Local Area Networks for Microcomputers

This Survey summarizes local network architectures now available for microcomputers or personal computer systems. Details on 27 local architectures produced by 25 computer or communications vendors are presented. Specifics on the physical media, transmission rate, applications, configuration and options, and gateways are included.

For quick reference, an outline precedes the survey entries, offering a dot (●) chart access to the more significant features of the local network architectures. Complete entries in the Survey are arranged alphabetically by the vendor name.

LOCAL AREA NETWORKS OUTLINE

COMPANY	NETWORK	NETWORK TYPE Baseband	Broadband	ACCESS METHOD Contention	Token Passing	Other	TRANSMISSION SPEED to 1M bps	to 2M bps	to 10M bps	over 10M bps	CABLE LENGTH to 2000 ft	to 5000 ft	over 5000 ft	GATEWAYS IBM SNA/SDLC	X.25	Xerox Ethernet	Other	APPLICATION AREA General Business	Electronic Mail	Word Processing	Industrial	Other
Altos Computer sys	Altos-Net	●	—	—	—	●	—	—	●	—	—	—	●	●	●	●	—	●	●	—	—	●
Apple Computer	AppleNet	●	—	●	—	—	●	—	—	—	●	—	—	—	—	—	—	●	●	●	—	●
Corvus Systems	Omninet	●	—	●	—	—	●	—	—	—	—	●	—	—	—	—	—	●	●	●	●	●
Corvus Systems	Omninet Appleshare	●	—	●	—	—	●	—	—	—	●	—	—	—	—	—	—	—	—	—	—	●
Cromemco	C-Net	●	—	●	—	—	●	—	—	—	—	—	●	—	—	—	—	—	●	●	●	●
DESTEK Group	DESNET	●	●	●	—	—	—	●	—	—	—	—	●	—	●	—	—	●	●	●	●	●
Digilog Business Sys	SYSTEM 1800	●	—	—	—	●	●	—	—	—	●	—	—	—	—	—	●	●	●	●	—	●
Digital Equipment	Ethernet	●	—	—	—	●	—	—	●	—	—	●	—	●	●	—	●	—	●	●	—	●
Digital Microsystems	HiNet	●	—	—	—	●	●	—	—	—	●	—	—	—	—	—	●	—	●	●	—	●
Interactive Sys/3M	VIDEODATA	—	●	—	—	●	●	—	—	—	—	—	●	—	—	—	—	●	—	●	—	●
Intertec Data Systems	CompuStar	●	—	—	—	●	●	—	—	—	—	●	—	—	—	—	—	●	—	●	●	●
Logica	Polynet	●	—	—	●	—	—	—	●	—	—	—	—	●	—	—	●	●	—	●	—	●
Molecular Computer	SuperMicro Multiuser	●	—	●	—	—	●	—	—	—	●	—	—	—	—	—	—	●	—	●	—	●
NCR Corporation	Decision Net	●	—	●	—	—	●	—	—	—	●	—	—	—	—	—	—	●	—	—	—	●
Nestar Systems	Plan 4000	●	—	—	●	—	—	—	●	—	—	—	●	●	●	●	●	●	●	●	—	—
North Star Computer	NorthNet	●	—	●	—	—	●	—	—	—	—	—	●	—	—	—	—	●	●	●	—	●
Novell Data Systems	ShareNet	●	—	●	—	●	—	—	—	●	—	—	●	—	—	—	—	●	●	●	—	●
Orange Compuco	ULCnet	●	—	●	—	—	●	—	—	—	—	—	●	—	—	—	—	●	●	●	—	●
Syntech	MARS/NET	●	—	●	—	—	●	—	—	—	—	—	●	—	—	—	—	●	—	●	—	●
3COM	Etherlink	●	—	●	—	—	—	—	●	—	●	●	●	—	—	—	—	●	●	—	—	●
Ungermann-Bass	Net/One Baseband	●	—	●	—	—	—	●	—	—	—	—	●	—	—	—	●	●	●	●	●	●
Ungermann-Bass	Net/One Broadband	—	●	●	—	—	—	●	—	—	—	—	●	—	—	—	●	●	●	●	●	●
Vector Graphic	LINC	●	—	—	●	—	●	—	—	—	—	—	●	—	—	—	—	●	—	●	—	●
Xerox	Ethernet	●	—	●	—	—	—	—	●	—	—	—	●	●	—	●	●	●	—	●	—	●
Zeda Computers	InfiNet	●	—	●	—	—	●	—	—	—	—	—	●	—	—	—	●	●	—	●	—	●
Zilog	UNET	●	—	●	—	—	●	—	—	—	—	—	●	—	—	—	—	●	—	●	—	●

LOCAL AREA NETWORKS FEATURES

Initally, the concept of local networking became familiar as a data communication scheme no longer dependent on phone lines, switched data services, or public facilities, and independent of applications and specific computer or terminal environments. The local networking concept has now evolved to include a general-purpose, multivendor environment that provides interconnection of terminals, computers, personal computers, and other resources within one building or within a complex of closely linked buildings. Significantly, modern local networking systems are characterized by very high data rates, achieved by high-speed digital modulation and baseband or broadband transmission systems. These systems use coaxial cable, CATV

Local Area Networks for Microcomputers

cable, twisted-pair, or even fiber optic transmission mediums.

A new subset of the Local Area Network (LAN) market is the personal computer network, or PCN. PCNs differ from traditional local networks in that their primary purpose is the sharing of disk, printer, and communication resources among office computer systems rather than support of message communication between such systems. As such, the economics of PCNs differ sharply from traditional LAN systems; a network of as few as three personal computers sharing a large hard disk may be totally cost effective, whereas a traditional terminal-host LAN typically requires dozens of users to be cost justified. Resources other than disks may also be shared in PCN—some users find that high-speed or letter-quality printers cannot be justified for a single user, but can be effective when applied to a network of users. More communication-oriented features such as electronic mail and message exchange services may be applied to such resource-sharing networks, but usually as an additional application rather than as the primary reason for purchase. The sharing of data files requires a very high transfer rate if unreasonable performance limitations are to be avoided, and many entries to the PCN market support data rates from 1 million bps to over 2.5 million bps. Price ranges for connections range from $200 to $600, exclusive of the cost of the shared resources. There are more new entries to the PCN market than in the more traditional communication LANs.

Not all personal computer networks are designed for resource sharing, however. The Ethernet-compatible PC LANs offerpersonal computer users a gateway to minicomputer and wide-area networks, primarily through DEC minicomputers. DEC (DEC's equivalent of IBM's SNA) in its present form can support personal computer data links, and PCs attached in this way have access through DECnet to the wide-area services of DDCMP and X.25.

