NIC 50002

TCP/IP IMPLEMENTATIONS AND VENDORS GUIDE

September 1985

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Additional copies of this document may be obtained from the DDN Network Information Center, SRI International, 333 Ravenswood Avenue, Room EJ291, Menlo Park, CA 94025.

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INTRODUCTION

This is a guide to implementations and products associated with the Department of Defense (DoD) Defense Data Network (DDN) TCP/IP protocols. It is published for informational purposes only by the DDN Network Information Center (NIC) at SRI International on behalf of the Defense Data Network Program Management Office (DDN PMO) and in no way endorses or officially recommends any implementation or product on the part of the Defense Communications Agency (DCA), the Defense Advanced Research Projects Agency (DARPA), the NIC or DoD. It is not complete. Omission of any vendor or implementor has no significant implication, other than that the NIC has no information about that vendor or implementor, or that the information was not available at the time of this printing. Likewise, only completed fields of the product templates are included, and unfilled fields have been deleted to conserve space. Anyone planning to use either a product or an implementation is urged to do their own investigation of the details, costs, and support of the product.

This guide is divided into software implementations (listed alphabetically by machine type) and hardware implementations (listed alphabetically by company). The guide is also indexed by operating system, with the machine type listed under each and by company name.

Vendors who wish to have their TCP/IP products tested and certified for use on the DDN should contact Code B617, the Test and Evaluation Branch of the DDN PMO for details.

Throughout the document, references are made to RFCs and IENs. RFCs, or Requests for Comments, are network technical notes used primarily to introduce proposed internet protocols and related network topics to the DDN. IENs, or Internet Experiment Notes, are Internet Working Group technical notes. Both RFCs and IENs are available on the SRI-NIC host. You may obtain copies of either by using the FTP facility, if it is available at your host. Connect to the SRI-NIC host [10.0.0.51 or 26.0.0.73] and log in as ANONYMOUS with GUEST as password. RFC filenames are of the format RFC:RFCxxx.TXT (where xxx is the number of the RFC) and IENs are of the format IEN:IEN-xxx.TXT (where xxx is the number of the IEN -- note the dash in the IEN filename.)

Online copies of the guide are available through FTP in the file named NETINFO:TCP-IP-IMPLEMENTATIONS.TXT. For those who are not on the network, contact the DDN Network Information Center to request copies of RFCs, IENs or this guide by calling our toll-free number 1-800-235-3155. Network users without FTP capability may send requests to NIC@SRI-NIC.ARPA.

The NIC also welcomes your comments, additions and corrections. The last page of this document contains a Feedback form for your

convenience in sending us your comments.

Note: UNIX is a trademark of AT&T Information Systems; VAX, TOPS-10 and TOPS-20 are trademarks of Digital Equipment Corporation.

Key to Symbols:

v	Taken from vendor literature
[ ]	Not yet available
Last edit:	September, 1985

1. TCP/IP SOFTWARE IMPLEMENTATIONS BY MACHINE TYPE

1.1. APPLE

1.1.1. v STANFORD ETHERNET APPLETALK GATEWAY

PRODUCT-OR-PACKAGE-NAME: STANFORD ETHERNET APPLETALK GATEWAY

(SEAGATE)

TYPE: Gateway

DESCRIPTION:

SEAGATE is a gateway (Apple term: bridge) that connects an Ethernet using the internet protocols, to an applebus (AppleTalk) using Apple or IP protocols. The IP protocol family was chosen because many campuses and engineering groups are using it on their Ethernets; most such groups have access to Berkeley UNIX. With such a gateway in place, it becomes possible to create UNIX server daemons to provide file, printing, mail, etc. services for the Macintoshes.

In addition, it would be possible for the UNIX systems to become integrated into a Macintosh Office such that UNIX users could access Apple-provided services such as printing on a LaserWriter or sending mail to Macintosh users via an Apple file server.

This distribution of SEAGATE provides all the information and software you should need to setup your own gateway. Please bear in mind that this distribution is not 'supported' and that we can't give extensive help about the mechanics of putting your gateway together. I would like to hear about bug reports or enhancements however.

To assemble your own gateway, you will need at least the items below:

- The hardware is a 3 card multibus system: A 'SUN' 68000 CPU board, an Interlan NI3210 Ethernet card, and a homebrew applebus card (about 8 chips) which takes an afternoon to wirewrap.

- A UNIX (usually VAX) running 4.2 BSD, 4.1 BSD or Eunice. This is because the source distributed is written in the PCC/MIT 68000 C compiler. [This is the same compiler included with the SUMACC Mac C cross development kit.] You can probably make due with any 68K C compiler and assembler, but it will be harder.

- Inside Mac, update service, and the Mac software

supplement.

- Applebus Developer's Kit, includes: protocol manual, applebus taps and interconnecting cable, Mac applebus drivers on SONY disks.

- Dartmouth's IP package from Mark Sherman (mss%dartmouth@CSNET-relay). The gateway distribution includes the binary for TFTP, but if you want the whole package (and source), you should get it from Mark.

- A Lisa Workshop system is handy to have around; you would need it to compile Mark's sources. Even if you are doing development in C, Apple releases Applebus updates as a combination of Mac and Lisa disks. The Mac disks contain the 'driver' binary resources. The Lisa disks contain source for header files.

The current software on the Macintosh is the IP TFTP program. As mentioned above, the gateway also has the capability to translate Apple DDP datagrams into IP UDP datagrams, and vice versa. We are now writing some UNIX (user-level) UDP daemons

that directly provide AppleTalk ATP services (such as external file system access.)

Using Mark Sherman's (Dartmouth) TFTP and the Berkeley 4.2 BSD TFTP daemon, we made some simple timings. On the Mac side, TFTP used a ramdisk to avoid any delays induced by the slow SONY drive. For a UNIX to Mac transfer, we found that the Mac took 43 ms between data received and ack sent, while UNIX spent 25 ms between ack received and next data sent.

Most of the transfer occurred at 512 data bytes every 70ms = 7314 bytes/sec = 58K baud.

Note however that the IP TFTP protocol is just that, a 'trivial' FTP. It is purely half-duplex in nature. When we start using Apple's ATP, which can stream several packets per acknowledgement, it should boost throughput significantly. Gursharan Sidhu tells me that their process-to-process (no disks) ATP throughput is 180K baud (out of the 230K available on the cable). This is very good, considering many TCP's running on 10 megabit Ethernet are lucky to get a few hundred kilobits of throughput.

DOCUMENTATION:

On [SUMEX]<info-mac> the files are:

seagate.ms documentation in -ms format
seagate.hard the wirelist for the applebus interface
seagate.shar1 the main gateway sources (including above docs)

seagate.shar2 the ddt, dlq, testscc, and tftp subdirectories

All these files are plain ASCII and can be FTP'd from SUMEX with the 'anonymous' login. The two shar (shell archive) files are each about 170K bytes, so we would appreciate it if you would avoid transfers during 9 AM to 5 PM PST.

CPU:

Apple Macintosh

O/S:

UNIX and others

IMPLEMENTATION-LANGUAGE:

C

CONTACT:

Bill Croft, (croft@sumex.arpa), SUMEX, Stanford University

PROPRIETY-STATUS:

1.2. BOLT, BERANEK AND NEWMAN

1.2.1. BBN-C/70

PRODUCT-OR-PACKAGE-NAME: BBN-C/70

TYPE: TCP/IP Implementation

DESCRIPTION:

The C/70 processor is a BBN-designed system with a native instruction set oriented toward executing the C language. It supports UNIX Version 7 and provides for user processes with a 20-bit address space. The TCP/IP implementation for the C/70 was ported from the BBN VAX TCP/IP, and shares all of its features. This version of TCP/IP is running experimentally at BBN, but is still under development. Performance tuning is underway, to make it more compatible with the C/70's memory management system.

CPU:

C/70

O/S:

UNIX

IMPLEMENTATION-LANGUAGE:

C

CONTACT:

Dennis Rockwell, (drockwel@BBN-UNIX.ARPA), 617-497-2643

1.2.2. BBN-GATEWAYS
TYPE: TCP/IP Implementation

DESCRIPTION:

In an effort to provide improved service in the gateways maintained at BBN, a new gateway implementation written in MACRO-11 instead of BCPL has been developed. The MACRO-11 gateway provides users with internet service that is functionally equivalent to that provided by the current BCPL gateways with the following exceptions:

- Packets with options will be fragmented if necessary.

- ICMP protocol is supported.

- The gateway sends Time Exceeded, Parameter Problem, Echo, Information Request, Destination Unreachable, and Redirect ICMP messages.

- Initially, Source Quench and Timestamp packets will not be supported.

- Class A, B, and C Network Address formats as specified in the September 1981 Internet Protocol Specification (RFC791) are supported.

The gateway contains an internetwork debugger (XNET) that allows the gateway to be examined while it is running. Buffer space is greatly expanded to provide better throughput. ARPANET RFNMs are counted so the gateway will not send more than 8 outstanding messages to an ARPANET host.

IMPLEMENTATION-LANGUAGE:

MACRO-11

CONTACT:

Alan Sheltzer, (ASheltzer@BBN-UNIX.ARPA), 617-491-1850 x3876

HOSTS:

BBN-PR-GATEWAY, BBN-RING-GATEWAY, BBN-TIU-GATEWAY, BBN-NET-GATEWAY, NDRE-GATEWAY, UCL-GATEWAY, BBN-GATEWAY, SRI-C3PO, DCEC-GATEWAY

1.3. BURROUGHS

1.3.1. [B5000]
TYPE: DDN-contracted TCP/IP Implementation

DESCRIPTION:

This will be a package of software and technical support services for interfacing Burroughs computing environments to the Defense Data Network. The contract has not yet been awarded as of this writing.

CPU:

B5000 family

DISTRIBUTOR:

Not yet determined

1.3.2. [BURROUGHS/HYPERLINK]
PRODUCT-OR-PACKAGE-NAME: Hyperlink/DDN Software

TYPE: TCP/IP/X.25 Implementation

DESCRIPTION:

Hyperlink/DDN is being implemented in accordance with the ARPANET Upper Layer Protocols (presentation/application layers), Transmission Control Protocol (session/transport layers), and Internet Protocol (network layer functions for internetwork communications). The software includes the host driver (either with Ethernet or Hyperchannel connections), transmission control protocol, internet protocol, network administrator and application software. Applications include file transfer, electronic mail and Telnet.

Hyperlink/DDN integrates ARPANET's packet switching protocol standards with Internet Systems Corporation's proprietary Ethernet-based hardware connection devices or with Network Systems Corporation's HYPERchannel connection devices for complete connections between LANs and/or long-haul networks. A

product option is available which provides an LSI 11/73 based host front-end processor which will contain the TCP and IP layers and an X.25 communications subsystem. Internet also offers high speed local-area network solutions for non-DDN requirements which can be integrated with DDN offerings.

DOCUMENTATION:

A full set of documentation is in process

CPU:

Burroughs

O/S:

Burroughs MCP

IMPLEMENTATION-LANGUAGE:

C or Pascal

DISTRIBUTOR:

Internet Systems Corporation
8360 Oakland Park Blvd.
Sunrise, Florida 33321

CONTACT:

Kerry A. Hartley, Director of Sales
313-357-1370
Jerry Lieberman, Product Marketing Manager
305-742-0301

ORDERING-PROCEDURE:

See above contacts

PROPRIETY-STATUS:

Product of Internet Systems Corporation

1.4. CONTROL DATA CORPORATION

1.4.1. [CDC-CYBER]

TYPE: DDN-contracted TCP/IP Implementation

DESCRIPTION:

This will be a package of software and technical support services for interfacing Cyber computing environments to the Defense Data Network. The expected date of completion is the end of 1985.

CPU:

Cyber 170

O/S:

NOS

DISTRIBUTOR:

Control Data Corporation

1.5. DATA-GENERAL

1.5.1. [DATA-GENERAL]

TYPE: TCP/IP Implementation

DESCRIPTION:

The TCP/IP product currently supports Ethernet under the DG/UX operations system and will run under the AOS/VS operating system in the future. Support for the DDN implementation is forthcoming. Presently the product includes implementations of FTP and Telnet protocols. TCP/IP tracks the Berkeley 4.2 implementation.

DOCUMENTATION:

Contact Data General

CPU:

DS/4000 family, and MV product line

O/S:

DG/VX-today; AOS/VS-future

DISTRIBUTOR:

Data General
Data General Sales Force
4400 Computer Drive
Westboro, MA 01580

CONTACT:

Robert Ritter, Product Marketing Manager
Distributed Systems
617-366-8911

1.6. DATAPOINT

1.6.1. [DATAPOINT]

TYPE: TCP/IP implementation

DESCRIPTION:

Bill Wimp is the manager of this task. The implementation has not yet been written (as of May 1983.)

DISTRIBUTOR:

Datapoint Corporation
9725 Datapoint Drive
MS - M95
San Antonio, TX 78284

CONTACT:

Bill Wimp, 512-699-5242

1.7. DIGITAL EQUIPMENT CORPORATION

1.7.1. BRL GATEWAY

PRODUCT-OR-PACKAGE-NAME: BRL Gateway

TYPE: TCP/IP Implementation

DESCRIPTION:

The BRL Gateway is a total redesign. None of the original MIT code was used. The gateway runs as a set of tasks on a simple multiprocessing operating system called LOS. Both LOS and the gateway code as described here were entirely designed and written by Ron Natalie.

This is an IP gateway with EGP support. The gateway will run on most PDP-11 series processors, but is designed to be portable to other machines that have C compilers. Point-to-point serial links, DEC PCL-11/B, and the ACC LH-DH/11 interfaces are currently supported. Work is in process to support the Interlan

Ethernet interfaces with the Address Resolution Protocol, the Network Systems Corporations's HYPERchannel, and the Proteon Ringnet hardware.

All gateway functions and features of the IP and ICMP protocols are supported with the following exceptions. The ICMP timestamp packet is not implemented and ICMP source quench messages are ignored. IP timestamp and routing options are supported. The Exterior Gateway Protocol is supported as described in RFC904. Deviations from the specification are made to optimize the performance as a stub system from the existing core networks. The gateway also uses its own UDP based debug and monitoring protocol. GGP echo packets are also answered.

In addition, the gateway provides Virtual-Host service. TCP connections to be dynamically directed to an active host on the BRLNET. This allows the host "BRL" to appear to always be up for mail purposes.

The original BRL gateway was an early version of the MIT-C gateway modified to know about class B and C addresses and to work with the previously mentioned network interfaces. With the advent of EGP, higher network traffic, and greater routing intelligence, the modified MIT gateway became ineffective.

DOCUMENTATION:

Not yet

CPU:

Any PDP-11 processor that has memory management. The machines currently in use are a PDP-11/34 and LSI-11/23. A console terminal interface and a clock are required, as well as any network interfaces. The built-in line frequency clock on the LSI-11 processors may be used in lieu of an additional clock.

O/S:

LOS (the Little Operating System) is a small message-passing, multitasking operating system written for the implementation of the gateway, but is also being planned for use in real-time and file server applications. The Gateway code runs in the hardware user mode, while LOS itself runs in kernel mode. Interrupts are serviced in real-time by the user code.

IMPLEMENTATION-LANGUAGE:

With the exception of small parts of the operating system and some bit manipulation routines, which are written in assembler, both LOS and the Gateway code are written in the C language.

