNIS HSSIcontroller 641 Network Interface Card is the hardware which provides HSSI on a DECNIS.

ICMP (Internet Control Message Protocol)

The protocol used for various IP error and control messages.

IDI (Initial Domain Identifier)

This is a value allocated under the addressing authority identified by the Authority and Format Identifier (AFI). The IDI is part of the Initial Domain Part (IDP), which is part of an NSAP address.

IDP

See Initial Domain Part.

IGP

See Interior Gateway Protocol.

In-band Management

When a system is managed over the network, rather than through a direct connection to a console. *See also* Out-of-band Management.

Index Profile

The refractive index of a fiber-optic cable as a function of its distance from the center of the core.

Individual address

The unique address assigned to a CPE in an SMDS network. It used to identify the sending or receiving station of a message.

Initial Domain Identifier

See IDI.

Initial Domain Part (IDP)

Part of an NSAP address. It identifies the administrative domain and consists of an AFI and an IDI.

Integrated IS–IS

An extended version of the OSI routing protocol, IS–IS. This is a link state protocol used for both IP and OSI routing.

Interior Gateway Protocol (IGP)

A routing protocol that operates within an autonomous system.

International Organization for Standardization

See ISO.

Internet

Networks linked by gateways (or routers) that use the TCP/IP protocols. They are sometimes referred to as IP networks. The name "Internet" refers to the Defense Advanced Projects Research Agency (DARPA) internet and the TCP/IP protocols it uses.

Internet Address

Address assigned to nodes within the Internet network.

Internet Control Message Protocol

See ICMP.

Internet Protocol (IP)

See IP.

Internetwork Packet Exchange

See IPX.

IP (Internet Protocol)

The Network layer protocol of the TCP/IP protocol suite, used within Internet networks.

IP Gateway

Same as IP router.

IP Multicasting

A way of sending data to a group of multicast host systems simultaneously. Members of a multicast host group are identified by a Class D IP destination address.

IP Network

Networks linked by gateways (or routers) that use the TCP/IP protocols. *See also* internet.

IP Packet Filtering

IP packet filtering allows you to control the access between IP hosts on your network. This allows you to provide security on the IP section of your network. It also gives you some control over the bandwidth used on your network.

IP Router

A system that routes IP packets within an internet.

IP Standby

This facility enables DECNIS IP routers on a LAN to act as backup (or standby) routers to each other. When an IP Standby router fails, or its connection to the LAN fails, another IP Standby router will rapidly take over.

IP standby is sometimes referred to as Virtual Router Cluster.

IPX

A connectionless datagram protocol as used by Novell NetWare.

IS–IS

An OSI routing protocol. *See also* Integrated IS–IS.

ISO (International Organization for Standards)

The International Standards Organization has produced recommendations for data communications. The ISO has produced a model called the Open Systems Interconnect (OSI) reference model.

LAN (Local Area Network)

A high-speed data communications network that covers a limited geographical area, such as one building.

LAN/WAN Relay

Communications that allow systems on LANs to communicate over PSDNs without having a direct connection to the PSDN. This usually involves Connection-mode Network Service (CONS).

LAPB (Link Access Protocol Balanced)

An X.25 module that defines the X.25 Level 2 protocol used to exchange frames between a DTE and a DCE. It is a set of procedures used for link control, where the DTE/DCE interface is defined as operating in two-way simultaneous asynchronous response mode (ARM), with the DTE and DCE containing a primary and secondary function.

LAPBE

Extended Level 2 access protocol for X.25. Provides a packet-level window size of 127.

Layer

A software protocol level.

LCI

Logical Channel Indicator. Same as Logical Channel Number.

LCN

See Logical Channel Number.

Learning Process

The process by which a bridge builds and maintains its address database. By "listening" to network traffic the bridge notes the source address of each incoming packet and which port received the packet.

Leased Line

A line for the exclusive use of a leasing customer without interchange switching arrangements. Also called a private line or a dedicated line.

Level 1 Router

A system that can forward packets within its own area.

Level 2 Router

A system that can forward packets both within its own area and to other areas. Also known as an area router.

Line

A physical data path between two systems.

Line Speed

Rate at which data can be transmitted over a line.

Link

A path between two nodes.

Link Access Protocol Balanced

See LAPB.

Link-loss Budget

The total amount of optical loss that can be introduced into an FDDI system (by splicing, for example) without preventing it from working.

Link Service Access Point (LSAP)

A protocol identifier that identifies an OSI Network layer entity. An example of such an entity is an implementation of the Internet protocol.