In regard to standardizing activities to support LAN development, the IEEE-802 Standards Committee resolved against the monolithic approach to forming guidelines for a LAN transmission medium access method. The Committee accepted both CSMA/CD (Carrier Sense Multiple Access/Collision Detection) and the Token Passing (both ring and bus) methods for accessing baseband or broadband networks and assigned 3 working groups to study these schemes and provide standards. The Standard 802.3 Group was assigned CSMA/CD, which follows Ethernet specifications (10M-bps transmission on 50-ohm cable using Manchester data encoding); Standard 802.4 Group was assigned study of the token bus access method (both baseband and broadband on 75-ohm cable for 1M-, 5M-, 10M-bps transmissions); Standard 802.5 was to focus on the token ring method (1M- and 4M-bps transmissions on 150-ohm shielded twisted-pair, and for 10M- and 20M-bps transmissions on 75-ohm coaxial cable). A fourth group was formed, Standard 802.6, to work on a standard for data transmission over CATV-based LAN systems serving large area topologies (Metropolitan Area Networks: MAN); and a fifth group, Standard 802.2, was formed to determine a standard link-level protocol (resembling HDLC) and the packaging of data on shared medium. All groups, with the exception of Standard 802.5, have completed and approved Draft Standards, which have been submitted to the Technical Committee for Computer Communications (TCCC) for final approval early 1983. The 802.5 Group is also preparing to submit Draft Standards on the token ring access method to the TCCC this spring. The IEEE-802 Standard Committee's work on this phase of solving LAN problems is almost over; and as its organization follows the ISO (International Standards Organization) model recommendations, there are many other levels of communication to be studied by the Committee in the near future. In addition, as PCN vendors are digressing from the beaten path to respond to user pressures for speedy solutions to personal computer networking, a standard-for-PCNs movement is surfacing: some of the new PCNs include parts of the ISO guidelines (7-layer computer-network architecture) in their network systems' design in anticipation of a need for standards.

Each Survey entry is initially identified by network name. Specifications are categorized by type of network, transmission speed, maximum cable length, applications, configurations, interfacing, gateways, first announcement, number installed, and pricing.

Type ● identifies the kind of system and a basic structure (cable, bus, wire) and access method, such as contention, token passing, IEEE standard, and others. Recurring protocols are referred to as CSMA/CD, token passing, and the IEEE standard. CSMA/CD or Carrier Sense Multiple Access with Collision Detection, is a contention scheme used in Ethernet. Before and during transmission, a device "listens" for collision of data streams from 2 or more local net users. When another carrier is detected, the packet is aborted and a jam signal occurs, informing other participants of the collision. After a jam, each station must allow a waiting period prior to transmitting again.

Different from the Ethernet scheme, the token passing scheme (ring or bus) makes collision impossible by allowing only 1 user to transmit at a time. To conceptualize the token ring structure, consider that a station must capture a control "token" before it can transmit. Control tokens are placed on the ring by stations as they finish transmission and passed to stations ready for transmission. Transmissions are unidirectional around the ring.

Other special terms used by vendors are nonblocking, collision avoidance, and positive acknowledgement.

"Nonblocking" is associated primarily with PBX-type local area networks to define the system's traffic carrying capacity. Usually a system can support only a fraction of its total user capacity simultaneously. The assumption is made that all users will not want to access to the system at the same time and all the time. Nonblocking means the system can support its peak capacity simultaneously and continuously.

"Collision avoidance" is a scheme to avoid collisions in a CSMA system. A second user waiting to transmit on a busy line is signaled to transmit later at an arbitrary time on the Corvus Omninet. On Network Systems HYPERbus, collisions are avoided by using a "virtual" token passing scheme for line access.

Transmission Speed ● indicates speed in millions (M) of bits per second (bps).

Cable Length ● describes the maximum length of cable from end-to-end, node-to-node, device-to-device, also includes aggregate cable length using repeater or extender.

Application ● describes functional use such as office, industrial, or financial.

Configuration ● describes the topology of the network, composition of the basic system, type of devices supported, and hard disk storage capacity available for shared use and contained in the network products themselves rather than in individual user systems. Such disk storage may be optional at extra cost, and various sizes of hard disk may be available.

Interfacing ● includes required device, adapter, or standard that devices must use to connect to the trunk or cable used in the local network.

Gateways ● provision for crossing boundary from local networks into another type of local or distributed network such as Ethernet, SNA, X.25 networks, or other local nets.

First Announced ● year of announcement if known.

Number Installed ● as of publication if known.

Pricing ● includes purchase price of major network components.

LOCAL AREA NETWORKS LISTINGS

■ **ALTOS COMPUTER SYSTEMS**

2360 Bering Drive, San Jose, CA 95131 ● 408-946-6700.

□ **Altos-Net**

Type ● based on UNET from 3 COM Corporation; connects

Local Area Networks for Microcomputers

UNIX/XENIX-based Altos computers in local/distributed network configurations ● 2 network types: RS-422 twisted-pair Altos network and Ethernet ● implements higher-level vendor-independent Internet Protocol (IP) for routing and Transmission Control Protocol (TCP) for system-to-system access, adopted as standard by U.S. Department of Defense as well as Mail Transfer, Virtual Terminal, and File Transfer Programs.

Transmission Speed ● 800K bps on twisted-pair link; 10M bps over Ethernet coaxial cable.

Cable Length ● 500 feet on twisted-pair link ● 1,500 feet on Ethernet cable; with repeaters up to 7,500 feet.

Application ● office automation, word processing, distributed processing, electronic mail, remote file transfers ● virtual terminal program allows users to log-on to remote systems; full UNIX security through log-on procedure.

Configuration ● 16-bit 8086 microprocessor-based Altos ACS8600 (UNIX) and 586 Series (XENIX) computer systems; intelligent I/O controller support ● single ACS8600 microcomputer supports up to 8 satellite terminals; each 586 system supports up to 6 user terminals on RS-232C channels ● up to 32 computer systems (clusters) connected on a single Altos or Ethernet network; Altos-Net communication software provides IP/TCP protocols for inter-net Altos network; optional Ethernet controller interconnects Altos and Ethernet networks ● I/O controller supports X.25, 2780/3780, 3270, or SNA/SDLC communication protocols ● Altos 186 workstations can serve on local and remote distributed networks.

Interfacing ● RS-232C serial channels to local terminals; RS-422 computer interface to Altos-Net; and direct connection to Ethernet through Altos Ethernet controller; indirectly via telephone lines.

Gateways ● Ethernet controller links Altos-Net to Ethernet network ● Altos communication processor implements 1 synchronous link that can handle X.25 protocol access to packet-switching networks, or 3270 terminal emulation, 2780/3780 for Remote Job Entry environments, or IBM SNA/SDLC protocol for access to mainframes.

First Announced ● May 1982.

Systems Installed ● over 45,000 distributed processors.