DISTRIBUTOR:

U.S. Army Ballistic Research Laboratory
ATTN: AMXBR-SECAD/R. Natalie
APG, MD 21005-5066

CONTACT:

Ron Natalie, (RON@BRL.ARPA), 301-278-6678 or above address

ORDERING-PROCEDURE:

Send mail to RON@BRL.ARPA for more information

PROPRIETY-STATUS:

Both LOS and the Gateway are the property of the Department of the Army. They are available for public use at no charge. They may be distributed with commercial products with slight restrictions.

1.7.2. SRI-LSI-11
PRODUCT-OR-PACKAGE-NAME: SRI-LSI-11

TYPE: TCP/IP Implementation

DESCRIPTION:

The IP/TCP implementation for the Packet Radio terminal interface unit is intended to run on an LSI-11 under the MOS real-time operating system. The TCP is written in MACRO-11 assembler language. The IP is currently written in assembler language; but being converted into C. There are no plans to convert the TCP from assembler into C.

TCP implements the full specification, although the current user interface lacks a mechanism to communicate URGENT pointer information between the TCP and the higher-level software. The code for rubber-EOL has been removed in anticipation of a change to the specification. The TCP appears to be functionally compatible with all other major implementations. In particular, it is used on a daily basis to provide communications between users on the Ft. Bragg PRNET and ISID on the DDN. The IP implementation is reasonably complete, providing fragmentation and reassembly; routing to the first gateway; and a complete host-side GGP process. Currently the source quench message is ignored. No IP options are generated and all received options are ignored.

A measurement collection mechanism is currently under development to collect TCP and IP statistics and deliver them to a measurement host for data reduction.

CPU:

LSI-11

O/S:

MOS

IMPLEMENTATION-LANGUAGE:

PDP-11 assembler

CONTACT:

Jim Mathis, (Mathis@SRI-KL.ARPA), 415-859-5150

PROPRIETY-STATUS:

Developed with DARPA funds

1.7.3. LSI-11/PDP11/LINKABIT
PRODUCT-OR-PACKAGE-NAME: LINKABIT-DCNET-FUZZBALL

TYPE: TCP/IP Implementation

DESCRIPTION:

The DCNET internet software system has been developed with DARPA sponsorship over the last three years and used extensively for testing, evaluation and experimentation with other implementations. It currently runs in a sizable number of PDP11s and LSI-11s with varying configurations and applications. The system is designed to be used with the DCNET local network and BOS/VOS operating system for a multi-media internet workstation (so-called "fuzzball"), which operates using emulation techniques to support ordinary RT-11 system and application programs. However, the system has also been used on other networks, including the DDN, and with other operating systems, including RSX-11. An RSX-11 based version incorporating only IP/TCP modules is presently used to support the INTELPOST electronic-mail network.

The software system consists of a package of MACRO-11 and C modules structured into levels corresponding to local-net, IP, TCP and application levels, with user interfaces at each level. The local-net level supports several communication devices, including synchronous and asynchronous serial lines, 16-bit parallel links and 1822 interfaces. Hosts using these devices have been connected to DDN IMPs, Satellite IMPs, MACRO-11 Internet Gateways, SRI Port Expanders and to the DCNET local network. When used on DCNET the system provides automatic routing, time-synchronization and error-reporting functions. The IP level conforms to the RFC791 specification, including fragmentation, reassembly, extended addressing and options, but currently does not interpret options. A full set of ICMP features compatible with RFC792 is available, including destination-unreachable, timestamp, redirect and source-quench messages. Destination-unreachable and source-quench information is conveyed to the user level via the TCP and raw-datagram protocol modules. Internet gateway (routing and non-routing) facilities compatible with RFC823 can be included on an optional basis. This support can be configured to include hierarchically structured gateways and subnets.

The TCP level conforms to the RFC793 specification, including PUSH, URGENT and options. Its structure is based on circular buffers for reassembly and retransmission, with repacketizing on each retransmission. Retransmission timeouts are dynamically determined using measured roundtrip delays, as adjusted for backoff. Data flow into the network is controlled by measured network bandwidth, as adjusted by source-quench information. Features are included to avoid excessive segment fragmentation

and retransmission into zero windows. The user interface level provides error and URGENT notification, as well as a means to set outgoing IP/TCP options.

A raw-datagram interface is available for non-TCP protocols such as (RFC768). It includes internal congestion and fairness controls, multiple-connection management and timestamping. Protocols above UDP supported in the present system include Time

Server (IEN-142) and Name Server (IEN-116). Other raw-datagram services include XNET (IEN-158), GGP Gateway (RFC823), along with developmental versions of an EGP Gateway (RFC827) and a DECnet Gateway. A number of user-level protocol modules above TCP have been built and tested with other internet hosts, including user/server Telnet (RFC764) user/server FTP (RFC765), user/server SMTP (RFC788) and various other file-transfer, debugging and control/monitoring protocols.

Code sizes and speeds depend greatly on the system configuration and features selected. A typical 30K-word LSI-11/2 single-user configuration with all features selected and including the operating system, device drivers and all buffers and control blocks, leaves about 16K words for user-level application programs and protocol modules. A typical 124K-word LSI-11/23 configuration provides the same service to a half-dozen individually relocated users. Disk-to-disk FTP transfers across a DMA interprocessor link between LSI-11/23s operate in the range 30-50 Kbps with 576-octet packets. The 124K-word PDP11/34 INTELPOST adaptation supports two 56-Kbps lines and a number of lower-speed lines.

DOCUMENTATION:

Online help files distributed with system plus annotated source code

CPU:

LSI-11 or PDP11 with disk, EIS and 28K or more words of memory

O/S:

None (self-contained)

IMPLEMENTATION-LANGUAGE:

MACRO-11 and C

DISTRIBUTOR:

Linkabit Corporation
Eastern Operations

1517 Westbranch Drive
McLean, VA 22102

CONTACT:

Dave Mills, (Mills@ISID.ARPA), 703-734-8660

ORDERING-PROCEDURE:

Source and/or object modules on double-density DEC RX02 diskettes only. DARPA approval required and redistribution is limited. Contact R. Kahn (Kahn@ISI.ARPA) for approval only; contact D. Mills (Mills@ISID.ARPA) for distribution.

PROPRIETY-STATUS:

DARPA

HOSTS:

DARPA Internet system: 8 (Linkabit), 10 (Ford Scientific Research Labs), 1 (Ford Aerospace), 4 University of Maryland), 1

(Purdue), 1 (Norwegian Telecommunications Administration), 4 (DFVLR - Germany), 1 (University College London), 1 (Royal Signals and Radar Establishment - UK); INTELPOST system: 13 worldwide

1.7.4. RSX-11M
TYPE: TCP/IP Implementation

DESCRIPTION:

This TCP/IP Implementation supports file transfer operations between DEC RSX-11M, RSX-11M-PLUS and IAS operating systems. Both user and server FTP are implemented. Full support is included for Ethernet (DEUNA and DEQNA) as well as proNET ring hardware interfaces. Process Software Corporation can modify the software for other interfaces.

DOCUMENTATION:

Fully documented; supplied with User's Manual

CPU:

PDP-11 and LSI-11

O/S:

RSX-11M, RSX-11M-PLUS, IAS

IMPLEMENTATION-LANGUAGE:

Macro-11

DISTRIBUTOR:

Process Software Corporation
P. O. Box 746
35 Montague Road
Amherst, MA 01004

CONTACT:

Phil Denzer
413-549-6994
Telex 517891

ORDERING-PROCEDURE:

Contact Process Software Corporation

1.7.5. UNIX 2.9BSD
TYPE: TCP/IP Implementation

DESCRIPTION:

2.9BSD TCP/IP is an adaptation of Berkeley's original VAX TCP/IP (running under BSD 4.1B UNIX) which in turn is an offshoot of BBN's VAX TCP/IP. 2.9BSD TCP/IP runs on PDP-11/44s and PDP-11/70s. The 2.8 version from SRI was adapted by Bill Croft (formerly at SRI), then Tektronix adapted it for 2.9. Berkeley took over modification of the software and brought it back to SRI where Dan Chernikoff and Greg Satz adapted it for a later release of 2.9. In addition to TCP/IP, UDP, ARP and the raw packet interface is available. ICMP redirects are not supported. User software implementations include Telnet and FTP, plus Berkeley-developed local net protocols, RWHO, RSH, RLOGIN, and RCP.

2.9BSD with TCP/IP support could probably be made to run on smaller PDP-11s although the address space would be very tight and might present problems.

DOCUMENTATION:

Some documentation available; will be sent with tape request

CPU:

PDP-11/44, PDP-11/70 [PDP-11/45 ?]

O/S:

2.9 UNIX

IMPLEMENTATION-LANGUAGE:

C (some system-dependent sections written in assembler)

CONTACT:

For technical information:
Carl Smith, (Carl@BERKELEY.ARPA)
415-644-1230

ORDERING-PROCEDURE:

For distribution, contact the PDP-11 Distribution office at:

Valerie Hanson
University of California

Berkeley, CA
415-642-6258

PROPRIETY-STATUS:

Governed by stipulations of Berkeley BSD license

HOSTS:

SRI-TSC, SRI-PRMH

1.7.6. Venix/11 TCP/IP
PRODUCT-OR-PACKAGE-NAME: Venix/11 TCP/IP

DESCRIPTION:

This is based on the "PDP-11/45" implementation available from the MIT Laboratory for Computer Science. It has been ported to a V7 UNIX system, in particular VenturCom's Venix/11

V2.0.

As little of the processing as possible takes place in the kernel, to minimize the code space required. It fits comfortably on I&D machines, but is almost hopeless on the smaller machines. The kernel includes a proNET device driver, IP fragment reassembly, IP header processing, local-net header processing, and simple routing. The rest of the IP processing, and all of the UDP and TCP functions, are in user libraries. The psuedo-teletype driver is also in the kernel, and is used by Server TELNET.

User programs handle ICMP processing; User and Server TELNET, SMTP, TFTP, Finger, and Discard. There are User programs for Nicname and Hostname. IEN-116 nameservers are used by all programs, and an IEN-116 nameserver is also provided. The TCP used is very simple, not very fast, and lies about windows. No FTP is available, nor is one currently planned.

DOCUMENTATION:

There is a full set of manual pages, and some internals documentation. The kernel code is well commented.

CPU:

PDP-11/44, 45, 70, 73, 84

O/S:

Venix/11 V2.0, should be simple to port to other V7 UNIX systems.

IMPLEMENTATION LANGUAGE:

C

DISTRIBUTOR:

Proteon, Inc.
4 Tech Circle
Natick, MA 01760

CONTACT:

John Shriver, jas@proteon.ARPA, 617-655-3340

ORDERING-PROCEDURE:

Vendor product, available only in source form.

PROPRIETARY-STATUS:

Improvements are proprietary to Proteon.

1.7.7. PDP-11/45
TYPE: TCP/IP Implementation

DESCRIPTION:

In the UNIX kernel we have modules to drive a "Pronet" device (10 Mb/s token-passing ringnet), to transmit and receive internet packets, to demultiplex incoming TCP and UDP packets, to reassemble internet fragments, and to maintain a cache of internet hosts and their best first hop gateways. Kernel code and data use from 9k to 10.5k bytes depending on the size of the receive packets buffer.

Outside the kernel we have: TCP, user and server Telnet, SMTP, ICMP, and TFTP. All are running but are in varying stages of development.

DOCUMENTATION:

Some documentation about the user/kernel interface and about the kernel code

CPU:

PDP-11/45

O/S:

Version 6 UNIX

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

Laboratory for Computer Science
MIT
545 Technology Square
Cambridge, MA 02139

CONTACT:

Liza Martin, (martin@MIT-CSR.ARPA)
Larry Allen, (lwa@MIT-CSR.ARPA)
617-253-6011

ORDERING-PROCEDURE:

We are willing to give this software to anyone who wants it, has a UNIX source license, and will agree to a few constraints. We should point out that it would be difficult for someone who

is not a UNIX wizard to install this code. To find out more about the software send mail to martin@MIT-CSR.ARPA or to lwa@MIT-CSR.ARPA.

PROPRIETY-STATUS:

1.7.8. BBN-V6-UNIX
PRODUCT-OR-PACKAGE-NAME: EDN-V6-UNIX

TYPE: TCP/IP/ICMP implementation

DESCRIPTION:

This TCP/IP/ICMP implementation runs as a user process in version 6 UNIX, with modifications obtained from BBN for network access. IP reassembles fragments into datagrams, but has no separate IP user interface. TCP supports user and server Telnet, echo, discard, internet SMTP mail, and FTP. ICMP generates replies to Echo Requests, and sends Source-Quench when reassembly buffers are full.

1. Hardware - PDP-11/70 and PDP-11/45 running UNIX version 6, with BBN IPC additions.

2. Software - written in C, requiring 25K instruction space, 20K data space. Supports 10 connections (including "listeners").

3. Unimplemented protocol features:

   - TCP - Discards out-of-order segments.

   - IP - Does not handle some options and ICMP messages.

CPU:

DEC PDP-11/70 and PDP-11/45

O/S:

V6-UNIX

IMPLEMENTATION-LANGUAGE:

C

CONTACT:

Ed Cain, (Cain@EDN-UNIX.ARPA), 703-437-2578

ORDERING-PROCEDURE:

Contact Ed Cain

1.7.9. v 3COM-UNET
PRODUCT-OR-PACKAGE-NAME: UNET

TYPE: TCP/IP Implementation

DESCRIPTION:

UNET is a communication software package which enables UNIX

systems to communicate using TCP/IP protocols. UNET will utilize any physical communications media, from low speed links such as twisted pair RS-232C to high speed coaxial links such as Ethernet. All layers of the UNET package are directly available to the user. The highest layer provides user programs implementing ARPA standard File Transfer Protocol (UFTP), Virtual Terminal Protocol (UVTP), and Mail Transfer Protocols (UMTP). These programs in turn utilize the virtual circuit services of the TCP. The TCP protocol is implemented on top of the IP. Finally, IP can simultaneously interface to multiple local networks. UNET implements 5 of the 7 layers of the International Standards Organization Open Systems Interconnection Reference Model, layers 2 through 6: Link, Network, Transport, Session, and Presentation. Features of TCP 6 not yet implemented are Precedence and Security, End-of-Letter, and Urgent. Feature of IP 4 not yet implemented is Options.

DOCUMENTATION:

UNET Networking Software Reference Manual, Training Documents, Users Manual

CPU:

DEC PDP-11s, VAX-11/780 and 11/750s

O/S:

UNIX and UNIX-based systems (UNIX V7, Sys 3, Sys 5, ZENIX, ONYX)

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

3Com Corporation
1365 Shorebird Way
Mountain View, CA 94043

CONTACT:

Pamela Lawson, 415-961-9602

ORDERING-PROCEDURE:

Contact 3COM directly

PROPRIETY-STATUS:

A Program License Agreement between 3Com and UNET purchaser is required

1.7.10. v UNIQ-SYS5
PRODUCT-OR-PACKAGE-NAME: PASSAGE TCP/IP

TYPE: TCP/IP Implementation

DESCRIPTION:

PASSAGE TCP/IP is a complete implementation of TCP/IP that allows a UNIX System V (5.2) to participate as a routing or nonrouting (end) host over a wide spectrum of communication systems ranging from hard-wired connections to packet-switched or circuit-switched networks. It communicates with adjacent hosts over synchronous communication lines, Ethernet, LANs, and standard 1822 interface to an IMP. Features include TCP/IP, ICMP, Telnet, FTP, UDP, and SMTP. Plans are to implement X.25 in the near future.