Link-State Routing Algorithm

One of the two widely used types of routing algorithms. It is based on the shared knowledge of all end systems and intermediate systems. Routers receive reports from each system, detailing the state of the system's links with its immediate neighbors. DECnet/OSI Phase V uses link-state routing.

Live Insertion

When a Network Interface Card is inserted into a running system without interrupting the system's operation.

LLC2

An X.25 module that defines the data link protocol used on Local Area Networks (LANs), conforming to the LLC Type 2 standard. This allows machines on a LAN to communicate with remote nodes over a PSDN.

Load Host

A system which provides MOP services for other systems such as downline loading and upline dumping.

Local Area Network

See LAN.

Local DTE

A DTE on the local node.

Local Node

Node where you are located.

Logical Channel

A logical link between a DTE and its DCE. The physical communications line between a DTE and DCE is divided into a set of logical channels.

Logical Channel Number (LCN)

A unique reference number that identifies a logical channel. A DTE recognizes a virtual circuit by its associated LCN.

LSAP

See Link Service Access Point.

MAC

See Media Access Control.

Maintenance Operation Protocol

See MOP.

MAN (Metropolitan Area Network)

High-speed network that uses a specific technology, and covers a moderate sized area (such as a city).

Management Protocol

The protocol defined for the circuit between the DECNIS and the frame relay device. For example, LMI/Joint, ANSI T1.617 Annex D. The management protocol carries information between the DECNIS and frame relay device about the state of PVCs in the network.

Manual Routing

Same as static routing.

Martian Address

This is an IP term for an invalid IP destination address.

Media Access Control

The Data Link layer sublayer responsible for scheduling, transmitting, and receiving data on a shared-medium local area network such as FDDI.

Metropolitan Area Network

See MAN.

Migration Bridges

Bridges manufactured by Digital that can dynamically adapt to either the LAN Bridge 100 Spanning Tree Mode or the IEEE 802.1 Spanning Tree Mode, depending on what the network requires. The LAN Bridge 150 and the DECNIS are migration bridges.

Modem (Modulator–Demodulator)

A device that translates digital signals (electrical impulses) generated by a computer into analog signals (tones) that can be transmitted over telephone lines, and vice versa.

Modem Connect

Name used in DNA for the class of communications links governed by industry standards for modem connection.

MOP (Maintenance Operation Protocol)

The protocol used for low-level communication with a system that is not fully operational, or a system being tested. It is used to perform maintenance functions such as circuit testing, triggering, upline dumping, and downline loading.

MOP Client

A MOP Client on a load host identifies a DECNIS that requires the MOP services of the load host. The MOP services include downline loading to the DECNIS and upline dumping from the DECNIS.

Multicasting

The ability to send a single datagram/packet to multiple locations. *See also* IP Multicasting.

Multiple Area Network

Network divided into areas, each area having a group of nodes.

Multiprotocol Environment

A network in which several protocols are operating.

Name Binding Protocol (NBP)

The AppleTalk transport layer protocol that allows user-defined zones and names to be understood by using a translation table.

Name Service

General term for DECdns which manages system names and objects within the network.

Native System

A system running VAX P.S.I. Native that has direct access to one or more PSDNs.

NBP

See Name Binding Protocol.

NCL (Network Control Language)

NCL is a command line interface that allows you to obtain information about, and manage, a network. NCL replaces the Network Control Program (NCP) used for DECnet Phase IV networks.

NCL Script

An ASCII file of NCL commands.

NetWare RIP

Novell NetWare Routing Information Protocol, which provides the reachability of Novell NetWare routers and end systems.

NetWare SAP

Novell NetWare Service Access Protocol, which provides information about the services available in the Novell NetWare network.

Network

A collection of systems interconnected by lines.

Network Control Language

See NCL.

Network Delay

Time taken for a unit of data to travel from the transmission system to the destination system.

Network Diameter

This is the length of the most direct path between the two furthest systems in a network.

Network Information Frame

Frame sent periodically to a station's downstream neighbor, for use by Station Management.

Network Interface Card (NIC)

Network Interface Cards are the hardware through which the DECNIS connects to LANs and WANs. The type of card used determines the connection type. An example of a Network Interface Card is the DEC LANcontroller 601.

Network Layer

OSI layer that permits communications between network entities in open systems. CONS and CLNS services are provided at this level.

Network Service Access Point

See NSAP.

Network Service Access Point (NSAP) Address

Address of a Network Service Access Point. This is a Phase V address type used in DECnet/OSI networks.

Network Services Protocol

A DECnet proprietary transport protocol.

NIC

See Network Interface Card.