Pricing ● purchase price for a minimum Altos network including 2 586 Series systems with 10M-byte disk capacity, Altos-Net software package, and support fo 12 users is approximately $16,600 ● purchase price for a maximum of 32-computer (586 Series) configuration including communication software is approximately $264,000 ● the Ethernet software/hardware option costs $2,500 for each system (8-user terminal cluster) ● Altos-Net local networking software is priced at $295 per module; RS-232C or RS-422 interface for each system.

■ APPLE COMPUTER, INC

20525 Mariani Avenue, Cupertino, CA 95014 ● 408-973-3019.

□ AppleNet

Type ● baseband network uses twinaxial shielded cable to support Apple II, Apple III, and Lisa computers; uses CSMA/CD access method and the Xerox Network System (XNS) protocol.

Transmission Speed ● 1M bps.

Cable Length ● 2,000-foot links; gateway computer used to expand beyond 2,000 feet.

Application ● office environment; provides common access/sharing of files, data bases, and peripherals such as printers and mass storage devices.

Configuration ● clusters of up to 4 terminals are connected to the network through a cluster box; up to 32 cluster boxes are supported on a 2,000-foot cable for a total support of 128 terminals/computer systems; drop cable allows computer to be located 100 feet from cluster box on cable ● network software will be developed for AppleNet and Xerox/Intel/DEC standard Ethernet network.

Interfacing ● interface card plugs into computer containing all electronics; computer connects to network through the cluster box, which is a passive unit with no electronics.

Gateways ● none currently.

First Introduced ● January 1983.

Systems Installed ● network will be available late 1983.

Pricing ● purchase price is less than $500 per connection.

■ CORVUS SYSTEMS, INC

2029 O'Toole Avenue, San Jose, CA 95131 ● 408-946-7700.

□ Omninet

Type ● baseband network using twisted-pair wire cable and CSMA/CA (Corvus collision avoidance) access method.

Transmission Speed ● 1M bps.

Cable Length ● up to 4,000 feet.

Application ● to interconnect microcomputers and peripherals in shared storage/peripheral environment.

Configuration ● minimum system connects at least 2 microcomputers; maximum system supports up to 64 microcomputers and peripherals from a variety of vendors, including Apple, IBM (PCs), Xerox, NEC, S-100 Bus, Radio Shack, DEC (LSI-11), NCR, Victor Technologies, Onyx, and Texas Instruments (Professional Computer).

Interfacing ● requires transporter interface which allows variable length messages to/from microcomputer and peripherals.

Gateways ● none but plan to implement gateway to X.25 and other standard networks.

First Announced ● mid-1981.

Systems Installed ● 2,000.

Pricing ● purchase price of transporter interface is $495.

□ Omninet Appleshare

Type ● baseband network using twisted-pair cable and CSMA/CA (Collision Avoidance) support access method; Apple II computers.

Transmission Speed ● 1M bps.

Cable Length ● up to 1,000 feet.

Application ● educational environments.

Configuration ● supports up to 64 Apple II 48K-RAM computers, 1 functions as a Network Server to 63 Network Stations running APPLESOFT BASIC ● shared resources include 1 to 6 Apple DOS 3.3 formatted diskette drives and 1 printer, expandable to Winchester disk storage of 5M to 50M bytes ● Corvus Constellation software supports computer intercommunication, peripherals spooling, and both Apple DOS and Pascal on same disk system.

Interfacing ● OMNINET transporter cards for each Apple II station.

Gateways ● none.

First Announced ● November 1982.

Systems Installed ● none, still in production.

Pricing ● purchase price of minimum configuration is less than $1,500; includes 3 OMNINET transporter cards plus Appleshare software package.

■ CROMEMCO, INC

280 Bernardo Avenue, Mountain View, CA 94043 ● 415-964-7400.

□ C-Net

Type ● baseband network using twin-axial cable in bus topology and CSMA/CD access protocol; supports Cromemco computers/devices, S-100 bus-based systems, and RS-232C devices.

Transmission Speed ● 880K bps.

Cable Length ● 6,000 feet.

Local Area Networks for Microcomputers

Application ● scientific and technical laboratory environments; automated office environment, including word processing applications; automated factory and educational applications.

Configuration ● supports up to 255 users on systems with S-100 bus and RS-232C interface connected to 6,000 foot (maximum) twin-axial cable; does not support repeaters.

Interfacing ● C/Net Interface (CNI) is S-100 plug-in board which attaches S-100-based systems to C/Net cable ● C-Net Server (CNS) provides RS-232C interface.

Gateways ● none currently ● gateways planned to Ethernet and Wangnet networks.

First Announced ● April 1982.

Systems Installed ● 4.

Pricing ● a CNI interface costs $395 per computer connector.

■ DESTEK GROUP

830C East Evelyn Avenue, Sunnyvale, CA 94086 ● 408-737-7211.

□ DESNET

Type ● baseband network using coaxial cable CSMA/CD access method and bus topology; network interface system (NIS) level for standalone model or network interface board (NIB) level for integral network control available ● options include boards for broadband, fiber optic, or telephone line communication via modems ● 3 types of add-in network interface boards are provided: 1 for IBM personal computers; 1 for MULTIBUS-based systems; and 1 for S-100 bus-based systems ● NIS version connects dissimilar systems/peripherals through RS-232C serial port or a parallel I/O port either general-purpose or Centronics-compatible port.

Transmission Speed ● 2M bps.

Cable Length ● maximum distance between nodes is 6,000 feet, maximum total length is about 4 miles.

Application ● office and industrial environment; can perform electronic mail function.

Configuration ● NIS-level network can interconnect almost any combination of dissimiliar processor/peripheral devices; practical limit up to 350 nodes; broadband maximum is unlimited; peripherals include printers, disk files, and modems ● NIB-level network: DESNET/IBM-PC board requires 1 slot in IBM personal computer card cage; uses variation of HDLC protocol; DESNET/MULTIBUS is single-board intelligent controller, can function as an intelligent slave in multiple master environment; S-100 bus interface is single intelligent controller ● DESNET software supports file/disk/printer/console sharing; features transparent CP/M applications mode; record locking ● guaranteed message support and network statistic functions supported on boards.

Interfacing ● NIS module connects 8/16/24 system peripherals either through standard RS-232C serial port (block transfer or CCITT X.28 mode) or parallel I/O port in general-purpose or Centronic-compatible mode ● NIB version: with bus-imbedded controller, plug-in NIB series consists of sets of printed circuit boards which plug into computer backplane; circuit boards logically divide into Network Control Unit (NCU) and Media Access Unit (MAU); NCU contains network control interface, serial I/O port, bus decoding, and arbitration logic, timing control, and parallel I/O port.

Gateways ● Ethernet via NIB.

First Announced ● first quarter 1982.

Systems Installed ● up to 100, both S-100 and IBM PCs in individual or mixed network environments.

Pricing ● purchase price of Network Interface Board is $500 to $700 in quantities of more than 2.