DOCUMENTATION:

Included in package

CPU:

DEC VAX (PDP-11 in the future)

O/S:

UNIX System V (5.2)

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

UNIQ Digital Technologies UNIQ Digital Technologies

28 S. Water St.
Batavia, Ill 60510
312-879-1008

37 Wheaton Drive
Nashua, NH 03063
603-883-4860

UNIQ Digital Technologies
8150 Leesburg Pike
Suite 600
Vienna, VA 22180
703-448-8508

UNIQ Digital Technologies
2040 Avenue of the Stars
Suite 400
Los Angeles, CA 90067
213-277-6288

CONTACT:

Sales department (see above)

ORDERING-PROCEDURE:

Contact distributors

PROPRIETY-STATUS:

PASSAGE is a product of UNIQ Digital Technologies

1.7.11. PURDUE
TYPE: TCP/IP/X.25 Implementation

DESCRIPTION:

The IP/X.25 effort is supported at Purdue by CSNET for distribution to CSNET sites. It is based on the TCP/IP implementation from BBN (for 4.1BSD) or Berkeley (for 4.2BSD). A device driver was added which allows IP datagrams to be sent over X.25 virtual circuits. An Interactive Systems INcard is required.

DOCUMENTATION:

Complete manual available if CSNET subscriber

CPU:

VAX-11/750 and VAX-11/780

O/S:

Berkeley UNIX 4.1BSD and 4.2BSD

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

CSNET CIC
Bolt, Beranek and Newman Inc.
10 Moulton Street
Cambridge, MA 02238
(CIC@CSNET-SH.ARPA)
617-497-2777

CONTACT:

Tim Korb, (JTK@PURDUE.ARPA)
Computer Science Dept.
Math Bldg.
Purdue University
West Lafayette, IN 47909
317-494-6184

ORDERING-PROCEDURE:

Contact CIC (see above under DISTRIBUTOR)

PROPRIETY-STATUS:

For CSNET users only

1.7.12. BBN-VAX-UNIX
PRODUCT-OR-PACKAGE-NAME: BBN-VAX-UNIX

TYPE: TCP/IP Implementation

DESCRIPTION:

BBN has developed an implementation of TCP/IP for DEC's VAX(TM) family of processors, that runs under the Berkeley 4.1BSD version of UNIX(TM). The development effort was funded by DARPA. Some important features of the BBN VAX TCP/IP are that it runs in the UNIX kernel for enhanced performance, it is a complete implementation of the TCP and IP protocols, and provides facilities for direct user access to the IP and underlying network protocols. The IP module supports checksums, option interpretation, fragmentation and reassembly, extended internet address support, gateway communication with ICMP, and support of multi-homing (multiple interfaces and addresses on the same or different networks). The TCP supports checksums, sequencing, the ability to pass options through to the IP level, and advanced windowing and adaptive retransmission algorithms. Support is also provided for the User Datagram Protocol (UDP).

In addition to the TCP/IP software for the VAX, BBN has developed implementations of the Telnet Virtual Terminal Protocol, File Transfer Protocol (FTP), and Simple Mail Transfer Protocol (SMTP), for use with TCP. These protocols are operated as user level programs. Also provided are network programming support tools, such as network name/address manipulation libraries, status, tracing, and debugging tools.

The TCP/IP and higher level protocol software are now available direct from BBN. The software is distributed on a 1600 bpi tar format tape, containing the sources and binaries for a 4.1BSD UNIX kernel containing the network modifications and the sources and binaries for the higher level protocols and support software. Documentation is provided in the form of a set of UNIX manual pages for the network access device, user programs, and libraries. In addition, a detailed installation document is provided. Device drivers are supplied for the ACC LH-DH/11 IMP interface, the Proteon Associates PRONET Local Network Interface, the ACC IF-11 IMP interface, and the Interlan 10MB Ethernet interface.

CPU:

DEC VAX-11 series

O/S:

UNIX (4.1BSD)

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

BBN (see above)

CONTACT:

Dennis Rockwell, (drockwel@BBN-UNIX.ARPA), 617-497-2643

ORDERING-PROCEDURE:

The tape is available for a $300.00 duplication fee to Berkeley 4.1BSD licensees. To order the tape, contact:

Ms. Judy Gordon (jgordon@BBN-UNIX.ARPA)
Bolt Beranek and Newman, Inc.
10 Moulton St.
Cambridge, MA 02238
617-497-3827

You will then receive a copy of the licensing agreement. Tapes will be mailed upon receipt of a completed agreement and the distribution fee.

This tape is supplied as-is to 4.1BSD licensees, with no warranties or support expressed or implied. BBN would be pleased to arrange separate agreements for providing installation assistance and/or software support services, if desired.

PROPRIETY-STATUS:

Requires a 4.1BSD license from U.C. Berkeley

HOSTS:

BBN-VAX (development site)

1.7.13. BERKELEY-VAX-UNIX-4.2
PRODUCT-OR-PACKAGE-NAME: BERKELEY-VAX-UNIX-4.2

TYPE: TCP/IP implementation

DESCRIPTION:

This implementation was developed by the Computer Research Group of the University of California at Berkeley as part of a number of research projects. It is based on the BBN implementation for the VAX. It provides support for TCP, IP, ICMP, and UDP with user and server programs for Telnet, FTP, TFTP and SMTP. Hardware supported includes ACC and DEC/CSS Imp Interfaces, 10M bit/s and 3M bit/s Ethernet, and Proteon PRONET.

DOCUMENTATION:

Online documentation of user programs, system call interfaces, etc.; "4.2BSD Networking Implementation Notes", CSRG TR/6

CPU:

VAX-11/780, 11/750, 11/730

O/S:

UNIX-4.2

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

Computer Systems Research Group
Computer Science Division
University of California
Berkeley, CA 94720

CONTACT:

Pauline Schwartz, (Pauline@BERKELEY.ARPA)
Distribution Coordinator
415-642-7780

ORDERING-PROCEDURE:

Contact Distribution Coordinator

PROPRIETY-STATUS:

Requires a 4.2BSD license agreement and Western Electric UNIX/32V, System III, or System V UNIX license

1.7.14. v GOULD-ACCESS-VAX
PRODUCT-OR-PACKAGE-NAME: ACCESS

TYPE: TCP/IP implementation

DESCRIPTION:

ACCESS is a TCP/IP implementation for DEC VAX/VMS users. It

features TCP/IP, ICMP, Telnet, STMP, FTP and UDP. It requires no modification to the VMS operating system. Installation is straight forward, using command procedures. The protocols are implemented in software modules. The network interfaces that ACCESS uses are ACC LH-DH/11 (for DDN), 3Com (for Ethernet), and Interlan (for Ethernet).

Protocol features supported:

- IP: Supports Fragmentation and Reassembly; fixed reassembly time out; oldest fragments are discarded when buffers fill up; address translation by hostname table and/or Plummer's Address Resolution Protocol; no IP options.

- TCP: URGENT, PUSH supported per specification; Maxseg Option generated and understood; dynamic retransmission timeout based on smoothed round trip delay; advertised window is larger than actual available buffer space by the maximum size of an internal buffer; delayed acknowledgements.

DOCUMENTATION:

Supplied with software

CPU:

DEC VAX computers

O/S:

DEC standard VAX/VMS Release 3.0 and above

IMPLEMENTATION-LANGUAGE:

Mostly C, with some MACRO

DISTRIBUTOR:

GOULD Corporation
GOULD Software Division
1101 East University Avenue
Urbana, IL 61801

800-952-8888

CONTACT:

Steve Yasukawa, ARPANET technical liaison, 217-384-8500

ORDERING-PROCEDURE:

Contact Sales/Marketing Dept. at Gould

PROPRIETY-STATUS:

GOULD proprietary product

HOSTS:

AEROSPACE, WPAFB-JALCF, PAXRV-NES, ISI-VAXA

1.7.15. [VAX-VMS/HYPERLINK]
PRODUCT-OR-PACKAGE-NAME: Hyperlink/DDN Software

TYPE: TCP/IP/X.25 Implementation

DESCRIPTION:

Hyperlink/DDN is being implemented in accordance with the ARPANET Upper Layer Protocols (presentation/application layers), Transmission Control Protocol (session/transport layers), and Internet Protocol (network layer functions for internetwork communications). The software includes the host driver (either with Ethernet or Hyperchannel connections), transmission control protocol, internet protocol, network administrator and application software. Applications include file transfer, electronic mail and Telnet.

Hyperlink/DDN integrates ARPANET's packet switching protocol standards with Internet Systems Corporation's proprietary Ethernet-based hardware connection devices or with Network Systems Corporation's HYPERchannel connection devices for complete connections between LANs and/or long-haul networks. A product option is available which provides an LSI 11/73 based host front-end processor which will contain the TCP and IP layers and an X.25 communications subsystem. Internet also offers high speed local-area network solutions for non-DDN requirements which can be integrated with DDN offerings.

DOCUMENTATION:

A full set of documentation is in process

CPU:

DEC/VAX

O/S:

VMS

IMPLEMENTATION-LANGUAGE:

C or Pascal

DISTRIBUTOR:

Internet Systems Corporation
8360 Oakland Park Blvd.
Sunrise, Florida 33321

CONTACT:

Kerry A. Hartley, Director of Sales
313-357-1370
Jerry Lieberman, Product Marketing Manager
305-742-0301

ORDERING-PROCEDURE:

See above contacts

PROPRIETY-STATUS:

Product of Internet Systems Corporation

1.7.16. TEKTRONIX-VAX
PRODUCT-OR-PACKAGE-NAME: VAX/VMS

TYPE: TCP/IP implementation

DESCRIPTION:

This implementation runs under VAX 780/VMS. It has a hyperchannel interface with a home-grown VMS driver. TCP/IP from 3COM interoperates with VMS TCP/IP over HYPERchannel. They have added TCP and IP options to UNET. Currently, there is no plan to market TCP/IP software, although it is available to the network research community for internal use only. Support has been added for Ethernet using an Interlan driver.

- TCP: Has no security or precedence.

- IP: No datagram reassembly or fragmentation. Neither Internet control protocol nor gateway protocol have been implemented. There are no plans to implement fragmentation.

- FTP: Not compatible with Berkeley's 4.2 UNIX but compatible with 3COM's implementation of FTP. There are plans, however, to make it compatible with 4.2 UNIX.

DOCUMENTATION:

Source is well-commented

CPU:

VAX/780,750 and any DEC machine running VMS (including micros)

O/S:

UNIX for UNET, VMS for homegrown TCP/IP

IMPLEMENTATION-LANGUAGE:

BLISS (an equivalent of C) and some MACRO

DISTRIBUTOR:

TEKTRONIX
PO Box 500
Stop 50/454
Beaverton, OR 97077

CONTACT:

Tim Fallon, (timf.tek@RAND-RELAY.ARPA)
503-627-5471
Stan Smith, (stans.tek@RAND-RELAY.ARPA)
503-627-5347

ORDERING-PROCEDURE:

Contact Tim Fallon

PROPRIETY-STATUS:

Not available for OEM resale

1.7.17. WOLLONGONG VAX-VMS
PRODUCT-OR-PACKAGE-NAME: WIN/MVX

DESCRIPTION:

This TCP/IP implementation includes Telnet (remote login), FTP (file transfer), SMTP (Mail) Netstat, Finger, TFTP. Supports the following network interface: DEC DEUNA Ethernet Controller.

DOCUMENTATION:

Installation Guide and Users Manual available

CPU:

DEC MicroVAX I and II

O/S:

Micro VMS 4.0 or greater

IMPLEMENTATION LANGUAGE:

C

DISTRIBUTOR:

The Wollongong Group
1129 San Antonio Road
Palo Alto, CA 94303

CONTACT:

Wollongong Sales
415-962-7200

ORDERING PROCEDURE:

Available with support from The Wollongong Group

PROPRIETY STATUS:

Wollongong

1.7.18. WOLLONGONG VAX-VMS
PRODUCT-OR-PACKAGE-NAME: WIN/VX

DESCRIPTION:

This TCP/IP implementation includes Telnet (remote login), FTP (file transfer), SMTP (Mail) Netstat, Finger, TFTP. Supports the following network interfaces:

- ACC LH-DH (1822 interface)

- ACC HDH (1822-J) (For WIN/VX (DDN))

- ACC X.25 (For WIN/VX (DDN))

- Interlan Ethernet Controller

- DEC Deuna Ethernet Controller

- Ungermann-Bass

- DEC DMR-11

DOCUMENTATION:

Installation Guide and Users Manual available

CPU:

DEC VAX

O/S:

VMS 3.1 or greater and VMS 4.x

IMPLEMENTATION LANGUAGE:

C

DISTRIBUTOR:

The Wollongong Group
1129 San Antonio Road
Palo Alto, CA 94303

CONTACT:

Wollongong Sales
415-962-7200

ORDERING PROCEDURE:

Available with support from The Wollongong Group

PROPRIETY STATUS:

Wollongong

1.7.19. WOLLONGONG-SYSTEM-V-UNIX
PRODUCT-OR-PACKAGE-NAME: WIN/SVX

DESCRIPTION:

This TCP/IP implementation includes Telnet (remote login), FTP (file transfer), SMTP (Mail) Netstat, Finger, TFTP. Supports the following network interfaces:

- Interlan Ethernet Controller

- DEC Deuna Ethernet Controller

- EXCELAN Ethernet Controller

DOCUMENTATION:

Installation Guide and Users Manual available

CPU:

DEC VAX

O/S:

UNIX System V2 and greater

IMPLEMENTATION LANGUAGE:

C

DISTRIBUTOR:

The Wollongong Group
1129 San Antonio Road
Palo Alto, CA 94303

CONTACT:

Wollongong Sales
415-962-7200

ORDERING PROCEDURE:

Available with support from The Wollongong Group

PROPRIETY STATUS:

Wollongong

1.7.20. SRI-TENEX/FOONEX/AUGUST
TYPE: TCP/IP Implementation

DESCRIPTION:

SRI has implemented TCP/IP for the TENEX (FOONEX and AUGUST) operating system running on DEC-10 KA or KI and F2, F3 or F4 Foonly processors. It was adapted from the BBN and ISI versions

of TENEX TCP/IP, with contributions from Ed Taft of Xerox and Phil French of Tymshare, and resides in the operating system. It is largely upward-compatible with TOPS-20 implementations and fully compatible with AUGMENT. Telnet, FTP, SMTP, ICMP, ECHO, TIME, WHOIS, and NAME service are available although some are still under development.

This is an implementation done at BBN. DARPA has dropped funding for continued support for Tenex development, and thus the latest versions done for BBN and DEC for TOPS-20 are not available for Tenex.

DOCUMENTATION:

None available at this time other than that embedded in the programs

CPU:

DEC-10(KA, KI) F2,F3,F4

O/S:

TENEX-134,135/FOONEX/AUGUST

IMPLEMENTATION-LANGUAGE:

MACRO

DISTRIBUTOR:

SRI International
Network Information Center
Room EJ286
333 Ravenswood Ave.
Menlo Park, CA 94025

CONTACT:

Vivian Neou, (VIVIAN@SRI-NIC.ARPA), 415-859-4871

ORDERING-PROCEDURE:

FTP the appropriate files across the network or provide a

tape for tape copy. If number of tape requests is large, a small handling charge may have to be added.