NIF

See Network Information Frame.

Node

In DECnet/OSI, a top-level entity in the management hierarchy of a system. A Phase IV node supports DECnet Phase IV software. A DECnet/OSI node (usually called a system) supports DECnet/OSI.

Node Name

Name associated with a specific node. This could be a name registered in DECdns, or any other alphanumeric name.

NSAP (Network Service Access Point)

The addressable point at which a network service is made available.

NSP

See Network Services Protocol.

Open Shortest Path First

See OSPF.

Open Systems Interconnection

See OSI.

OSI (Open Systems Interconnection)

The OSI reference model is a 7-layer model which incorporates many standards from various organizations. The three CCITT X.25 levels correspond to the lower three layers of OSI.

OSI TP

See OSI Transport.

OSI Transport

OSI layer that transfers data between end systems, and has error recovery and flow control.

OSPF (Open Shortest Path First)

An IP routing protocol. This is a link state interior gateway protocol (IGP).

Out-of-band Management

When a system is managed through a direct connection to a console, rather than over the network. *See also* In-band Management.

Packet

Unit of data sent from a source system to a destination system.

Packet Assembler/Disassembler

See PAD.

Packet Filtering

See IP Packet Filtering.

Packet Prioritization

Packet prioritization lets you control the order in which the DECNIS transmits packets.

For example, if Telnet traffic is more important than file transfer traffic, you assign a high priority to Telnet and a low priority to file transfer. This means the DECNIS will always transmit Telnet packets before file transfer packets. *See also* Pattern Matching.

Packet Size

The amount of user data in a packet.

Packet Switched Data Network

See PSDN.

PAD (Packet Assembler/Disassembler)

A device that allows an asynchronous terminal, such as a VT220™, to access a PSDN. The terminal connects to the PAD and the PAD formats the data sent from the terminal into packets (assembles). Data which is sent to the terminal in packet format is 'disassembled' by the PAD before transmission to the terminal.

Path

The route a packet takes from the source node to the destination node.

Path Cost

The total of the circuit costs for a path.

Path Length

The number of circuits a packet uses to reach the destination.

Path Splitting

Ability to split data over several paths to a single destination node.

Pattern Matching

Pattern Matching is an extension to packet prioritization that lets you be more specific about the packets you want to prioritize. The priority of a packet is determined by the presence or absence of specific byte sequences. *See also* Packet Prioritization.

PDU (Protocol Data Unit)

A block of information that is exchanged between two processes within communicating machines. It contains both data and control (protocol) information that allows the two processes to coordinate their interactions.

Permanent Virtual Circuit

See PVC.

Physical Layer Medium Dependent

FDDI standard that defines the medium and protocols to transfer symbols between PHYs.

Physical Layer Protocol

FDDI standard that defines symbols, line states, clocking requirements, and the encoding of data for transmission.

Physical Level

A protocol level that defines the characteristics of the physical link between the user's equipment and the network. Also known as Level 1.

PING

In IP terms, PING is used as a verb. "To ping" means to send an ICMP Echo Request and wait for an ICMP Echo Reply, to see if a host is working. It is derived from the name of a program called "Packet Internet Groper".

PMD

See Physical Layer Medium Dependent.

Point-to-Point Protocol

A routing protocol that allows systems from different vendors to interoperate.

Post, Telegraph and Telephone Authority (PTT)

A country's national communications provider. The term is used mainly in Europe.

Power Budget

The difference between transmission power and receiver sensitivity, including any safety margins.

Power Penalty

The total loss introduced by planned-for splices in the fiber-optic link.

PPP

See Point-to-Point Protocol.

Prioritization

See Packet Prioritization.

Protocol

An agreed set of rules governing the operation of a communications link.

Protocol Data Unit

See PDU.

Protocol Filtering

In bridging, the process of preventing a frame from being forwarded across a bridge, based on the protocol type used by that frame.

Proxy ARP

ARP is normally used for LAN communications. Proxy ARP is a process in which a "proxy router" answers ARP requests for a system that is not on the LAN. The proxy router supplies its own physical address to the source system, and forwards any packets to the destination system. By using proxy ARP, a site can use a single Internet network address (without subnets) over more than one physical network.

PSDN (Packet Switched Data Network)

These are both public and private networks that use the CCITT X.25 protocol to route X.25 packets. For public networks, it also means the set of equipment and interconnecting links that provide a public packet switching service to subscribers within a particular country.

PVC (Permanent Virtual Circuit)

A permanent logical association between two DTEs which is analogous to a leased line. Transmission of packets on a PVC needs no call set up or call clearing by the DTE. Packets are routed directly by the network from one DTE to the other.