■ DIGILOG BUSINESS SYSTEMS, INC

Welsh Road & Park Drive, P.O. Box 355, Montgomeryville, PA 18936 ● 215-628-4810.

□ System 1800

Type ● System 1800 local area network using twisted-pair wire to daisychain Digilog desktop computer/workstations and printers together ● System 1800 operates as network controller and workstation (master/slave polling); System 1500 and 1000 operate as network processors; and System 900 operates as workstation.

Transmission Speed ● 500K bps.

Cable Length ● up to 1,000 feet.

Application ● office automation; electronic mail; distributed processing.

Configuration ● all systems based on Z80A microprocessor; basic installation requires a System 1800 or 1850 dual microcomputer configuration, both processors housed in a single cabinet, 1 programmed to control the network, the other used as a workstation; up to 15 additional workstations can be supported for a maximum 16-workstation network ● System 1800 host processor consists of dual Z80A processors running under TURBO DOS CP/M-compatible software; supports 128K-byte RAM, RS-232C asynchronous port; synchronous communication port and printer port; the 1800 also provides 5M-byte (Model I) or 10M-byte (Model II) hard disk with 820K-byte diskette backup; the workstation includes a CRT display and keyboard (PROM programmable) ● the System 1850, which also can be used as host processor, provides the same features as the System 1800 but provides mass storage of 50M-byte capacity plus backup ● other desktop business computers used as local workstations are the diskette-based System 1000 (700K- or 1.6M-byte storage), the System 1500 with 5M- or 10M-byte Winchester drive and 820K-byte diskette backup ● the Workstation 900 (without mass storage) can be used as a remote station with automatic access to network; other workstations key in an access command via the controller ● minimum network configuration requires a Systems 1800 or 1850 to operate as a controller and provide a workstation; maximum network supports up to 16 workstations (including the System 1800/1850 host/workstation combination).

Interfacing ● RS-422 network interface; RS-232C computer port interface; parallel interface for printers.

Gateways ● through communication port on System 1800; to other computer system and to Western Union Electronic Mail, Inc.

First Announced ● June 1981.

Systems Installed ● 5,000.

Pricing ● purchase price of minimum network based on System 1800 (controller and workstation) supporting 10M-byte mass storage (Model II) is approximately $8,000; purchase price of a System 1850 supporting up to 50M-byte storage is approximately $22,000 ● maximum 16-workstation configuration price depends on choice of workstations; purchase price of each 1.6M-byte System 1000 (Model II) is $4,000, of each 10M-byte System 1500 (Model II) $6,000, and each Workstation 900 $2,000.

■ DIGITAL EQUIPMENT CORPORATION

129 Parker Street, Maynard, MA 01754 ● 617-493-4097.

□ Ethernet

Type ● baseband local area network conforming to Ethernet specifications; will be developed within framework of DECnet Phase IV ● supports VAX-11 and PDP-11 computers as well as Professional 300 Series personal computers ● DECnet Phase IV support will be extended to VMS, RSX, TOPS-20, and P/OS operating systems.

Transmission Speed ● 10M bps.

Cable Length ● each segment up to 1,500 feet; up to 1.5 miles maximum.

Application ● office, manufacturing, laboratory, university environments.

Configuration ● branching-bus topology supports up to 1,024 processors (nodes, with each cable segment supporting up to 100 nodes; software support includes DECnet VAX/VMS maximum length of cable between any 2 nodes is 4,500 feet and

Local Area Networks for Microcomputers

DECnet-RSX ● PDP-11s can serve as terminal servers to support terminals and other EIA devices ● network support includes VAX-11, PDP-11, and Professional 300 Series personal computers.

Interfacing ● through H4000 transceiver and DEUNA ● HP4000 serving as direct linkage between cable and Ethernet station or node ● DEUNA is controller interface between transceiver cable and UNIBUS computer buses on VAX-11 and PDP-11; the DEUNA microprocessor contains 32K-byte buffer area for receiving/transmitting data as well as a separate DMA controller for transferring data to host memory; DEUNA's link functions include channel access and automatic retransmission on collision detection; also diagnostic and loopback capabilities.

Gateways ● DECnet/SNA gateway for PDP-11 and VAX-11 communications with IBM computers through server (PDP-11); special-purpose system including optional software modules for network management, remote job entry, interactive 3270 facility, and applications program interface; gateway is designed to be operated/maintained from any node in DECnet network ● DECnet Phase IV gateway to X.25 packet-switched networks ● router to DECnet Phase III DECnet networks.

First Announced ● May 1982.

Systems Installed ● none, except Beta test sites.

Pricing ● purchase price of the H4000 unit is $300; in quantities of 500 or more, price goes down to $200 ● purchase price of DEUNA will be approximately $3,500 ● purchase price of DECnet SNA gateway will be $26,995 for the fundamental gateway application; it will require software ranging in price from $550 to $8,500, depending on application module.

■ DIGITAL MICROSYSTEMS, INC

1755 Embarcadero, Oakland, CA 94606 ● 415-532-3686.

☐ HiNet

Type ● distributed microcomputer network baseband using dual twisted-pair cable to connect HiNet CP/M-based workstations in master/slave polled configuration for access control ● SDLC protocol.

Transmission Speed ● 500K bps.

Cable Length ● 300 feet for standard ribbon cable; 1,000 feet for dual twisted-pair cable.

Application ● word processing, mail management, financial applications in office/business environment; industrial and scientific applications; electronic mail; graphics.

Configuration ● network practical limit of 1 Master Station and up to 32 satellite or user workstations; Master Station with 10M-, 23M-, or 46M-(optionally up to 92M bytes) byte disk provides central file facilities, CRT, and attached printers and peripherals; Master Station controls all communication between workstations; it continuously polls all workstations on the network to give them access to central file, shared printer, and other peripherals ● DMS-15 and DMS3-101/102/103 can both be HiNet masters and run the HiNet management software in addition to the CP/M, MP/M, or OASIS operating system; both are based on the Z80A microcomputer ● the DMS-15 is a Z80A, 8-bit, 4 MHz CPU with CRT, keyboard, 64K-byte memory, 5.25-inch Winchester disk with 19M bytes of unformatted or 15M bytes of formatted storage, and 1 5.25-inch double-sided, double-density diskette drive with 640K bytes unformatted and 614.4K bytes formatted storage; the DMS-15 supports 3 RS-232C serial ports at up to 9600 bps data rates and 1 RS-422 High-Speed serial network port at 500K bps ● the DMS-3 systems can support up to 92M-byte disk storage, an 8-inch 509K-byte diskette, and an optional 20M-byte streamer tape ● workstations are available in 8- or 16-bit models supporting from 64K- to 1M-byte memory ● serial bus expander can provide 7 logical ports for 1 serial port, thus system can connect up to 9 terminals.