PROPRIETY-STATUS:

DCA-owned software

HOSTS:

SRI-NIC.ARPA, OFFICE machines, SRI-CSL.ARPA, KESTREL.ARPA

1.7.21. LLL-TOPS-10
TYPE: TCP/IP implementation

DESCRIPTION:

A TOPS-10 implementation was begun by Don Provan while at WPAFB-AFWAL and was completed by him at LLL-MFE. There have been no serious problems since April of 1983. System supports IP/ICMP and TCP. User level software available for FTP and Telnet connections.

DOCUMENTATION:

Scarce: existing code (both system code and user level code) is the only reliable source of information; user level code maintained by nedved@CMU-CS-A.ARPA

CPU:

PDP-10 or PDP-10 look alikes

O/S:

TOPS-10 (also runs under WAITS at SU-AI)

IMPLEMENTATION-LANGUAGE:

MACRO-10

DISTRIBUTOR:

Don Provan
Lawrence Livermore Laboratory
MFE Computer Center
P.O. Box 5509
Livermore, CA 94550

CONTACT:

Don Provan, (provan@LLL-MFE.ARPA), 415-422-4474

ORDERING-PROCEDURE:

All files are in [70,71,monitor]@LLL-MFE, available via FTP. Also available on 9-track tape

HOSTS:

LLL-MFE running TOPS-10 7.01a on a KL-10, WPAFB-AFWAL running TOPS-10 7.01 on a KL-10, CMU-CS-A running TOPS-10 6.02a on a KL-10, SU-AI running WAITS on a PDP-10 look-alike, WHARTON running TOPS-10 7.01a on a KL-10

1.7.22. MIT-ITS-10/20
TYPE: TCP/IP Implementation

DESCRIPTION:

This is a TCP/IP implementation that runs under the MIT Incompatible Timesharing System (ITS) on DEC-10/20 machines (KA or KL), written by Ken Harrenstien of SRI International under contract to MIT. Includes Telnet, FTP and SMTP. Bug reports and interest group is BUG-TCP@MIT-MC.ARPA.

DOCUMENTATION:

Available from contact

CPU:

DEC-10/20 (KA and KL)

O/S:

ITS

IMPLEMENTATION-LANGUAGE:

MIDAS(PDP-10)

DISTRIBUTOR:

MIT, Cambridge, MA

CONTACT:

Ken Harrenstien, (KLH@SRI-NIC.ARPA)
SRI International
Room EJ280
333 Ravenswood Avenue
Menlo Park, CA 94025
415-859-3695

ORDERING-PROCEDURE:

Appropriate files can be FTP'd across the network. Contact KLH@SRI-NIC.ARPA for more information.

PROPRIETY-STATUS:

MIT-proprietary software

HOSTS:

1.7.23. BBN-TOPS-20
PRODUCT-OR-PACKAGE-NAME: BBN-TOPS-20

TYPE: TCP/IP Implementation

DESCRIPTION:

The TOPS20 Internetworking software supports multiple networks, multiple interfaces on a single network, and multiple protocol suites. Included in the standard distribution are an interface to 1822 nets via an AN20, an interface to a network front-end via a DTE20, and the DARPA protocol suite (DEC is developing an Ethernet interface).

The DARPA IP, ICMP, TCP, Server TELNET protocols are included within the TOPS20 monitor; other protocols are implemented as user application processes. The IP module supports a routing cache maintained via ICMP redirect NET and HOST messages. It performs fragmentation and reassembly, implements all options and can forward traffic between any of the host's interfaces. Applications may interface to the IP layer using User Queues.

All ICMP messages are supported; error messages may be sent by any of the protocol layers; higher layers are notified when a message is received concerning one of their packets. Messages can be sent by applications using the User Queue facility.

Applications can interface to TCP either as a read/write file or via multiple buffers. The TCP layer supports IP routing options, ICMP destination unreachable, source quench, and redirects which specify a type-of-service, and the segment size option. Support for preemption, precedence, and security options is delegated to the application. Telnet supports options and subnegotiations.

There is extensive inter-layer flow control, error reporting, and monitoring. Utilities are available to provide information, list monitoring data, and perform diagnostics.

DEC has distributed a prior version of this implementation as part of its standard TOPS20-AN monitor; the current version is currently being transferred to DEC.

DOCUMENTATION:

User's Manual including Site Configuration Guide

CPU:

DEC KL10

O/S:

TOPS20-AN, Release 5 or 6

IMPLEMENTATION-LANGUAGE:

Macro

DISTRIBUTOR:

Bolt Beranek and Newman, Inc.
10 Moulton Street
Cambridge, Mass. 02238

CONTACT:

Charles Lynn, (CLynn@BBNA), (617) 497-3367

ORDERING-PROCEDURE:

The latest software release should soon be available as part of the standard DEC TOPS20-AN monitor. Until the transfer process has been completed, the software is available via FTP over the internet, or by sending a magtape to:

Bolt Beranek and Newman, Inc.
10 Moulton Street
Cambridge, Mass. 02238
Attn: Charles Lynn

A return mailing label should be included. Also required is a TOPS-20 Source License and the TOPS-20 monitor sources, as the implementation includes source-level changes to the standard DEC monitor.

PROPRIETY-STATUS:

Public domain

HOSTS:

TOPS-20s at BBN, ISI; DEC Customers are running a previous version

1.7.24. v TOPS-20AN
PRODUCT-OR-PACKAGE-NAME: TOPS-20AN

TYPE: TCP/IP version of the TOPS-20 monitor

DESCRIPTION:

Based on the DARPA sponsored TCP/IP implementation for TOPS-20 with major modifications. The BBN TCP/IP software was merged into the standard supported TOPS-20, and a different JSYS interface was implemented that utilized the existing TOPS-20 I/O JSYSs by adding a logical device for TCP. Supports: the 1822 interface, DEC NI20 Ethernet interface and the DEC CI20 computer interconnect.

CPU:

DEC KL10E or KL10R

O/S:

TOPS-20, Release 6.1

IMPLEMENTATION-LANGUAGE:

PDP10/TOPS-20 assembler

DISTRIBUTOR:

Digital Equipment Corporation
200 Forest St.
Marlboro, MA 01752

CONTACT:

Kevin W. Paetzold, (Paetzold@DEC-MARLBORO.ARPA)
MRO1-2/L14
617-467-7430

ORDERING-PROCEDURE:

See your local DEC salesman

PROPRIETY-STATUS:

Licensed by DEC

1.7.25. [DEC-VMS-LAN]
PRODUCT-OR-PACKAGE-NAME: Virtual Transport System

TYPE: TCP/IP Compatible Local-Area Network

DESCRIPTION:

This is a high performance LAN (25 Mbs) which will be in commercial production in second quarter, 1985. This product will be compatible with Internet Systems Corporation's products, which are TCP/IP-based.

CPU:

DEC VAX

O/S:

VMS

DISTRIBUTOR:

Computer Network Technology
9440 Science Center Drive
New Hope, MN 55428

CONTACT:

Bob Lutnicki, 800-638-8324

1.7.26. FUSION-VAX
PRODUCT-OR-PACKAGE-NAME: FUSION

TYPE: TCP/IP Implementation

DESCRIPTION:

Network software for Ethernet, Pronet, Omninet. Runs TCP/IP and/or XNS protocols. Provides file transfer (FTP/send,recv), virtual terminal (Telnet), network management. Interoperates with 4.2 UNIX, socket calls. First released February 1983.

DOCUMENTATION:

User manuals for VMS

CPU:

PDP-11, VAX, Rainbow, DEC Pros

O/S:

UNIX: 4.1, 4.2, System3, Version 7, System 5, Xenix, Venix, VMS

IMPLEMENTATION-LANGUAGE:

C, runs on system's native C compiler

DISTRIBUTOR:

Direct Sales:
Northwest: 408-996-2056
Northeast: 617-229-2570
Southwest: 213-394-7200
Southeast: 703-525-4141

CONTACT:

M.K. Graham, Northwest Sales Manager

ORDERING-PROCEDURE:

See above

PROPRIETY-STATUS:

Developed by Network Research Corporation

1.8. ELXSI

1.8.1. ELXSI

PRODUCT-OR-PACKAGE-NAME: ELXSI Fusion TCP/IP

DESCRIPTION:

Implementation of FTP and Telnet for ELXSI machines running release 10 or later. Also included are packet-monitoring and statistics utilities. Later releases will include networking libraries.

DOCUMENTATION:

Manuals and on-line documentation

CPU:

ELXSI 6400

O/S:

Embos, Enix System V, Enix 4.2

IMPLEMENTATION LANGUAGE:

C and Pascal

DISTRIBUTOR:

ELXSI Inc.
2334 Lundy Place
San Jose, CA 95131

CONTACT:

Bob Hedges, ELXSI
408-942-0900

ORDERING PROCEDURE:

Through sales representatives

PROPRIETY STATUS:

Source and object code for sale

1.9. FORTUNE

1.9.1. [FORTUNE]

PRODUCT-OR-PACKAGE-NAME: FORTUNE 32:16

TYPE: TCP/IP Implementation

DESCRIPTION:

UNET was ported from 3COM in to the Fortune 32:16 system for evaluation purposes.

CPU:

Fortune 32:16

O/S:

FOR:PRO (TM)

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

Fortune Systems Corp.
300 Harbor Blvd.
Belmont, CA 94002

CONTACT:

Richard Tung, 415-595-8444

PROPRIETY-STATUS:

Not available as a commercial product at this time

1.10. GOULD

1.10.1. MPX-32

PRODUCT-OR-PACKAGE-NAME: MPX-32 TCP/IP

DESCRIPTION:

MPS-32 TCP/IP Rel 1.0 implements a set of services which allow an MPX-32 task to interchange data with a task in a remote system. This release will operate exclusively over MPX-32 Ethernet. The product contains the standard TCP and IP specifications except for options, precedence, and security. It has a FORTRAN user interface.

DOCUMENTATION:

MPX-32 TCP/IP Software Manual, Document number 323-003500-000

CPU:

32 Bit Concept Series

O/S:

MPX-32 Real-Time

DISTRIBUTOR:

Gould Inc. Computer Systems Division
6901 West Sunrise Boulevard
Ft. Lauderdale, Florida 33313-4499

CONTACT:

Don Zwonitser, Product Line Manager, Communications, (305) 587-2900

1.11. HEWLETT PACKARD

1.11.1. BBN-HP-3000

PRODUCT-OR-PACKAGE-NAME: BBN-HP-3000

TYPE: TCP/IP Implementation

DESCRIPTION:

HP 3000 series III software handles TCP, IP, 1822 and HDH protocols. The code runs under the MPE IV operating system. It is typically a user mode batch job, so that it may be stopped and restarted for SYSDUMPs if desired without having to shut down the rest of the system. It uses an HP Intelligent Network Processor (INP) as the HDCC (Lap B) interface to the network. Intrinsics exist to access TCP or UDP IP. The protocol process includes TCP, IP, 1822 and a new protocol called HDH which allows 1822 messages to be sent over HDLC links. The protocol process has about 8k bytes of code and at least 20k bytes of data depending on the number of buffers allocated.

The TCP code is believed to support all features except rubber EOL. The IP code currently supports fragment reassembly but not fragmentation. Provisions may be added to allow the IP layer to act on routing and source quench messages. Security and precedence are currently ignored.

In addition to TCP, the HP3000 has user and server Telnet as well as user FTP. There is not a server FTP at this time.

A complete description of the implementation software can be found in IEN-167.

For further information see BBN Report 4856, January 1982,

available from BBN.

CPU:

HP 3000 Series III

O/S:

MPE IV

IMPLEMENTATION-LANGUAGE:

HP's Systems Programming Language (SPL)

CONTACT:

Steve Blumenthal, (Blumenthal@BBN-UNIX.ARPA), 617-497-3197

1.12. HONEYWELL

1.12.1. [DPS6]

PRODUCT-OR-PACKAGE-NAME: DPS6-DDN

TYPE: DDN-contracted TCP/IP/X.25 implementation

DESCRIPTION:

This will be a package of software and technical support services for interfacing Honeywell computing environments to the Defense Data Network.

This implementation includes an X.25 interface. Features are FTP, SMTP and Telnet support for asynchronous terminals and Honeywell synchronous terminals. It also includes a programmatic interface for applications running under Mod 400. Available end of 1985.

DOCUMENTATION:

Complete documentation

CPU:

Honeywell DPS6

O/S:

GCOS 6 Mod 400

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

Honeywell Information Systems
Federal Systems Divisions
7900 West Park Drive
McLean, VA 22102

CONTACT:

Tony Concia, 703-827-3000

ORDERING-PROCEDURE:

Contact Tony Concia

PROPRIETY-STATUS:

Honeywell Information Systems

1.12.2. [DPS8]
PRODUCT-OR-PACKAGE-NAME: DPS8-DDN

TYPE: DDN-contracted TCP/IP/X.25 Implementation

DESCRIPTION:

This will be a package of software and technical support services for interfacing Honeywell computing environments to the Defense Data Network.

This TCP/IP implementation includes an X.25 interface. Features are FTP, SMTP and Telnet support for asynchronous terminals and Honeywell synchronous terminals. It also includes a programmatic interface for applications running under GCOS 8. Available end of 1985.

DOCUMENTATION:

Complete documentation

CPU:

Honeywell DPS8

O/S:

GCOS 8

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

Honeywell Information Systems
Federal Systems Divisions
7900 West Park Drive
McLean, VA 22102

CONTACT:

Tony Concia, 703-827-3000

ORDERING-PROCEDURE:

Contact Tony Concia

PROPRIETY-STATUS:

Honeywell Information Systems

1.12.3. MULTICS
PRODUCT-OR-PACKAGE-NAME: MULTICS TCP/IP Facility

TYPE: TCP/IP implementation

DESCRIPTION:

The Multics implementation includes TCP/IP as well as Telnet, FTP, and SMTP. Support is also available for Finger, Discard, Echo, Time, and ICMP.

DOCUMENTATION:

Online help file supplied

CPU:

Honeywell Level 68, DPS8M

O/S:

Multics MR 10.0 and beyond

IMPLEMENTATION-LANGUAGE:

PL/1

DISTRIBUTOR:

Honeywell Information Systems
Federal Systems Division
7900 Westpark Drive
McLean, VA 22102

CONTACT:

Harry Quackenboss
Honeywell Information Systems
MST 60
P.O. Box 8000
Phoenix, AZ 85065
602-249-6629

ORDERING-PROCEDURE:

Contact Honeywell marketing

PROPRIETY-STATUS:

Honeywell product

HOSTS:

CISL-SERVICE-MULTICS, HI-MULTICS, MIT-MULTICS, RADC-MULTICS, USGS1-MULTICS, USGS2-MULTICS

1.13. IBM

1.13.1. IBM PC

PRODUCT-OR-PACKAGE-NAME: PC/IP

TYPE: TCP/IP Implementation

DESCRIPTION:

The TCP, UDP, and IP layers are designed with specific tailoring to the requirements of their known customers, user Telnet and user/server tftp. Drivers have been implemented for the 3Com Etherlink card and the Proteon proNET card. This package is the outgrowth of an MIT research project exploring networking of small personal computers.