Reachable Address

This defines the address of a system or set of systems that can be reached over a circuit. A reachable address is manually assigned as opposed to dynamically assigned. It is used by DECnet/OSI routers to reach third-party and DECnet Phase IV addresses.

Remote DTE

Any DTE in a network other than the one at which the user is located.

Remote Node

Any node in the network, other than the local node.

Resilient Routing Circuits

See Backup Circuits.

RIP (Routing Information Protocol)

An Interior Gateway Protocol (IGP) which assumes that the same subnet mask is used throughout the network. RIP is used by small IP networks.

Root Bridge

The root bridge initiates Hello messages that propagate to other bridges in the extended LAN. Each spanning tree has a unique root bridge. The root bridge for the spanning tree is the bridge with the lowest bridge ID.

Route Filtering

In IP routing, this process allows you to control which routes the DECNIS inserts into its routing database. For example, the DECNIS might be set up to accept only RIP routes with the address 24.45.21.0.

Route Propagation

In IP routing, this process allows the DECNIS to advertise a route learnt from one IP protocol in another IP protocol. This allows systems running different IP protocols to communicate. For example, a DECNIS might propagate a RIP route into IS–IS. This would allow the IS–IS system to reach the RIP system.

Router

A system that can send and receive data, and forward data to other systems. In OSI terminology, routers are called intermediate systems.

Routing

Network function that determines the path used by data to reach the destination system.

Routing Information Protocol

See RIP.

Routing Table

A table on each AppleTalk router that holds information about the topology of the network.

Routing Table Maintenance Protocol (RTMP)

The AppleTalk protocol used to establish and maintain routing information for the routing tables. RTMP allows dynamic updates to the routing tables as network changes occur.

Routing Vector Algorithm

This is the Phase IV routing algorithm. It is based on the shared knowledge of the network. Each router reports a vector of costs and hops involved in reaching all nodes in the area, to other routers.

RPF (Route Propagation and Filtering)

See the separate descriptions of Route Propagation and Route Filtering.

RTMP

See Routing Table Maintenance Protocol.

SAC

See Single Attachment Concentrator.

SAS

See Single Attachment Station.

Security Filter

An entity which defines an Access Control List (ACL). This controls which remote DTEs can access a filter.

Seed Router

An AppleTalk router that transmits information about the network to other routers.

Server

In general terms, a server is a system which provides services for other systems. It usually refers to a system which provides a service to a Client system. A typical Client–Server relationship is a VAX P.S.I. Access system using a DECNIS to connect to a PSDN.

Server Client

Server clients on a DECNIS identify Client systems that use the DECNIS as a Connector system. Each server client has one or more incoming call filters which ensure that incoming calls are passed to the correct Client systems.

Session Control

DNA module used for process-to-process communications, name-to-address mapping, and protocol selection.

SIF

See Station Information Frame.

Simple Network Management Protocol

See SNMP.

Single Attachment Concentrator

A concentrator that offers one S-port for attachment to the FDDI network, and M-ports for the attachment of stations or other concentrators.

Single Attachment Station

A concentrator that offers one S-port for attachment to the FDDI ring.

Sink Node

The system at which events are logged.

SIP (SMDS Interface Protocol)

The protocol defined at the interface between the network and the end user.

Slot

A single module space on the hardware unit, into which a Network Interface Card is inserted.

SMDS (Switched Multimegabit Data Service)

A high-speed connectionless public packet-switched data service offered by telecommunications carriers. SMDS extends LAN capabilities over wider areas.

SMDS DSU

An intelligent DSU modem which exchanges DXI protocol with the CPE and SIP level 2 protocol with a remote SMDSU.

SMDS Interface Protocol

See SIP.

SMDSU

Shortened form of SMDS DSU.

SMT

See Station Management.

SNMP (Simple Network Management Protocol)

Network management protocol for IP networks and bridging.

Spanning Tree

The logical arrangement created by bridges in an extended LAN in which all LANs are connected and there are no loops (that is, there is only one path between any two bridges).

Spanning Tree Algorithm

An algorithm used by bridges to ensure that the extended LAN is configured as a spanning tree.

Static Routing

Routing that uses information that has been manually configured, for example Reachable Addresses.

Station

An addressable node on an FDDI ring capable of transmitting, receiving, and repeating data. A station has one instance of SMT, at least one instance of PHY and PMD, and an optional MAC entity.

Station Information Frame

Frame used by FDDI stations to exchange more detailed information for use by Station Management.