Interfacing ● interface to HiNet by RS-422 ● RS-232C interfaces to local terminals.

Gateways ● supports CP/M-compatible environments.

First Announced ● November 1980.

Systems Installed ● 1,500.

Pricing ● purchase price of a minimum configuration is $10,545 to $10,695; includes workstation ($1,695 with single serial 9600 bps printer port), 10M-byte master station ($8,450), Henet software ($450), cable ($50 per 100-foot roll, $200 per 500-foot roll), and female/male connectors ($7 each) ● purchase price of a maximum 32-workstation configuration can range from approximately $67,000 to over $172,280.

■ INTERACTIVE SYSTEMS/3M

TelComm Products Division/3M, 3980 Varsity Drive, Ann Arbor, MI 48104 ● 313-973-1500.

☐ VIDEODATA

Type ● broadband network using coaxial cable; supports simultaneous transmission of audio, data, and video communication ● FDM (Frequency Division Multiplexing) and TDM (Time Division Multiplexing) with AUTOPOLL.

Transmission Speed ● full-duplex 100K (TDM) ● 5 MHz to 300 MHz (FDM); 159 MHz to 300 MHz for host to devices transmission; 116 MHz to 159 MHz for buffer; and 5 MHz for device to host transmissions.

Cable Length ● maximum distance 40 miles.

Application ● multifunction system supports industrial and automated office applications.

Configuration ● typical multifunction system supports computer-terminal networks, IBM 3705 or 3274 networks, and various application centers equipped with appropriate user devices within industrial complex or business office; process control, production control, data communication, fire alarm/security control, time/attendance reporting/piece parts count, work in progress, work scheduling, quality assurance, inventory control, energy management, word processing, and data processing use FDM transmission ● VIDEODATA configuration consists of 2 basic parts: head-end block contains host computer and its modem; and remote locations include user devices (CRT terminals, analog devices, printer, card readers, magnetic storage devices, microprocessors, programmable controllers, other computers) and their associated modems; a modem interface is used for each device in system and functions as receiver as well as transmitter: upper range of frequencies called forward channels used for transmission from head-end to remote devices; lower range of frequencies called reverse channels used for transmission from remote devices back to head-end computer ● expansion requires tapping in new sections of cable for additional remote devices and adding the necessary modems; any device can be moved to any location on the network cable; FDM network usually assigns a specific frequency to each channel and is useful where transmission rates vary widely between head-end and remote devices in point-to-point or multidrop applications ● TDM used with AUTOPOLL accommodates up to 258 terminals (such as CRTs) on same channel; AUTOPOLL allows data from the front-end computer to be selectively transmitted to addressable remote device modems; in a 100-CRT TDM system, each CRT is polled 3 times per second.

Interfacing ● various modem interfaces for both TDM and FDM transmission ● 310B Channel Control Modem (head-end data modem for TDM channel control) controls up to 248 remote devices through 800 Series modems on a single-/full-duplex data channel at 100K bps in each direction; connects to user-supplied mini- or microcomputer through interrupt-driven 16-bit parallel full-duplex interface ● 310BS Switchable Modem (identical to 310 Modem) allows backup modem or computer/modem switchover in redundant configurations; features on/off control; can run in switchover mode in event of cable break ● 810B Modem is single-address full-duplex, 8-bit parallel I/O data modem with CMOS logic for interfacing single byte-parallel interface devices (CRT, printer, microprocessor) to TDM channel; monitors/controls up to 8 digital points ● 820B4 Modem interfaces up to 4 RS-232C-compatible asynchronous devices to TDM channel; device requires Baud Rate Converter (BRC) interface module that allows terminal device to run at lower than channel speed; aggregate maximum data rate of 100K bps in each direction; switch-selectable rates from 150 to 19.2K bps; up

Local Area Networks for Microcomputers

to 4 BRCs can be used with each 820 Modem; acts as serial to parallel converter; with addition of optional buffer, acts as store-and-forward module; each BRC can operate at data rate; allows for interfacing complete workstation via single modem ● 830B Modem used to interface single serial RS-232C-compatible user device to TDM channel; 100K bps each direction; contains integral BRC; optional 256-character buffer available for high-speed block transfer from computer to 830 modem ● 840B Modem is digital I/O multiplexer modem that interfaces a series of I/O modules to TDM channel; 840 Modem I/O modules are available in 32-bit Input, 32-bit Output, 32-bit Contact Monitor Input, 16-bit Control Output, A/D Input Module, Bridge Type Signal Conditioner, Analog Signal Conditioner, and Three Channel Counter configurations.

Gateways ● none currently.

First Announced ● 1980.

Systems Installed ● over 300.

Pricing ● purchase price of a 310B Channel Control Modem is $2,145; 310BS $2,530; 810B $1,310; an 820B4R rackmount model $2,080, a desktop version (820B4) $1,860; 830B cost $1,145; and 840B $1,980.

■ INTERTEC DATA SYSTEMS

2300 Broad River Road, Columbia, SC 29210 ● 803-798-9100.

□ CompuStar

Type ● baseband twisted-pair wire network designed around disk storage resource; supports Intertec CP/M-based video terminal stations connected in daisy-chain configuration ● access through individual terminal identification from 255 user numbers; features record-locking.

Transmission Speed ● 72.5K bytes per second (440K bps) between controller and terminals.

Cable Length ● up to 1 mile.

Application ● distributed data/word processing; small business applications; standard CP/M application environment.

Configuration ● up to 255 Video Processing Units (VPUs) can be daisy-chained into a single network configured around a Disk Storage System (DSS) ● each VPU is a dual Z80 microprocessor with 64K-byte RAM running under standard CP/M operating system, includes 12-inch screen with 24-line/80-character display; offered in 4 models ● Model 10 is basic 64K-byte memory model that can be downline-loaded from DSS or remote host; Model 20 offers same features as Model 10 and also includes double-sided, double-density disk drive with 350K-byte local storage; Model 30 adds another double-sided drive for a total of 750K bytes of storage; and Model 40 includes a double-track drive with 1.5M-byte storage; Models 20/30/40 can be used as standalone units ● DSS can consist of hard disk device and Intertec's special disk controller and multiplexer circuitry to connect user stations into a common disk system; DSS units include Intertec's 10M-byte Winchester disk tabletop configuration; 96M-byte Cartridge Module Drive (CMD) available from Control Data Corporation (CDC) and featuring 80M-byte fixed/16M-byte removable storage; 144M-byte Winchester drive from Intertec requiring the special Disk Storage System Controller (also available for the CMD).

Interfacing ● each terminal includes a main and auxiliary port ● the main RS-232C port supports modem for synchronous/asynchronous interface to high-speed 8-bit parallel bus, which connects daisy-chained terminals; the first VPU is connected directly into the DSS ● the second RS-232C port supports auxiliary printer.

Gateways ● none.