DOCUMENTATION:

User's manual with object; Programmer's guide with source

CPU:

IBM-PC, and XT, Compaq

O/S:

DOS 2.0

IMPLEMENTATION-LANGUAGE:

C: Portable C cross-compiler operating under VAX UNIX, and AB6 (Cross-assembler operating under VAX UNIX)

DISTRIBUTORS:

3Com Corporation
1365 Shorebird Way
Mountain View, CA 94043
415-961-9602

Proteon Associates
24 Crescent St.
Waltham, MA 02134
617-894-1980

CONTACT:

For research purposes only:
Prof. Jerome M. Saltzer
MIT/Laboratory for Computer Science
545 Technology Square
Cambridge, MA 02139
617-253-6016

ORDERING PROCEDURE:

Object software included in package with hardware; source available at reproduction cost

PROPRIETY-STATUS:

1.13.2. FUSION-IBM-PC
PRODUCT-OR-PACKAGE-NAME: FUSION

TYPE: TCP/IP Implementation

DESCRIPTION:

Network software for Ethernet, Pronet, Omninet. Runs TCP/IP and/or XNS protocols. Provides file transfer (FTP/send,recv), virtual terminal (Telnet), network management. Interoperates with 4.2 UNIX, socket calls. First released February 1983.

DOCUMENTATION:

User manuals for MS-DOS

CPU:

8088 (IBM PC and compatibles), 8086, 80186, 80286, 68000, 32000

O/S:

MS-DOS/PC-DOS

IMPLEMENTATION-LANGUAGE:

C, runs on system's native C compiler

DISTRIBUTOR:

Direct Sales:
Northwest: 408-996-2056
Northeast: 617-229-2570
Southwest: 213-394-7200
Southeast: 703-525-4141

CONTACT:

M.K. Graham, Northwest Sales Manager

ORDERING-PROCEDURE:

See above

PROPRIETY-STATUS:

Developed by Network Research Corporation

1.13.3. KNET/PC
PRODUCT-OR-PACKAGE-NAME: KNET/PC

TYPE: TCP/IP Implementation

DESCRIPTION:

This product enables the IBM Personal Computer to participate as host on Ethernet or any network using TCP/IP protocols. Supports TFTP and Telnet. Requires 128K bytes of memory, one disk drive, mono or color monitor with 80 column display and 3Com Etherlink Control Board. Compatible with other systems supporting TCP/IP.

DOCUMENTATION:

Available from vendor

CPU:

IBM PC, PC/XT

O/S:

DOS 2.0, 2.1, 3.0

IMPLEMENTATION-LANGUAGE:

C, 8086 Assembler

DISTRIBUTOR:

Spartacus, Inc.
5 Oak Park Drive
Bedford, MA 01730

CONTACT:

Patricia E. Lefebvre, 617-275-4220 or 800-LAN-KNET

PROPRIETY-STATUS:

Source code not available for purchase

1.13.4. WOLLONGONG-IBM-PC
PRODUCT-OR-PACKAGE-NAME: WIN/PC

DESCRIPTION:

This TCP/IP implementation includes Telnet (remote login), TFTP (trivial file transfer). Supports the following network interfaces:

- 3COM Ethernet Controller

DOCUMENTATION:

Installation Guide and Users Manual

CPU:

IBM PC, XT, AT, and IBM compatibles

O/S:

PC-DOS (MS-DOS) 2.0 and greater

IMPLEMENTATION LANGUAGE:

C

DISTRIBUTOR:

The Wollongong Group
1129 San Antonio Road
Palo Alto, CA 94303

CONTACT:

Wollongong Sales
415-962-7200

ORDERING PROCEDURE:

Available with support from The Wollongong Group

PROPRIETY STATUS:

Wollongong

1.13.5. IBM-VM
PRODUCT-OR-PACKAGE-NAME: IBM VM

TYPE: TCP/IP Implementation

DESCRIPTION:

The VM software is written almost entirely in Pascal, with a small amount of assembler-language support. Some assembler code running on the Series/1 interfaces with the X.25 code, which is a standard IBM product. Standard IBM-released software is used throughout.

TCP/IP runs in a separate disconnected virtual machine. Similarly, user SMTP, server SMTP, server FTP, and server Telnet each occupies a dedicated virtual machine. User FTP and user Telnet run within a user's virtual machine under CMS. Communication between virtual machines is done through the IBM Virtual Machine Communication Facility (VMCF). A detailed preliminary design document is available by contacting one of the individuals listed below. (Some details have changed since it was written, but it is still mostly accurate.)

A Pronet driver has been implemented to enable the IP/TCP to use the PRONET 10 megabit/sec token ring LAN. The hardware interface is via a DACU (Device Access Control Unit) provided by IBM. The DACU enables connection of UNIBUS devices to an IBM channel. A driver for Ethernet will also be provided.

Direct connection to a C/30 IMP will require implementation of a software driver in conjunction with a suitable hardware interface (e.g., DACU--LH/DH or Series/1--HDH.)

The University of Wisconsin has implemented the Internet protocols (FTP/SMTP/Telnet/TCP/IP) for IBM VM systems under contract with IBM. In addition, a software interface between IP and an X.25 implementation running on a Series/1 (RPS operating system) has been completed. The complete package will enable CSNET IBM VM hosts to connect to the DARPA Internet via TELENET. This product is available on the commercial market for VM/SP Release 3, Series/1 EDX Version 4, Series/1 RPS Version 5.2.

CPU:

Will run on any 370 architecture using VM

O/S:

VM/SP

IMPLEMENTATION-LANGUAGE:

IBM Pascal and assembler

DISTRIBUTOR: IBM Corporation

CONTACT:

If your site is a university:

Distribution contact:
Carl VanWinter
IBM Corporation
Rochester, MN
507-286-3378

Technical contacts:

David DeWitt, Larry Landweber, or Marvin Solomon
Computer Science Department
University of Wisconsin
1210 W. Dayton St.
Madison, WI 53706
608-262-1204

If your site is not a university:

IBM Corporation
656 Quince Orchard Place
Gaithersburg, MD 20878
ATTN: VM Interface Program for TCP/IP Support Group
301-921-1931

ORDERING PROCEDURE:

Contact appropriate IBM location (addresses above)

1.13.6. [IBM-VM]
TYPE: DDN-contracted TCP/IP Implementation

DESCRIPTION:

This will be a package of software and technical support services for interfacing IBM-VM computing environments to the Defense Data Network. It will be available early 1986.

CPU:

IBM 370

O/S:

VM

DISTRIBUTOR:

IBM Corporation

1.13.7. KNET/VM
PRODUCT-OR-PACKAGE-NAME: KNET/VM

TYPE: Local-Area Network

DESCRIPTION:

KNET/VM is a TCP/IP-based network software package supporting the Ethernet local-area network, Bisync and CTCA links. KNET conforms to the ISO/OSI Reference Model for layered network architecture and runs as an application on the mainframe. (See also "Spartacus, K200" described in the Hardware Section of this document.)

Services supported include client and server Telnet, client and server FTP, client and server TFTP. An application interface to TCP virtual circuits and UDP datagram circuits is also available. In addition, the following small servers are available for UDP: time, discard, echo, name, and quote of the day. Support for TCP echo and discard services is also provided. Telnet access to all VM services is provided via 3270 emulation. Support is provided under FTP for both binary mode and for NETASCII. Automatic data conversion to/from ASCII to EBCDIC is supported. No modification of VM/SP is required. All services run either under CMS or as a guest operating system under CP.

DOCUMENTATION:

Available from vendor

CPU:

IBM 370 class or equivalent

O/S:

VM/SP Rel 2 or later (MVS in development)

IMPLEMENTATION-LANGUAGE:

Assembler and C

DISTRIBUTOR:

Spartacus, Inc.
5 Oak Park Drive
Bedford, MA 01730

CONTACT:

Patricia E. Lefebvre, 617-275-4220 or 800-LAN-KNET

PROPRIETY-STATUS:

Source code not available for purchase

1.13.8. IBM-UNIX
PRODUCT-OR-PACKAGE-NAME: IBM-FED-SYS

TYPE: front-end interface

DESCRIPTION:

IBM Fed Sys Division is working on a Series 1 FEP for interface to the DDN/ARPANET. That box will be based on a Series 1 that was done for USA DARCOM by Channel Systems, Inc. as a sub to IBM. The Channel Systems box was acquired to attach to the IBM I/O channel to provide the host an HDH/HDLC interface to a remote IMP.

McKay is expanding the DARCOM box to run IBM UNIX and will then migrate an existing UNIX-based TCP/IP to it. The resulting FEP would allow the host to implement FTP, Telnet and Mail and rely on the Series 1 for TCP/IP and connection to the net. There are some efforts to pick up the completed UCLA implementation and support it as a complete package or as host-based FTP, Mail and Telnet for use with the Series 1 FEP.

O/S:

IBM UNIX

DISTRIBUTOR:

IBM Federal Systems Division

CONTACT:

Doug McKay, 301-921-1914

1.13.9. [IBM-MVS-LAN]
PRODUCT-OR-PACKAGE-NAME: TCP/IP compatible Virtual Transport System

TYPE: Local-Area Network

DESCRIPTION:

This is a high performance LAN (25 Mbs) which will be in

commercial production in second quarter, 1985. This product will be compatible with Internet Systems Corporation's products, which are TCP/IP-based.

CPU:

IBM

O/S:

MVS-VM

DISTRIBUTOR:

Computer Network Technology
9440 Science Center Drive
New Hope, MN 55428

CONTACT:

Bob Lutnicki, 800-638-8324

ORDERING-PROCEDURE:

Call for information

1.13.10. UCLA-IBM/MVS
PRODUCT-OR-PACKAGE-NAME: UCLA ACP

TYPE: TCP/IP Implementation

DESCRIPTION:

This is an IP/TCP implementation for IBM 370 under OS/MVS. Original development and current enhancements to TCP/IP were funded by DARPA. The complete package is known as "ARPANET Control Program" or ACP and was developed from UCLA NCP for the 360/91 in 1969.

1. IMP Interface Hardware: ACC-IF-IMP/370 interface, or IBM Series 1 with Channel Systems IMP Interface Card (see IBM-FED-SYS).

2. Installation: Requires no system modifications for installation. The ACP operates as a user job, but must be declared non-swappable and occupy a high performance group to OS/MVS. Uses ACF/VTAM for virtual terminals and IPC.

3. IP Protocol Implementation:

   - Fragmentation/reassembly: performs reassembly. Does not fragment, assuming that higher-level protocol (TCP) will create suitable size segments during packetizing.

   - Options: implements source routing (strict and loose). Other options are accepted but ignored.

   - Identifier selection: uses globally-unique identifiers for transmitted segments, independent of destination.

   - Reassembly timeout: fixed value (30-60 seconds), independent of time-to-live field. Packets are discarded if time-to-live field is zero.

   - Gateway functions: Uses preset table of "smart" gateways, expects Redirects to correct choice. However, uses gateway from which first packet was received (for remotely-initiated association).

   - ICMP: Fully supported (except Time Stamps and Info Req.)

4. TCP Protocol Implementation:

   - Precedence, security fields: not set or tested.

   - TCP Options: May send max packet size option, and can receive it.

   - Urgent: may be sent and received by user process.

   - Push: may be sent or received by user process.

   - Retransmission: successive retransmissions use exponential backoff. Base time is 2 times observed exponentially weighted round-trip time. Round-trip time is measured as initial packet transmission to complete acknowledgment. Retransmits slowly into zero window.

   - Initial Sequence Number: derived from system clock.

   - Window strategy: uses conservative strategy, never advertising a receive window larger than the space available in the circular buffer.

   - ACK generation: always sends <ACK> in response to receipt of a non-empty packet. As user process removes bytes from buffer, optimizing algorithm determines when to generate <ACK> to inform sender of larger window.

5. UDP: UDP is implemented.

6. User-Level Protocols: User and Server Telnet, User and Server FTP. Server Telnet access to TSO or any other VTAM application that handles 3767 line terminals. STMP will be implemented in the future.

7. Packet tracing, Debugging, and Monitoring Features Extensive.

DOCUMENTATION:

Considerable documentation comes with sources. Current documentation and update news available for FTP over the network.

CPU:

Any machine with 370 architecture

O/S:

OS/MVS with ACF/VTAM

IMPLEMENTATION-LANGUAGE:

Assembler H (User FTP and User Telnet mostly PL/1)

DISTRIBUTOR:

Office of Academic Computing
MS 5628
UCLA
Los Angeles, CA 90024

CONTACT:

Bob Braden, (BRADEN@USC-ISI.ARPA), 213-825-7518

ORDERING-PROCEDURE:

Contact Bob Braden

PROPRIETY-STATUS:

Public domain

1.13.11. [IBM-MVS]
TYPE: DDN-contracted TCP/IP Implementation

DESCRIPTION:

This will be a package of software and technical support services for interfacing IBM-MVS computing environments to the Defense Data Network.

Initial release is scheduled for the 2nd quarter of 1985. This work is being developed from the UCLA ARPANET Control Program Release 1.50.

DOCUMENTATION:

A product description document is available

CPU:

IBM S/370, 43xx, 303x, 308x, and PCMs

O/S:

MVS/SP Version 1 with ACF/VTAM Release 1.3

IMPLEMENTATION-LANGUAGE:

BAL

DISTRIBUTOR:

Network Solutions, Inc.
7926 Jones Branch Drive, Suite 1010
McLean, Virginia 22102

CONTACT:

Will McDuffie, (ns-ddn@DDN2.ARPA), 703-356-1411

ORDERING-PROCEDURE:

To be determined

PROPRIETY-STATUS:

Modifications to UCLA ACP are copyrighted

1.13.12. [IBM-MVS/HYPERLINK]
PRODUCT-OR-PACKAGE-NAME: Hyperlink/DDN Software

TYPE: TCP/IP/X.25 Implementation

DESCRIPTION:

Hyperlink/DDN is being implemented in accordance with the

ARPANET Upper Layer Protocols (presentation/application layers), Transmission Control Protocol (session/transport layers), and Internet Protocol (network layer functions for internetwork communications). The software includes the host driver (either with Ethernet or Hyperchannel connections), transmission control protocol, internet protocol, network administrator and application software. Applications include file transfer, electronic mail and Telnet.

Hyperlink/DDN integrates ARPANET's packet switching protocol standards with Internet Systems Corporation's proprietary Ethernet-based hardware connection devices or with Network Systems Corporation's HYPERchannel connection devices for complete connections between LANs and/or long-haul networks. A product option is available which provides an LSI 11/73 based host front-end processor which will contain the TCP and IP layers and an X.25 communications subsystem. Internet also offers high speed local-area network solutions for non-DDN requirements which can be integrated with DDN offerings.