Station Management

The entity within a station on the FDDI ring that monitors station activity and exercises overall control of station activity.

Step Index

A characteristic of fiber-optic cable in which the refractive index of the core material is uniform. A sudden change (or step) of the refractive index exists at the boundary between the core and the cladding.

Stuck Beacon

The condition where a station is locked into sending continuous beacon frames.

Subnetwork

Collection of nodes forming a self-contained unit within the network.

SVC (Switched Virtual Circuit)

Temporary logical association between two DTEs connected to a PSDN and analogous to a dial-up line. An SVC is set up only when there is data to transmit and is cleared when the data transfer is complete.

Switched Multimegabit Data Service

See SMDS.

Switched Virtual Circuit

See SVC.

Symbol

The smallest signaling element used by the MAC sublayer. The symbol set consists of sixteen data symbols and sixteen nondata symbols. Each symbol corresponds to a specific sequence of code bits (code group) to be transmitted by the Physical layer.

System

The DECnet/OSI Phase V term for a basic information-processing unit that is directly connected to a network: a single, addressable unit, such as a computer, workstation, or peripheral device. The Phase IV term is node.

T1 Modem

High-speed modem used as a DSU/CSU.

Target Token Rotation Time (TTRT)

The value used by the MAC receiver to time the operations of the MAC layer. The TTRT value varies, depending on whether or not the ring is operational.

TCP (Transmission Control Protocol)

The Internet Transport-level protocol.

TCP/IP

This is the name often used to refer to the full Internet protocol suite, as defined by the U.S. Department of Defense. TCP and IP are the basic Internet protocols.

Template

This defines the default values for the call parameters of outgoing X.25 calls.

TFTP

The Trivial File Transfer Protocol used to transfer files as described by RFC 783. This is linked to BOOTP.

Timed–Token Protocol

The rules defining how the target token rotation time is set, the length of time a station can hold the token, and how the ring is initialized.

TOS Values

TOS (Type of Service) values are used in IP packets to indicate how a packet should be treated during its transmission through the Internet system.

You can use TOS values to indicate how a packet is prioritized by the DECNIS.

Trace

A diagnostic process that an FDDI network uses to recover from a stuck-beacon condition. The fault is localized to the MAC entity and its upstream neighbor MAC.

Traffic

Measure of data flow through a network.

Translating Bridge

A nonproprietary MAC layer device used to connect similar and dissimilar LANs according to 802.1d rules.

Transmission Control Protocol

See TCP.

Transport Layer

The layer used for end-to-end data transfer.

Trivial File Transfer Protocol

See TFTP.

TTRT

See Target Token Rotation Time.

Tunnel Circuit

Tunnel circuits are virtual circuits, they are not associated with a physical line, but only with a destination IP address, or addresses.

Type of Service

See TOS Values.

UI Frames

Unsequenced Information frames sent over HDLC circuits; the service acts in a transparent mode. For example, MOP messages.

Upline Dump

Transferring a copy of a memory image from a target system to a sink node.

Upstream

A term that refers to the relative position of two stations in an FDDI ring. A station is upstream of its neighbor if it receives the token before its neighbor receives the token.

VCP (Vitalink Communications Protocol)

The protocol that allows you to connect the DECNIS to Vitalink systems.

Virtual Router Cluster

See IP Standby.

WAN (Wide Area Network)

A data communications network that covers a wide geographical area, such as a country.

Wide Area Network

See WAN.

Window Size

The maximum number of packets that are allowed to be transmitted without an acknowledgment.

X.121

CCITT recommendation that defines the format of a DTE address.

X.25

CCITT recommendation that defines the interface between Data Terminal Equipment and Data Circuit-terminating Equipment for equipment operating in packet mode on public data networks.

X.25 Network

Same as Packet Switched Data Network (PSDN).

X.25 Relay

This is an X.25 function that allows Digital and non-Digital systems to communicate over LANs and WANs.

X.75

CCITT recommendation that specifies procedures for communication between two PSDNs.

X25 Access

An X.25 module that defines the interface between X25 Protocol and applications.

X25 Client

An X.25 module that defines how a Client system operates.

X25 Client System

See Client system.

X25 Protocol

An X.25 module that defines the X.25 Level 3 protocol that is used to exchange packets between a DTE and a DCE. It defines the DTEs, PVCs, and Closed User Groups recognized by an X.25 system.

X25 Server

An X.25 module that defines how a Connector system communicates with a Client system.

X25 Server Client

Same as Server Client.

ZIP

AppleTalk Zone Information Protocol (ZIP), which provides mapping between AppleTalk networks and zones.

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