First Announced ● second quarter 1981.

Systems Installed ● 2,600 in U.S. and 1,800 abroad through 1981.

Pricing ● a user can begin with a single VPU and DSS and adds VPUs as required later; also a user is provided with a choice of VPU and DSS systems within a range of prices ● purchase price of Model 10 VPU is $1,995, Model 20 $2,995, Model 30 $3,495,

and Model 40 $3,995 ● purchase price of the 10M-byte DSS is $3,995, 144M-byte DSS $7,995, and multiuser controller interface $2,995.

■ LOGICA, INC

666 Third Avenue, New York, NY 10017 ● 212-599-0828.

□ Polynet

Type ● Cambridge Ring-based system offering 40-bit token slots (optional 38-bit slot version available); twisted-pair cable.

Transmission Speed ● 10M bps.

Cable Length ● 100 to 200 meters maximum between nodes; about 5 miles with use of node-repeaters.

Application ● office, industrial, and environments with sequence critical applications.

Configuration ● includes such components as network nodes, monitor stations, power supply, and range of interfaces to micro- and minicomputer systems; 254 nodes maximum on single ring.

Interfacing ● DMA for DEC's PDP-11 minicomputer, Multibus for Intel's systems, and I/O bus for LSI-11.

Gateways ● to IBM, Sperry, and other large mainframe systems via LSI-11, PDP-11.

First Announced ● 1977.

Systems Installed ● 50.

Pricing ● purchase price is approximatley $1,000 per connection, including interface and software.

■ MOLECULAR COMPUTER

251 River Oak Parkway, San Jose, CA 95134 ● 408-262-2122.

□ SuperMicro Multiuser Microcomputers

Type ● Z80A microprocessor-based multiprocessor networking system built around high-speed m-Bus using CSMA/CD protocol; supports multiple concurrent CP/M users over local network.

Transmission Speed ● 400K bytes per second.

Cable Length ● up to 2,000 feet.

Application ● supports multiple users performing simultaneous data processing tasks: financial worksheet, general accounting, inventory, word processing applications in CP/M-compatible environment.

Configuration ● network environment consists of a single File Processor running n/STAR Network Operating System compatible with CP/M and CP/M-86; supports 8, 32, or 64 user application processors; File Processors offered by Molecular Computer are Z80A microprocessor-based systems offered in 3 models supporting various mass storage capacities; each model can optionally support a 20M-byte streamer tape drive ● the SuperMicro 8 supports 8 user 64K-byte RAM application processors and includes 500K-byte 8-inch diskette, up to 15M-byte 5.25-inch Winchester disk; the SuperMicro 32X supports 32 users application processors and includes 500K-byte 8-inch diskette drive up to 240M-byte disk storage; the SuperMicro 64 supports 64 users (requires 32-slot expansion chassis), and includes 500K-byte diskette, up to 272M-byte storage on 14-inch Winchester drives ● optional 8086 processor card with up to 1M-byte RAM is available as a key-selectable 16-bit processing/shared capability.

Interfacing ● through Application or File Processor, m-Bus Interprocessor Link supports communication between Application Processors and File Processors including optional 16-bit processor; also, Application Processors can communicate with Application Processors independent of File Processor ● RS-232C serial I/O ports on Application and File Processors.

Gateways ● none currently.

First Announced ● as InfiNET in October 1981; as SuperMicro Multiuser Microcomputers Local Area Network in April 1982.

Systems Installed ● over 1,000.

Local Area Networks for Microcomputers

Pricing ● purchase price for a SuperMicro 8 10M-byte system is $7,995; the SuperMicro 32 60M-byte system is $18,995; the SuperMicro 64 with single 32-slot chassis and 136M-byte storage is $22,995 ● purchase price for a 16-bit process card with 256K-RAM is $2,795 ● purchase price for each application processor is $695 for SuperMicro 8 system and $995 for SuperMicro 32X and 64 systems.

■ NCR CORPORATION

1700 Patterson Boulevard, Dayton, OH 45479 ● 513-449-2000.

□ NCR Decision Net

Type ● baseband local area network; uses Corvus Omninet network combined with NCR MODUS file sharing system and NCR Decision Mate V; uses twisted-pair cable network and CSMA (for network access) with a collision avoidance scheme in which each transporter computes its own random transmit time ● supports MS-DOS and CP/M-based personal computers/ peripherals in resource sharing environment.

Transmission Speed ● 1M bps.

Cable Length ● up to 4,000 feet.

Application ● file/message/program-sharing among personal computers configured in business and office environments; CP/M applications.

Configuration ● supports up to 64 workstations; 16 operate simultaneously ● features the NCR Decision Mate V personal computer and the MODUS File Sharer ● NCR Decision Mate V can be Z80A 8-bit processor running under CP/M-80 or dual configuration of Z80A and Intel 8088 8-/16-bit processors running under CP/M-80, CP/M-86, or MS-DOS (Microsoft); and includes 64K-byte RAM expandable to 512K-byte capacity, and color display; supports file/program/message sharing ● NCR MODUS File Sharer is I/O file manager controlling centrally located files and high-speed peripherals; includes cache memory, 5.25-inch formatted diskette, 10- to 96M-byte fixed disk, and optional streaming tape drive.

Interfacing ● communication adapters include NCR Omninet microprocessor-based transporter boards interfacing devices to network ● RS-232C serial ports for asynchronous communications on Decision Mate V computer; Centronics parallel and RS-232C serial printer interfaces.

Gateways ● none currently.

First Announced ● January 1983.

Systems Installed ● Beta test only.

Pricing ● purchase price for 8-bit processor model of Decision Mate V begin at $2,800; for dual-processor model is $3,340 ● the MODUS file sharer sells for $9,995 ● hardware LAN interface costs $500 per personal computer.

■ NESTAR SYSTEMS, INC

2585 East Bayshore Road, Palo Alto, CA 94303 ● 415-493-2223.

□ Plan 4000 (Personal Local Area Network)

Type ● baseband network using coaxial cable and token-passing access scheme; designed around ARCnet and Ethernet technologies using physical and data link layers of ISO model used in ARCnet and Ethernet protocols as network and transport layers of ISO model ● connects Apple II, Apple III, Lisa, and IBM Personal Computers (PCs) in a shared-resource environment.

Transmission Speed ● 2.5M bps.

Cable Length ● up to 4 miles between stations.

Application ● automated office; shared-resource enviroments; electronic mail through MESSENGER application program.