DOCUMENTATION:

A full set of documentation is in process

CPU:

IBM

O/S:

IBM/MVS

IMPLEMENTATION-LANGUAGE:

C or Pascal

DISTRIBUTOR:

Internet Systems Corporation
8360 Oakland Park Blvd.
Sunrise, Florida 33321

CONTACT:

Kerry A. Hartley, Director of Sales
313-357-1370
Jerry Lieberman, Product Marketing Manager
305-742-0301

ORDERING-PROCEDURE:

See above contacts

PROPRIETY-STATUS:

Product of Internet Systems Corporation

1.14. LISP MACHINE

1.14.1. [LMI]

PRODUCT-OR-PACKAGE-NAME: LMI TCP/IP

DESCRIPTION:

An Exelan-Exos-101/200 series network front-end processor residing on the Multibus of an LMI-Lambda family multi-processor computer provides TCP and UDP services to the application programs; TELNET, FTP, IMAGEN and others. The applications are integrated into the generic device, pathname, filesystem, or network systems of the operating system, wherever applicable for transparent and automatic usage. The UNIX operating system support provided by Excelan for the front-end is also available and runs concurrently on a 68010 processor.

DOCUMENTATION:

Available from vendor

CPU:

LMI Lambda under the ZetaLisp-Plus operating system concurrently with a 68010 under the UNIX operating system

O/S:

ZetaLisp-Plus Release 2.0 or later, UNIX System V

IMPLEMENTATION-LANGUAGE:

Lisp, C

DISTRIBUTOR:

Lisp Machine, Inc.
1000 Massachusetts Avenue
Cambridge, MA 02138

CONTACT:

Local LMI Sales Office or LMI, Inc. (Sales: Alison Woodman)
(617) 876-6819

ORDERING-PROCEDURE:

Contact LMI Marketing

PROPRIETY-STATUS:

Proprietary product of Lisp Machine, Inc.

1.15. PERKIN-ELMER

1.15.1. [PERKIN-ELMER/HYPERLINK]

PRODUCT-OR-PACKAGE-NAME: Hyperlink/DDN Software

TYPE: TCP/IP/X.25 Implementation

DESCRIPTION:

Hyperlink/DDN is being implemented in accordance with the ARPANET Upper Layer Protocols (presentation/application layers), Transmission Control Protocol (session/transport layers), and Internet Protocol (network layer functions for internetwork communications). The software includes the host driver (either with Ethernet or Hyperchannel connections), transmission control protocol, internet protocol, network administrator and application software. Applications include file transfer, electronic mail and Telnet.

Hyperlink/DDN integrates ARPANET's packet switching protocol standards with Internet Systems Corporation's proprietary Ethernet-based hardware connection devices or with Network Systems Corporation's HYPERchannel connection devices for complete connections between LANs and/or long-haul networks. A product option is available which provides an LSI 11/73 based host front-end processor which will contain the TCP and IP layers and an X.25 communications subsystem. Internet also offers high speed local-area network solutions for non-DDN requirements which can be integrated with DDN offerings.

DOCUMENTATION:

A full set of documentation is in process

CPU:

Perkin-Elmer

O/S:

Perkin-Elmer OS/32

IMPLEMENTATION-LANGUAGE:

C or Pascal

DISTRIBUTOR:

Internet Systems Corporation
8360 Oakland Park Blvd.

Sunrise, Florida 33321

CONTACT:

Kerry A. Hartley, Director of Sales
313-357-1370
Jerry Lieberman, Product Marketing Manager
305-742-0301

ORDERING-PROCEDURE:

See above contacts

PROPRIETY-STATUS: Product of Internet Systems Corporation

1.16. PRIME

1.16.1. [PRIME]

PRODUCT-OR-PACKAGE-NAME: TCP/IP

TYPE: TCP/IP/X.25 implementation

DESCRIPTION:

This implementation will run on top of X.25 and will implement Mail, FTP and Telnet. It will be available the end of May 1985.

DOCUMENTATION:

Will be available

CPU:

All PRIME computers

O/S:

PRIMOS

IMPLEMENTATION-LANGUAGE:

Utilities in C; other code in PRIME's PLP

DISTRIBUTOR:

PRIME Computer
Custom Systems Group
500 Old Connecticut Path
Framingham, MA 01701

CONTACT:

Customs Systems Group, 617-879-2960 ext. 3869

PROPRIETY-STATUS:

Product of PRIME

1.17. RIDGE

1.17.1. RIDGE

PRODUCT NAME: Ridge TCP/IP

TYPE: TCP/IP Implementation

DESCRIPTION:

This product is based on the 4.2 BSD release which includes Telnet, FTP and the 4.2 programs--rlogin, rcp, rsh, ruptime and rwho. In addition, the CMU packet filter for Ethernet is also part of the release.

DOCUMENTATION:

Available

CPU:

Ridge 32c, Ridge 32s

O/S:

ROS 3.2

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

Ridge Computers
2451 Mission College Blvd.

Santa Clara, CA 95054

CONTACT:

Harry Taxin, Vice President, Marketing and Sales, 408-986-8500

ORDERING-PROCEDURE:

Call or write for information

1.18. SYSTEM DEVELOPMENT CORPORATION

1.18.1. v SDC

PRODUCT-OR-PACKAGE-NAME: SDC

TYPE: TCP/IP implementation

DESCRIPTION:

SDC's implementation is part of their overall LAN product and is designed to run in a variety of configurations, particularly as a host NFE resident package using an 0586 (8086)-based operating system. IP provides services to the TCP module and depends on services of the lower layer protocols. ICMP is implemented as an integral part of this IP.

The TCP is designed to support a wide range of ULPs and uses a PAR mechanism. Transmission timeout is dynamically adjusted to approximate the segment round-trip time plus a factor for internal processing. TCP uses checksum and sequencing mechanisms as well as variable windowing for acceptable sequences. As data is accepted, TCP slides the window upward in sequence number space with every segment. TCP also employs a multiplexing mechanism for multiple ULPS within a single host and multiple processes in a ULP to use TCP simultaneously.

The product is fully supported and documented from site planning and preparation to post-installation maintenance and technical support.

DOCUMENTATION:

Available through SDC

O/S:

0586 (8086)-based

DISTRIBUTOR:

System Development Corporation (SDC)
7929 Westpark Drive
McLean, VA 22102

CONTACT:

Bob Miller, 703-790-9850, ext. 292

1.19. SPERRY-UNIVAC

1.19.1. SPERRY-UNIVAC

PRODUCT-OR-PACKAGE-NAME: SPERRY-UNIVAC

TYPE: TCP/IP implementation

DESCRIPTION:

The University of Maryland Computer Science Center has implemented TCP/IP for the SPERRY 1100/60/70/80/90 machines. The implementation supports IP, ICMP, TCP, SMTP, and Telnet. The link layer connection is made via the DCNET local-network protocol. The IP level conforms to RFC791, and supports reassembly and extended addressing. ICMP functions are implemented per RFC792 and support destination-unreachable, redirects, echo and timestamps. The TCP conforms to the RFC793 except that security, precedence and URGENT have not yet been implemented. An STMP server is also supplied.

DOCUMENTATION:

User and internals documents are included with distribution

CPU:

SPERRY 1100/60, 1100/70, 1100/80, 1100/90

O/S:

OS1100 (Level 37R2C or later)

IMPLEMENTATION-LANGUAGE:

MASM and PLUS 5R1 or later

DISTRIBUTOR:

University of Maryland
Computer Science Center - Systems Programming
College Park, MD 20742

CONTACT:

Mike Petry, (PETRY@UMD-UNIVAC.ARPA)
Louis Mamakos, (LOUIE@UMD-UNIVAC.ARPA)
301-454-2946

ORDERING-PROCEDURE:

Contact above-named individuals for current procedure

PROPRIETY-STATUS:

Public domain (at this time)

HOSTS:

UMD-UNIVAC [128.8.0.8], UMD-UNIVAC-TEST [128.8.0.7]

1.19.2. v SPERRY-1100
PRODUCT-OR-PACKAGE-NAME: SPERRY-1100

TYPE: TCP/IP/X.25 implementation

DESCRIPTION:

The following DDN protocols are supported in this implementation: IP, ICMP, TCP, Telnet, FTP and SMTP. In addition, X.25 and HDLC Distant Host are supported. FTP and SMTP are implemented within DDP in the 1100 host. All other protocols are implemented within TELCON. Two hardware configurations are required as a minimum at each Series 1100 host location: an 1100/60, 1100/70, 1100/80 or 1100/90 computer and a Distributed Communications Processor (DCP/40 or DCP/10A) as a front-end. The DCP's may also be configured as remote concentrators to provide remote terminal access to DDN hosts. A medium or high-speed loadable line module configured to support bit-synchronous communications protocols is required in the DCP to support the HDLC interface.

Full interoperability of the X.25 interface as a

heterogeneous DDN host is targeted for July 1985.

DOCUMENTATION:

Available from vendor

CPU:

Sperry 1100 60/70/80/90 and Sperry DCP 40/10A

O/S:

OS 1100; TELCON

IMPLEMENTATION-LANGUAGE:

PLUS for 1100 software; TELCON assembler for DCP

DISTRIBUTOR:

Sperry Corporation
8008 Westpark Drive
McLean, VA 22102

CONTACT:

Technical:
Dale Pluta
703-749-6727

Sales:
John Flynn
703-749-6701

ORDERING-PROCEDURE:

Vendor restricted distribution; contact sales rep.

PROPRIETY-STATUS:

Proprietary product of Sperry

1.19.3. [SPERRY/HYPERLINK]
PRODUCT-OR-PACKAGE-NAME: Hyperlink/DDN Software

TYPE: DDN-contracted TCP/IP/X.25 Implementation

DESCRIPTION:

This will be a package of software and technical support services for interfacing Sperry computing environments to the Defense Data Network.

Hyperlink/DDN is being implemented in accordance with the ARPANET Upper Layer Protocols (presentation/application layers), Transmission Control Protocol (session/transport layers), and Internet Protocol (network layer functions for internetwork communications). The software includes the host driver (either with Ethernet or Hyperchannel connections), transmission control protocol, internet protocol, network administrator and application software. Applications include file transfer, electronic mail and Telnet.

Hyperlink/DDN integrates ARPANET's packet switching protocol standards with Internet Systems Corporation's proprietary Ethernet-based hardware connection devices or with Network Systems Corporation's HYPERchannel connection devices for complete connections between LANs and/or long-haul networks. A product option is available which provides an LSI 11/73 based host front-end processor which will contain the TCP and IP layers and an X.25 communications subsystem. Internet also offers high speed local-area network solutions for non-DDN requirements which can be integrated with DDN offerings.

DOCUMENTATION:

A full set of documentation is in process

CPU:

Sperry

O/S:

Sperry OS1100

IMPLEMENTATION-LANGUAGE:

C or Pascal

DISTRIBUTOR:

Internet Systems Corporation
8360 Oakland Park Blvd.

Sunrise, Florida 33321

CONTACT:

Kerry A. Hartley, Director of Sales
313-357-1370
Jerry Lieberman, Product Marketing Manager
305-742-0301

ORDERING-PROCEDURE:

See above contacts

PROPRIETY-STATUS:

Product of Internet Systems Corporation

1.20. SUN MICROSYSTEMS

1.20.1. SUN-68000

PRODUCT-OR-PACKAGE-NAME: SUN-Workstation

TYPE: TCP/IP Implementation

DESCRIPTION:

The SUN workstation was originally designed by Stanford University and is now a commercial computer product. The workstation uses the Motorola 68010 virtual memory processor and runs 4.2 BSD VMUNIX. The 4.2 BSD TCP/IP protocols are used in conjunction with a 10 mb Ethernet local-area network. Although not currently configured, an 1822 interface would not be difficult to add. In addition to the standard internet protocols, SUN supports the same services as the 4.2 BSD VAX UNIX network software: RLOGIN, RSH, RWHO, RUPTIME, DSH, ROUTED, REXECD, COURIER.

SUN is also developing new services and protocols to enhance throughput and utility, such as a net disk/file protocol that allows workstations to run UNIX without a local disk.

DOCUMENTATION:

Available from vendor

CPU:

68010

O/S:

UNIX, Berkeley 4.2 BSD

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

SUN Microsystems, Inc.
2550 Garcia Avenue
Mountain View, CA 94043

CONTACT:

Sales and Technical:
John Gage or Marlene Martin

(Via uucp: sun!name@BERKELEY.ARPA)
415-960-1300

ORDERING-PROCEDURE:

Available from vendor

PROPRIETY-STATUS:

(Most) network source code will be available for those desiring to add device drivers and net utilities

1.21. SYMBOLICS

1.21.1. v SYMBOLICS

PRODUCT-OR-PACKAGE-NAME: Symbolics TCP/IP

TYPE: TCP/IP Implementation

DESCRIPTION:

An implementation of the Internet protocol family for Symbolics Lisp Machines running release 5 or later. This includes IP, ICMP, TCP, and UDP. Higher level protocols supported include Telnet, SUPDUP, FTP, SMTP and TFTP. TCP/IP is completely integrated in the Lisp Machine generic network system and will be used by the system automatically whenever necessary.

DOCUMENTATION:

Use of the generic network system is documented in standard manuals

CPU:

Symbolics Lisp Machine (3600, 3640 and 3670)

O/S:

Symbolics Lisp System (Release 5 or later)

IMPLEMENTATION-LANGUAGE:

Lisp Machine LISP

DISTRIBUTOR:

Symbolics, Inc.
4 Cambridge Center
Cambridge, MA 02142

CONTACT:

Local Symbolics sales office or Symbolics, Inc. (Sales), 617-576-2600

ORDERING-PROCEDURE:

Contact Symbolics Marketing

PROPRIETY-STATUS:

1.22. TANDEM

1.22.1. [TANDEM]

TYPE: TCP/IP Implementation, specifically 1822/HDH Interface

DESCRIPTION:

Will be available in Spring, 1985 subject to availability of testing facilities.

DOCUMENTATION:

A user manual will be available when product is released

CPU:

Tandem NonStop II and Txp Processors

O/S:

Guardian

IMPLEMENTATION-LANGUAGE:

TAL

DISTRIBUTOR:

Tandem Computers
2550 Walsh Avenue
Santa Clara, CA 95051

CONTACT:

Michael Choi, 408-748-2666

ORDERING-PROCEDURE:

Contact Tandem

PROPRIETY-STATUS:

Tandem proprietary product

1.23. MULTIPLE-MACHINE IMPLEMENTATIONS

1.23.1. v EXCELAN-EXOS-8010

PRODUCT-OR-PACKAGE-NAME: EXOS 8010

TYPE: TCP/IP Implementation

DESCRIPTION:

The EXOS 8010 Protocol Package consists of two parts. One, the TCP/IP protocol module, is downloaded to any of Excelan's EXOS 101 or EXOS 200 series Ethernet Front-End Processor boards (described separately-see the Hardware Section of this document.) Running this code, the front-end then provides TCP,UDP, and IP services to the host system. The protocol module is supplied in object form. It can be used with any host system, and is independent of operating system design. The second part of the EXOS 8010 product consists of I/O drivers, libraries, and utilities which can be integrated with any version of the UNIX operating system. These emulate the BSD network interface model, and include applications such as FTP, rlogin, rsh, rcp, and mail.

DOCUMENTATION:

Available from Excelan

CPU:

Any

O/S:

Any

IMPLEMENTATION-LANGUAGE:

C language

DISTRIBUTOR:

Excelan
2180 Fortune Drive
San Jose, CA 95131

CONTACT:

Sue Johnson or Denise Bielan, 408-945-9526

ORDERING-PROCEDURE:

Contact Excelan

PROPRIETY-STATUS:

Excelan Product

1.23.2. FUSION
PRODUCT-OR-PACKAGE-NAME: FUSION

TYPE: TCP/IP Implementation

DESCRIPTION:

Network software for Ethernet, Pronet, Omninet. Runs TCP/IP and/or XNS protocols. Provides file transfer (FTP/send,recv), virtual terminal (Telnet), network management. Interoperates with 4.2 UNIX, socket calls. First released February 1983.

DOCUMENTATION:

User manuals for UNIX

CPU:

8088 (IBM PC and compatibles), 8086, 80186, 80286, 68000, 32000, PDP-11, VAX, Rainbow, DEC Pros

O/S:

UNIX: 4.1, 4.2, System 3, Version 7, System V, Xenix, Venix, PC-IX

IMPLEMENTATION-LANGUAGE:

C, runs on system's native C compiler

DISTRIBUTOR:

Direct Sales:
Northwest: 408-996-2056
Northeast: 617-229-2570
Southwest: 213-394-7200

Southeast: 703-525-4141

CONTACT:

M.K. Graham, Northwest Sales Manager

ORDERING-PROCEDURE:

See above

PROPRIETY-STATUS:

Developed by Network Research Corporation

1.23.3. UNISOFT
PRODUCT-OR-PACKAGE-NAME: B-NET

TYPE: TCP/IP Implementation

DESCRIPTION:

The UNIPLUS+ networking software which offers multiple and interactive links between UNIPLUS+ based systems (68000-based) and other computers running TCP/IP compatible protocols. The interconnected systems may use a variety of physical layers including Ethernet LAN products and may be geographically distributed or physically adjacent to one another and interconnected in a variety of topologies.

B-NET features include: process-to-process communication, remote file transfer, virtual terminal facilities, datagram service, electronic mail, automatic route-through, flexibility for adding additional network drivers, and access to all levels of protocols.

This software is basically an enhanced version of Berkeley's 4.2 UNIX.

DOCUMENTATION:

Available through vendor

CPU:

68000-based systems

O/S:

UNISOFT UNIX (Berkeley's 4.2 with enhancements)

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

Unisoft Systems
2405 Fourth Street
Berkeley, CA 94710

CONTACT:

Bill Northlich, 415-644-1230

2. TCP/IP HARDWARE IMPLEMENTATIONS

2.1. ADVANCED COMPUTER COMMUNICATIONS

2.1.1. v ACC-ECU

PRODUCT-OR-PACKAGE-NAME: ECU-II

TYPE: Error checking unit

DESCRIPTION:

The Error Control Unit provides an error-controlled link for long distance connection of LH-DH/11 to DDN IMPs. Data transfer between ECU-II units can take place at 1.5Mb/s when directly connected by a 4-pair low capacitance cable up to 914 meters (3000 feet) in length. Lower rates can be selected or determined by attached modem types 303, 209, V.35, or 188-114. Units are in pairs, one at each end of the communication link. The data rate is enhanced by elimination of the need for inter resource "handshaking" on every bit transferred. The units serve as store-and-forward buffers, receiving and buffering resource-generated data in semi-conductor RAMs, then forwarding it by special protocol to the ECU near the other resource device. Since the ECUs have two separate buffers they are capable of simultaneous receipt and transmission in each direction. ECUs are compatible with BBN-1822 or SDLC protocols by direct cable or via modems. Compatible with native mode C/30 IMPs and TCP/IP.

DOCUMENTATION:

Fully documented vendor product; descriptive literature available

DISTRIBUTOR:

ACC (Advanced Computer Communications)
720 Santa Barbara Street
Santa Barbara, CA 93101

CONTACT:

Technical & Sales:
Gary Krall, (Gary@ACC.ARPA)
DDN Industry Manager
805-963-9431

ORDERING-PROCEDURE:

Vendor product, contact sales rep.

PROPRIETY-STATUS:

Proprietary product of ACC

2.1.2. v ACC-IF-11Q/1822
PRODUCT-OR-PACKAGE-NAME: IF-11Q/1822

TYPE: Access controller

DESCRIPTION:

Full-duplex DMA controller used to attach a DEC LSI-11 to a DDN IMP. Operates in Local Host or Distant Host modes. If more than one IMP connection is required, optional XQ/1822 boards can be added.

DOCUMENTATION:

Fully documented vendor product; descriptive literature available

CPU:

PDP-11/03 and PDP-11/23

DISTRIBUTOR:

ACC (Advanced Computer Communications)
720 Santa Barbara Street
Santa Barbara, CA 93101

CONTACT:

Technical & Sales:
Gary Krall, (Gary@ACC.ARPA)
DDN Industry Manager
805-963-9431

ORDERING-PROCEDURE:

Vendor product, contact sales rep.

PROPRIETY-STATUS:

Proprietary product of ACC

2.1.3. v ACC-IF-6000/1822
PRODUCT-OR-PACKAGE-NAME: IF-6000/1822

TYPE: Communications interface

DESCRIPTION:

Communications interface between Honeywell 6000 processor and DDN-compatible 1822 devices. Operates in Local or Distant Host modes.

DOCUMENTATION:

Fully documented vendor product; descriptive literature available

CPU:

Honeywell 6000 series

O/S:

MULTICS

DISTRIBUTOR:

ACC (Advanced Computer Communications)
720 Santa Barbara Street
Santa Barbara, CA 93101

CONTACT:

Technical & Sales:
Gary Krall, (Gary@ACC.ARPA)
DDN Industry Manager
805-963-9431

ORDERING-PROCEDURE:

Vendor product, contact sales rep.

PROPRIETY-STATUS:

Proprietary product of ACC

2.1.4. v ACC-IF-370/DDN
PRODUCT-OR-PACKAGE-NAME: IF-370/DDN

TYPE: IBM 370 Front-end Processor

DESCRIPTION:

This implementation provides for either X.25 or HDH (1822J) connections to the block multiplexer I/O channel of an IBM 370-type system. It contains firmware necessary to operate X.25 or HDH protocols.

CPU:

Motorola 68000

O/S:

Peer Processing Executive

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

ACC (Advanced Computer Communications)
720 Santa Barbara Street
Santa Barbara, CA 93101

CONTACT:

Technical & Sales:
Gary Krall, (Gary@ACC.ARPA)
DDN Industry Manager
805-963-9431

ORDERING-PROCEDURE:

See above

PROPRIETY-STATUS:

Proprietary product of ACC

2.1.5. v ACC-IF-IMP/370
PRODUCT-OR-PACKAGE-NAME: IF-IMP/370 (IF-370/1822)

TYPE: Communications interface

DESCRIPTION:

Connects an IBM host computer to the DDN. It provides a DDN X.25 or HDH (1822-J) access to the DDN Interface Message Processor (IMP). The IF-370/DDN attaches to the Block Multiplexer Channel of any IBM 370, 303x, 43xx, or 308x systemn, or to the Block Multiplexer Channel of plug-compatible systems produced by other manufacturers (e.g. Amdahl). Host resident TCP/IP support for MVS systems to be provided by Network Solutions. Communications interface between an IBM-370 Channel (Byte Multiplexer,

DOCUMENTATION:

Fully documented vendor product; descriptive literature available

CPU:

IBM-370, 43XX, AMDAHL, MAGNASON

O/S:

MVS

DISTRIBUTOR:

ACC (Advanced Computer Communications)
720 Santa Barbara Street
Santa Barbara, CA 93101

CONTACT:

Technical & Sales:
Gary Krall, (Gary@ACC.ARPA)
DDN Industry Manager
805-963-9431

ORDERING-PROCEDURE:

Vendor product, contact sales rep.

PROPRIETY-STATUS:

Proprietary product of ACC

2.1.6. v ACC-LH-DH/11
PRODUCT-OR-PACKAGE-NAME: LH-DH/11

TYPE: Access controller

DESCRIPTION:

The LH-DH/11 is a full-duplex Direct Memory Access (DMA)

controller that attaches to a DEC PDP-11 or VAX Unibus and provides external communication according to BBN specification No. 1822 (available from BBN or the NIC). By means of interchange of plug-in circuits, the controller can be used for either local host (30' cable limit) or distant host (2000' cable limit) applications.

DOCUMENTATION:

Fully documented vendor product; descriptive literature available

CPU:

PDP-11, VAX

DISTRIBUTOR:

ACC (Advanced Computer Communications)
720 Santa Barbara Street
Santa Barbara, CA 93101

CONTACT:

Technical & Sales:
Gary Krall, (Gary@ACC.ARPA)
DDN Industry Manager
805-963-9431

ORDERING-PROCEDURE:

Vendor product, contact sales rep.

PROPRIETY-STATUS:

Proprietary product of ACC

2.1.7. ACC-IF-11/HDH
PRODUCT-OR-PACKAGE-NAME: IF-11/HDH (aka ACP 610-H)

TYPE: Communications interface

DESCRIPTION:

This is a full-duplex DMA error checking communication unit which attaches a PDP-11 or VAX to a DDN IMP (HDH protocol). This is the preferred C30 IMP connection. There are plans to support HDH on Wollongong's TCP/IP and Gould Software's ACCESS.

DOCUMENTATION:

Fully documented vendor product, descriptive literature available

CPU:

PDP-11, VAX

O/S:

UNIX

DISTRIBUTOR:

ACC (Advanced Computer Communications)
720 Santa Barbara Street
Santa Barbara, CA 93101

CONTACT:

Technical & Sales:
Gary Krall, (Gary@ACC.ARPA)
DDN Industry Manager
805-963-9431

ORDERING-PROCEDURE:

Vendor product, contact sales rep.

PROPRIETY-STATUS:

Proprietary product of ACC

2.1.8. ACC-IF-11Q/HDH
PRODUCT-OR-PACKAGE-NAME: IF-11Q/HDH

TYPE: Access controller

DESCRIPTION:

Full-duplex DMA controller used to attach a DEC LSI-11 to a DDN IMP (HDH protocol). If more than one IMP connection is required, optional XQ/HDH boards can be added.

DOCUMENTATION:

Fully documented vendor product; descriptive literature available

CPU:

PDP-11/03, PDP-11/23

DISTRIBUTOR:

ACC (Advanced Computer Communications)
720 Santa Barbara Street
Santa Barbara, CA 93101

CONTACT:

Technical & Sales:
Gary Krall, (Gary@ACC.ARPA)
DDN Industry Manager
805-963-9431

ORDERING-PROCEDURE:

Vendor product, contact sales rep.

PROPRIETY-STATUS:

Proprietary product of ACC

2.1.9. ACC-M/1822
PRODUCT-OR-PACKAGE-NAME: M/1822

TYPE: Access controller

DESCRIPTION:

DMA controller used to attach a MULTIBUS system to a DDN IMP. Currently implemented on Sun and Pyramid Technologies workstations.

DOCUMENTATION:

Fully documented vendor product; descriptive literature available

O/S:

UNIX

DISTRIBUTOR:

ACC (Advanced Computer Communications)
720 Santa Barbara Street
Santa Barbara, CA 93101

CONTACT:

Technical & Sales:
Gary Krall, (Gary@ACC.ARPA)
DDN Industry Manager
805-963-9431

ORDERING-PROCEDURE:

Vendor product, contact sales rep.

PROPRIETY-STATUS:

Proprietary product of ACC

2.1.10. ACC-ACP-625
PRODUCT-OR-PACKAGE-NAME: ACC-ACP-625

TYPE: Communications Interface

DESCRIPTION:

This is a full-duplex DMA communication interface which attaches a PDP-11 or VAX to a DDN IMP supporting Basic Mode X.25 (soon to be certified for Standard Mode operation). The ACC implementation is in conformance at link level to FED-STD-1041, FIPS-PUB 100 and at packet level to DDN X.25 Host Interface Specification, December 1983. The product is supported by Wollongong and by Internet Systems. There are plans by Uniq Digital to support the product for PASSAGE.

DOCUMENTATION:

Fully documented vendor product; descriptive literature available

O/S:

UNIX 4.2 BSD, UNIX System V, VAX/VMS

DISTRIBUTOR:

ACC (Advanced Computer Communications)
720 Santa Barbara Street
Santa Barbara, CA 93101

CONTACT:

Technical & Sales:
Gary Krall, (Gary@ACC.ARPA)
DDN Industry Manager
805-963-9431

ORDERING-PROCEDURE:

Vendor product, contact sales rep.

PROPRIETY-STATUS:

Proprietary product of ACC

2.1.11. ACC-V/1822
PRODUCT-OR-PACKAGE-NAME: V/1822

TYPE: Access Controller

DESCRIPTION:

Attaches the VERSAbus to a DDN IMP.

DOCUMENTATION:

Descriptive literature available

DISTRIBUTOR:

ACC (Advanced Computer Communications)
720 Santa Barbara Street
Santa Barbara, CA 93101

CONTACT:

Technical & Sales:
Gary Krall, (Gary@ACC.ARPA)
DDN Industry Manager
805-963-9431

ORDERING-PROCEDURE:

Vendor product, contact sales rep.

PROPRIETY-STATUS:

Proprietary product of ACC

2.2. BOLT, BERANEK AND NEWMAN

2.2.1. BBN-C/30

PRODUCT-OR-PACKAGE-NAME: BBN-C/30

TYPE: Access controller

DESCRIPTION:

The Terminal Access Controller (TAC) is a user Telnet host that supports TCP/IP and NCP host-to-host protocols. It runs in 32K H-316 and 64K C/30 computers. It supports up to 63 terminal ports, and connects to a network via an 1822 host interface. The TAC TCP/IP conforms with RFC791 and RFC793 specifications with the following exceptions:

- IP options are accepted but ignored.

- All TCP options except maximum segment size are not accepted.

- Precedence, security, etc. are ignored. The TAC also supports Packet core, TAC Monitoring, Internet Control Message Protocol (ICMP), and a subset of the Gateway-Gateway protocols.

For more information on the TAC's design, see IEN-166. All major features have been implemented except Class B and C addressing, IP reassembly, and TCP Urgent handling. These will be done in the near future.

CONTACT:

Bob Hinden, (Hinden@BBN-UNIX.ARPA), 617-497-3757

2.3. BRIDGE COMMUNICATIONS

2.3.1. v BRIDGE

PRODUCT NAME: The Communications Server 1 (CS/1)

TYPE: Communications server

DESCRIPTION:

Bridge's CS/1 server with TCP/IP software performs the function of a terminal or host server, allowing up to 32 asynchronous devices (e.g. terminals, printers, computers) to access host computers that support TCP/IP and are attached to an Ethernet LAN. The CS/1 also supports the User Datagram Protocol (UDP) and the Ethernet Address Resolution Protocol (ARP). Bridge Communications also offer gateway servers which interface the CS/1 to X.25 public data networks and the IBM SDLC world.

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

Bridge Communications Inc.
1345 Shorebird Way
Mountain View, CA 94043

CONTACT:

J. Patrick Malone, 415-969-4400

PROPRIETY-STATUS:

Product of Bridge Communications

2.4. EXCELAN

2.4.1. v EXCELAN-EXOS-101

PRODUCT-OR-PACKAGE-NAME: EXOS/101 front-end processor

TYPE: Ethernet Front-End Processor

DESCRIPTION:

The EXOS 101 is a single Multibus board which includes an 8088 CPU, 64 or 128 Kbytes RAM, and an Ethernet Data Link controller. An EPROM-based operating system kernel manages EXOS resources, and provides a standard high-level programming environment for protocol code. TCP/IP protocol code, available separately from Excelan, can be downloaded to EXOS RAM at start-up time either by the host system, or over the Ethernet.