Configuration ● each network segment can support up to 255 workstations that include Apple II, Apple III, Lisa, and IBM PCs; stations can be mixture of servers and user workstations ● servers include File Server (key component of system), Print Server, File Transfer Server, 3270 Emulator Server, 3780 Emulator Server, Gateway Server to other Nestar networks, and TELEX Server used with MESSENGER, Nestar's electronic mail program ● File Server manages access to shared storage and backup facilities; single

File Server supports up to 548M bytes of disk storage; includes integral high-speed tape unit with 20- or 45M-byte streaming cartridge tape backup; File Server Cabinet contains up to 3 Line Isolator Devices (LIDs) which allow up to 29 users or server stations to link to File Server; additional external LIDs can also link any of the File Servers 29 ports for a maximum network support of 255 stations; File Server can run on IBM PC under PC DOS or UCSD p-System, the Apple II under DOS or Apple Pascal System, or the Apple III under SOS; console support includes 2 RS-232C communication ports for ASCII terminals ● Print Server supports up to 6 printers, can be menu or application driven, integrates with MESSENGER Electronic Mail for hardcopy, and integrates with File Transfer Server for internetwork communication ● File Transfer Server (FTS) transfers files transparently between local/remote networks and/or standalone stations at 300 or 1200 bps ● 3270 Emulator Server allows each workstation to function as display stations and interface to IBM mainframes supporting 3270 bisynchronous protocols ● 3780 Emulator Server allows exchange of programs/data with mainframes/computers supporting 3780 bisync protocols ● gateway server allows access to other 4000 networks.

Interfacing ● Nestar Network Interface Card plugs into IBM PC slot and connects the IBM PC to the Plan 4000 network coaxial cable; with multiple network interface cards, a station can run on multiple networks; contains 2K-byte RAM for buffers, 2K-byte RAM for programming; 4K-byte PROM ● File Server Interface to network is built into cabinet; LID in File Server Cabinet is direct link between user or server station and File Server.

Gateway ● through Telex Server and in conjunction with MESSENGER electronic mail program, messages can be sent to TELEX/TWX stations throughout the world from personal workstation ● IBM 3270 compatibility ● IBM 3270 compatibility through Nestar's IBM 3270 and 3780 Emulator Servers ● Gateway Server for real-time packet transmissions between networks.

First Announced ● December 1982.

Systems Installed ● unknown; first shipments began in November 1982.

Pricing ● purchase price of about $25,000 for minimum network covers the bulk base system, which includes a 1-station support system with 16M-byte disk and 20M-byte backup, File Server software, integral LID, and nest card; purchase price of each additional workstation (up to 8) is $2,000; integral LID contains 30-port support, purchase price of every 10 ports is $800; external LIDs with 8 or 16 ports can be used for distant locations; purchase price of nest cards $400 per station.

■ NORTH STAR COMPUTERS, INC

14440 Catalina Street, San Leandro, CA 94577 ● 415-357-8500.

□ NorthNet

Type ● baseband local area network using unshielded twisted-pair wire configured in branching bus scheme; uses CSMA/PA (Carrier Sense Multiple Access/Positive Acknowledgement) access method ● provides multiuser communication among currently installed NorthStar CP/M-based ADVANTAGE standalone computers and peripherals and the ADVANTAGE 8/16.

Transmission Speed ● 1M bps.

Cable Length ● up to 1,000 feet per segment between branching repeaters; repeaters extend length to maximum 10,000 feet.

Application ● CP/M-compatible business and accounting environments include word processing, financial analysis, and business graphics applications; database management system includes programs for electronic mail and electronic filing.

Configuration ● consists of 3 basic elements: cable, workstations, and servers ● workstations and printer/file servers are designed around the ADVANTAGE and ADVANTAGE 8/16 microcomputers ● ADVANTAGE is based on Z80A microprocessors and requires a plug-in workstation (WS) Board to allow it to function as a workstation on NorthNet; the WS Board is a second 4 MHz Z80A microcomputer with EPROM, RAM, 15-foot connect cable, twisted-pair Tap, and VLSI chip to provide

Local Area Networks for Microcomputers

HDLC-like communication facility ● ADVANTAGE 8/16 is a dual-processor system using Intel 8088 16-bit microprocessor and 8-bit Z80 microprocessor ● ADVANTAGE runs under Graphics CP/M, GDOS/BASIC, and the proprietary North Star ASP; ADVANTAGE 8/16 can also run MSDOS and CP/M-86 is a planned future option ● a gateway to North Star's HORIZON Series Systems is also planned for NorthNet ● printer server provides shared access to matrix, letter-quality, and high-speed printers; file servers provide access to 5M- to 80M-byte disks; workstations can also use local disk and diskette storage ● from 2 to 64 ADVANTAGE and ADVANTAGE 8/16s can be supported on the network ● NorthNet features FASTACK which speeds data packet acknowledgement (CSMA/PA), thus minimizing the chance of potential collisions on the network with attendant retransmission attempts.

Interfacing ● through ADVANTAGE or ADVANTAGE 8/16 microcomputers serial or parallel I/O interface.

Gateways ● none currently; compatibility planned for 2780/3780 bisynchronous, SNA, and North Star HORIZON.

First Announced ● June 1982.

Systems Installed ● Beta test only.

Pricing ● purchase price of a minimum network system is approximately $1,566, including a WS-PACK ($399), SERVER-PACK ($499), CABLE-PACK ($249 for 1,000-foot cable, 2 repeaters, 2 terminators), TAP-PACK ($69 for 2 TAP boxes, 2 cable, 2 terminators), and the CP/M-based operating system ($349) ● purchase price of ADVANTAGE 8/16 microcomputer is $4,099 with 2 integrated QUAD diskettes; price rises to $5,499 with 5M-byte disk and 1 QUAD diskette ● purchase price of the ADVANTAGE is $3,599; price for upgrading to an 8/16 is $499.

■ NOVELL DATA SYSTEMS

1170 North Industrial Park Drive, Orem, UT 84057 ● 800-453-1267.

□ ShareNet

Type ● baseband twisted-pair cable network designed to interface a variety of microcomputers in a shared-resource environment; star configuration around central Network Processor allows each workstation direct communication at its own data rate with Network Processor ● currently supports IBM PCs and Z80-based microcomputers; planned support for Apple II/III/Lisa; TRS 80; IBM Displaywriter; UNIX systems.

Transmission Speed ● from 300K to 500K bps for each workstation; up to 12M bps aggregate.

Cable Length ● up to 3,000 feet between workstation and Network Processor.

Application ● data processing and general business; electronic mail.

Configuration ● Network Processor running under ShareNet software is a Motorola MC6800 16-bit processor centrally located in a star-configured topology and functions as file server for up to 24 microcomptuers and 5 printers; provides disk functions and supports concurrent file access for 1 IBM PCs running under PC-DOS and Z80-based microcomputers running under CPM-80, CP/M-86, and p-System; via synchronization commands workstation can simultaneously operate transaction processing, file and record locking/unlocking functions; "pipe" feature direct communications between 2 or more workstations ● Network Processor configuration includes a Texas Instrument TMS99105 16-bit microprocessor acting as DMA controller for every 2 workstations supported on the network ● from 20- to 120M-byte online disk storage and 256K- to 1M-byte RAM memory ● optional MDBS Data Management system with automatic record-locking for multiple station access to data files ● electronic mail program.