DOCUMENTATION:

Available through Excelan

CPU:

Any

O/S:

Any

DISTRIBUTOR:

Excelan
2180 Fortune Drive
San Jose, CA 95131

CONTACT:

Sue Johnson or Denise Bielan, 408-945-9526

ORDERING-PROCEDURE:

Contact Excelan

PROPRIETY-STATUS:

Excelan product

2.4.2. EXCELAN-EXOS-200
PRODUCT-OR-PACKAGE-NAME: EXOS 200 Series

TYPE: Ethernet Front-End Processor Boards

DESCRIPTION:

The EXOS 200 series includes boards for Multibus, VME, QBUS, and UNIBUS. The design is modular, and can be readily adapted to other host bus designs. Each is a single-board front-end processor which includes an 80186 CPU, at least 128 Kbytes RAM, and an Ethernet Data Link controller. In addition, a DMA-backed SBX bus connector allows additional communications links to be supported via off-the-shelf daughter boards. An EPROM-based operating system kernel manages EXOS resources, and provides a standard high-level programming environment for protocol code. All boards can run the same object code, and are 100% software compatible with Excelan's EXOS 101 product. TCP/IP protocol code, available separately from Excelan, can be downloaded to EXOS RAM at start-up time either by the host system, or over the Ethernet.

DOCUMENTATION:

Available from Excelan

CPU:

Any

O/S:

Any

DISTRIBUTOR:

Excelan
2180 Fortune Drive
San Jose, CA 95131

CONTACT:

Sue Johnson or Denise Bielan, 408-945-9526

ORDERING-PROCEDURE:

Contact Excelan

PROPRIETY-STATUS:

Excelan Product

2.5. IMAGEN

2.5.1. IMPRINT-10
PRODUCT NAME: IMPRINT-10 TCP/IP Ethernet Printer

TYPE: Laser printer

DESCRIPTION:

The IMPRINT-10 is an intelligent laser printer, based on a 10 page-per-minute, reliable printing engine, providing the page-layout language Impress, line-printer emulation, daisy-wheel printer emulation, and Tektronix 4014 emulation. The IMPRINT-10 is supported by the Scribe, TeX, troff, and ditroff document production systems. Supports a full, one-connection TCP and IP, along with ICMP and HARP.

DOCUMENTATION:

Available from vendor

CPU:

68000, multibus-based, proprietary hardware

O/S:

Proprietary, not user-programmable

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

IMAGEN Corporation
2660 Marine Way
Mountain View, California 94043

CONTACT:

Sales: David Perlmutter
Technical: Geoffrey H. Cooper
415-960-0714

ORDERING-PROCEDURE:

Contact vendor for more information

PROPRIETY-STATUS:

Proprietary product

2.6. INTERLAN

2.6.1. v INTERLAN-NS2010

PRODUCT-OR-PACKAGE-NAME: RSX-11M/S, Device Driver

TYPE: Device Driver

DESCRIPTION:

RSX-11M/S, Device Driver for NI1010 and NI2010 boards; includes user manual (UM-NS2010), source code on RX01 floppy disk with Files-11 file structure, and supported software license (SL-NS2010-S). Offers access to stream and raw datagram protocol levels. Only a small amount of effort should be necessary to process UDP-like datagram packets.

O/S:

Most DEC OPSYS

DISTRIBUTOR:

Interlan
3 Lyberty Way
Westport, MA 01886

CONTACT:

William Seifert, 617-692-3900

ORDERING-PROCEDURE:

Each of the above products may be ordered individually

PROPRIETY-STATUS:

Interlan product

2.6.2. v INTERLAN-NS2020
PRODUCT-OR-PACKAGE-NAME: RT-11 V4.0 (FB, SJ, XM) Device Driver

TYPE: Device Driver

DESCRIPTION:

RT-11 V4.0 (FB, SJ, XM) Device Driver for NI1010 and NI2010 boards. Provides datagram level-of-service; includes user manual (UM-NS2010), source code on RX01 floppy disk with RT-11 file structure, and supported software license (SL-NS2020-S).

DISTRIBUTOR:

Interlan
3 Lyberty Way
Westport, MA 01886

CONTACT:

William Seifert, 617-692-3900

ORDERING-PROCEDURE:

Each of the above products may be ordered individually

PROPRIETY-STATUS:

Interlan product

2.6.3. v INTERLAN-NI1010
PRODUCT-OR-PACKAGE-NAME: Interlan Unibus Ethernet Communications Controller Board

TYPE: Communications Controller Board

DESCRIPTION:

Unibus Ethernet Communications Controller Board (BD-NI1010) includes User Manual (UM-NI1010), standalone diagnostic on RX01 floppy disk (DS-NI1010-RX01), and interface cable with mating connectors (AC-NM10-10).

DISTRIBUTOR:

Interlan
3 Lyberty Way
Westford, MA 01886

CONTACT:

William Seifert, 617-692-3900

ORDERING-PROCEDURE:

Contact distributor

PROPRIETY-STATUS:

Interlan product

HOSTS:

Naval Postgraduate School

2.6.4. v INTERLAN-NM10
PRODUCT-OR-PACKAGE-NAME: Ethernet protocol module

TYPE: Ethernet Protocol Module

DESCRIPTION:

Ethernet protocol module (BD-NM10); includes User Manual

(UM-NM10) and NM10 interface cable with mating connectors (AC-NM10-10).

DISTRIBUTOR:

Interlan
3 Lyberty Way
Westford, MA 01886

CONTACT:

William Seifert, 617-692-3900

ORDERING-PROCEDURE:

Each of the above products may be ordered individually

PROPRIETY-STATUS:

Interlan product

2.6.5. v INTERLAN-NI2010
PRODUCT-OR-PACKAGE-NAME: Qbus Ethernet Communications Controller Board

TYPE: Communications Controller Board

DESCRIPTION:

Qbus Ethernet Communications Controller Board (BD-NI2010); includes user manual (UM-NI2010), standalone diagnostic on RX01 floppy disk (DS-NI2010-RX01), and interface cable with mating connectors (AC-NM10-10).

DISTRIBUTOR:

Interlan
3 Lyberty Way
Westford, MA 01886

CONTACT:

William Seifert, 617-692-3900

ORDERING-PROCEDURE:

Each of the above products may be ordered individually

PROPRIETY-STATUS:

Interlan product

2.6.6. v INTERLAN-NI3010
PRODUCT-OR-PACKAGE-NAME: Multibus Ethernet Communications Controller Board

TYPE: Communications Controller Board

DESCRIPTION:

Multibus Ethernet Communications Controller Board (BD-NI3010); includes user manual (UM-HI3010), and interface cable with mating connectors (AC-NM10-10).

DISTRIBUTOR:

Interlan
3 Lyberty Way
Westford, MA 01886

CONTACT:

William Seifert, 617-692-3900

ORDERING-PROCEDURE:

Each of the above products may be ordered individually

PROPRIETY-STATUS:

Interlan product

2.7. MITRE

2.7.1. v MITRE-NAC

PRODUCT-OR-PACKAGE-NAME: MITRE Network Access Component

TYPE: LAN or long-haul network interface

DESCRIPTION:

This is MITRE's second generation network controller (see ZILOG-Z8000). Using an expanded hardware base, industry standard backplanes and multiple microprocessor boards, MITRE has built a MCS-68000-based network access component. This network component has both MULTIBUS and VERSABUS form factors and broadband, Ethernet and 1822 network interfaces.

The standard MULTIBUS network component contains an OMNIBYTE-dual-ported 68000, with 128K bytes dynamic RAM, and 96K bytes EPROM, a memory board, and a Bridge serial i/o (SIO) interface board. The SIO board has its own 68000 cpu, 8 serial ports, 4K bytes RAM and 32K bytes ROM. The long-haul network version contains an ACC MULTIBUS-1822 interface. The VERSABUS version supports an ACC VERSABUS-1822 interface. In addition, the VERSABUS version supports an ACC VERSABUS-UNIBUS interface for host-interfacing to DEC machines.

The software is written in 'C' and runs under CMOS, a 'C' version of SRI's Micro Operating System. In addition to supporting TCP, IP, ICMP, and the appropriate network level protocol, the network front-end version (aka a host interface unit for the LAN environment) supports both the DTI-Host-to-Front-End Protocol and a MITRE Network Access Protocol.

DOCUMENTATION:

Some MITRE Technical Reports (also videotape description by Steve Holmgren)

CPU:

MCS-68000

O/S:

CMOS

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

The MITRE Corporation
McLean, VA 22102

CONTACT:

John Mullen, (jrm@MITRE.ARPA), 703-827-7476

PROPRIETY-STATUS:

Public domain

2.8. QMI

2.8.1. v QMI

PRODUCT-OR-PACKAGE-NAME: QM10 Advanced Communication Controller

TYPE: TCP/IP/ICMP Peripheral Chip

DESCRIPTION:

During the construction several TCP implementations for the PDP-11 and 16-bit micros (Z8000, M68000) it became evident that two major elements of the implementation process could be improved. The first is the problem of integrating protocol software into an operating system. It was found that as much as half of the software relating to a particular implementation was not really related to the protocol implementation but to the development of facilities (e.g. buffer management) and interfaces (e.g. I/O device emulators) between the protocol software and a particular system.

The second problem was that each time a new implementation was built it had to be tested locally, then with external implementations, and then watched over in operation for as much as 8 months before a mature, useful system was available.

It was felt that if a hardware peripheral could be developed which in a system sense appeared much the same as other peripherals yet implemented a "device" which was the higher level protocols the integration problem would be simplified. Further, if that system could be constructed in a chip form factor, much the same as the UARTS of today, that system developers would reduce the problem of access to mature, operational protocol software to that of a hardware technician rather than a sophisticated systems implementor working for as much as a year.

The QM10 is just such a chip, implementing as a "protocol engine" the TCP/IP/ICMP protocols. Each chip implements a single virtual circuit and is interfaced with a shared memory.

DOCUMENTATION:

Complete hardware and software interface documentation available

DISTRIBUTOR:

QMI
262M Cedar Lane #3
Vienna, VA 22180

CONTACT:

Steve Holmgren, 703-573-5701

PROPRIETY-STATUS:

The chips are sold on an OEM basis under copyright

2.9. SCOPE

2.9.1. DDN MICROGATEWAY

PRODUCT-OR-PACKAGE NAME: DDN MICROGATEWAY

TYPE: Microgateway

DESCRIPTION:

The DDN MICROGATEWAY is a single board product which implements the MIL Standard TCP/IP as well as ICMP and lower layer link and network protocols - either FIPS 100/X.25 or 1822/HDH.

Using a Motorola 68008 microprocessor, the DDN MICROGATEWAY provides full-service host support at 56K bits per second, and it will accommodate up to 64 TCP/IP sessions with its shared memory interface.

A companion DDN MICROGATEWAY software product support host TELNET, FTP, and SMTP applications, thus offering a total turn-key solution for certain UNIX operating system enviornments.

DOCUMENTATION:

A user's manual describes product design and provides information on how to integrate the DDN MICROGATEWAY into the user's host hardware and operating system environment.

CPU:

Single board implementations for MULTIBUS and IBM PC BUS. Other BUSES planned.

O/S:

Board product is not O/S specific. ULPs are based in BSD 4.2 or UNIX System V. Other O/S's are available.

IMPLEMENTATION-LANGUAGE:

TCP/IP, X.25 are in C firmware, embedded in the hardware product. ULPs are in C.

DISTRIBUTER:

SCOPE Incorporated
1860 Michael Faraday Drive
Reston, Virginia 22090

CONTACT:

Sue Gruszewski

ORDERING PRODCEDURE:

See above contact

PROPRIETARY-STATUS:

Commercially available

2.10. SPARTACUS

2.10.1. K200

PRODUCT-OR-PACKAGE-NAME: K200

TYPE: Local-Area Network Controller

DESCRIPTION:

Ethernet Controller providing a high-speed interface between an IBM 370, 30xx or PCM and the Ethernet local-area network. The K200 is a microprocessor driven control unit that attaches to IBM's block multiplexer channel using standard IBM bus and tag cables. K200 implements the physical and data link layers of the ISO/OSI Reference Model for network architecture and conforms to the specifications for Ethernet, version 1.0. Maximum throughput is in excess of 2.5 megabits per second.

DOCUMENTATION:

Available from vendor

CPU:

IBM 370, IBM 30xx, PCM

DISTRIBUTOR:

Spartacus, Inc.
5 Oak Park Drive
Bedford, MA 01730

CONTACT:

Patricia E. Lefebvre, 617-275-4220 or 800-LAN-KNET

PROPRIETY-STATUS:

Spartacus product

2.10.2. ZILOG Z8000

PRODUCT-OR-PACKAGE-NAME: Zilog Z8000

TYPE: network controller

DESCRIPTION:

This network controller is the product of a series of MITRE

projects aimed at making network access (both local and long-haul) as straightforward as computer peripheral access. Some of the new microprocessors make it possible to construct a "network controller" that handles the particulars of packet ordering and flow control in the same way that hardware controllers handle the particulars of disk cylinder centerline or an end of tap sensor. This TCP/IP network controller, supported by a Z8000 microprocessor box, is currently interfaced to a number of UNIX systems via a UMC-Z80. The outboard box is accessed by a set of I/O-like management calls (open, close, read, write, and special) which transport TCP requests via a network access protocol.

The outboard box has 64K bytes of Ram, 32 bytes of Rom, a Z8002 micro, and a serial Usart (880K BPS max.) All of the software was written in C using an in-house version of the portable C compiler. The unit interfaces as easily to a local network as it does to the DDN. All that is necessary for this conversion is the addition of an ACC-1822 hardware device and a new device driver. Other than different round trip delays, host user-level software sees no difference between the two network devices. The resulting set of Z8000-based building blocks supports host interface unit and a terminal concentrator on the local net.

Performance with TCP/IP has been measured with two user processes talking via TCP/IP over the cable at 350K BPS. Rates as high as 450K BPS occur when user I/O buffer sizes are set at 8K bytes per I/O. The Internet Protocol contains the lowest level of addressing. This allows for local units to be addressed in the same way remote units, two or three networks away, are addressed. The effect of 300 bit TCP/IP headers has negligible impact on performance.

DOCUMENTATION:

Some MITRE Technical Reports (Also videotape description by Steve Holmgren)

O/S:

CMOS

IMPLEMENTATION-LANGUAGE:

C

DISTRIBUTOR:

The MITRE Corporation
McLean, VA 22102

CONTACT:

John Mullen, (jrm@MITRE.ARPA), 703-827-7476

PROPRIETY-STATUS:

Public domain

FEEDBACK FORM

TCP/IP Implementations and Vendors Guide

September 1985

If you have a contribution, fill in the following template and send it via the DDN network to NIC@SRI-NIC.ARPA or through U. S. mail to: Brochures of vendor products are also welcome.

DDN Network Information Center
SRI International
333 Ravenswood Avenue
Menlo Park, CA 94025
Attn: Francine Perillo - EJ294

PRODUCT-OR-PACKAGE-NAME:

TYPE:

DESCRIPTION:

DOCUMENTATION:

CPU:

O/S:

IMPLEMENTATION-LANGUAGE:

DISTRIBUTOR:

CONTACT:

ORDERING-PROCEDURE:

PROPRIETY-STATUS:

HOSTS (on network using this implementation):

Comments:

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