Interfacing ● personal computers connect to the Network through a Network Interface Card (NIC) ● the IBM PC interface card supports ShareNet PC-DOS Shell software which resides in up to 8K bytes of PC RAM and provides 4 logical drives for interface to ShareNet-based Network Processor; compatible with DOS for existing applications; supports print spooling and

provides "pipes" for PC-to-PC intercommunication ● interface cards for Apple, TRS 80, and UNIX-based systems will be available.

Gateways ● planned Ethernet and SNA access.

First Announced ● November 1982.

Systems Installed ● 13.

Pricing ● purchase price for Network Processor is $8,000; purchase price for interface board is approximately $300.

■ ORANGE COMPUCO, INC

17801-G SE Main, Irvine, CA 92714 ● 714-957-8075 or 714-957-3992 (Com-net Distribution).

□ ULCnet (Universal Low-Cost Networking System)

Type ● baseband packet-switched network using standard 4-wire telephone cable supports 2 2-wire networks connecting CP/M-based microcomputers in shared-resource environment; bus uses CSMA/CD access method.

Transmission Speed ● variable 9600K to 800K bps; hailing frequency is at 9600 bps so that all recipients can recognize beginning of packet; data rate included on first byte of frame.

Cable Length ● up to 1,000 feet per cable segment; up to 14 repeaters for maximum length of 15,000 feet.

Application ● automated office and word processing; electronic mail.

Configuration ● up to 60 intelligent nodes supported on single 1,000-foot cable ● installation requires standard 4-wire telephone cable, connection boxes housing communication circuitry, network TAPS, connection box cables, termination TAPS for each end of cable, and RS-232C cable for each computer added to network ● a computer (node) transmits data from its serial I/O port through the connection box and onto the cable where data is received by other node stations via the box; diskette stores network software programs ● software offered on 3 levels: basic level contains data link transport level to allow user to develop applications, supports print spooler/file transfer programs; CP/M-based network protocol level with supporting File Server configuration; and OPS/Net-level, running under CP/M, creates background tasks for network and supports print spooler, electronic mail, file sharing.

Interfacing ● RS-232C serial interface.

Gateways ● none.

First Announced ● June 1982.

Systems Installed ● over 1,000.

Pricing ● purchase price for hardware connecting any 3 Z80 CP/M-based systems to network is $770; software, which is offered on 3 levels, costs from $50 to $200 per network, depending on user requirements.

■ SYNTECH INTERNATIONAL, INC

P.O. Box 28810, Dallas, TX 75228 ● 214-340-0379.

□ MARS/NET

Type ● baseband network; MARS (Marathon Attached Resource System) network uses MARS/BUS cable, a serial bus using twisted-pair cable and HDLC communications protocol with contention control; allows dual bus linking for backup ● system supports any S-100 bus or Multibus-based computer running CP/M (including SDSystem computers); provides limited access for non-S-100/Multibus computers via RS-232C port.

Transmission Speed ● 800K bps.

Cable Length ● 10 meters; maximum 1,000 meters.

Application ● 2 major areas supported are office automation and transaction processing ● microcomputer-based environment supports accounting, word/data processing, and general business functions in office applications ● turnkey transaction processing systems using 32 redundant microcomputers and dual Burroughs 6700s.

Local Area Networks for Microcomputers

Configuration ● supports up to 150 users at work, independent stations sharing storage facilities; S-100 bus or Multibus-based computers (intelligent workstations) running CP/M or MP/M and including SDSystem SD200, SD600, SD700 family microcomputers ● limited access for non-S-100/Multibus computers through RS-232C port ● Z80 microprocessor-based MARS/BUS controllers monitor transmissions; Master Series back office processor (MS-610) provides network disk storage of 10M to 40M bytes; SDSystem intelligent workstations (WS-800) support 64K bytes of memory and 4 256K-byte diskettes for 1M-byte local storage is optional; MARS/NET can use Syntech's Marathon Nonstop software for redundant nodal hardware ● Syntech provides a specialized redundant 32-microcomputer configuration using dual Burroughs 6700s in turnkey processing application.

Interfacing ● plug-in MARS/BUS interface board for S-100 bus or Multibus configurations; RS-232C port accommodates other computers.

Gateways ● none.

First Announced ● November 1981.

Systems Installed ● 4.

Pricing ● purchase price for each independent station interfaced to network is $4,000 to $5,000.

■ 3COM CORPORATION

1390 Shorebird Way, Mountain View, CA 94043 ● 415-961-9602.

☐ Etherlink

Type ● baseband Ethernet-compatible local area network designed; interconnect IBM Personal Computers for resource sharing; uses CSMA/CD access method.

Transmission Speed ● 10M bps.

Cable Length ● 900 feet using Thin Ethernet Cable; 1,500 feet with Ethernet Cable; 3,000 feet using Ethernet Cable with 3Com transceivers and 7,500 feet between any 2 computers using repeaters.

Application ● supports IBM DOS applications; office/business environment; electronic mail.

Configuration ● supports up to 100 IBM Personal Computers (PCs) per cable segment; 1,000 per network using repeaters ● Ethershare Network Server implemented using an Intel 8086 with 512K-byte memory; it offers shared access to hard disk with 10M-byte capacity expandable to 40M bytes; provides 1M-byte diskette for backup; optional cartridge tape drive also available; features password control; includes CRT display and keyboard; Ethershare software divides Winchester disk into volumes accessible (read or written) by any PC on network; each PC can access up to 4 volumes at one time; network supports multiple Ethershares; with add-on Etherprint software, Ethershare becomes print server ● Ethermail is optionally available for electronic mail to all PCs on network (compatible with IBM DOS applications only).

Interfacing ● through an Etherlink card (single circuit board) that plugs into 1 expansion slot in IBM PC; on-board transceiver connects directly to Thin Ethernet Cable; standard Ethernet transceiver connector is used for interfacing to existing Ethernet network ● Ethershare Network Server unit includes Ethernet transceiver.

Gateway ● none currently.

First Announced ● October 1982.

Systems Installed ● Beta test only.

Pricing ● purchase price is $950 per Personal Computer Connection.

■ UNGERMANN-BASS, INC

2560 Mission College Boulevard, Santa Clara, CA 95050 ● 408-496-0111.

☐ Net/One Baseband

Type ● baseband network with common bus, coaxial cable, employing CSMA/CD (Carrier Sense Multiple Access Collision Detection); fully Ethernet compatible; VLSI circuits available for use in non-proprietary local networks are compatible with Ethernet and conform to physical and link layers of ISO reference model using CSMA/CD access protocol ● supports any vendor's text/data processing equipment.

Transmission Speed ● up to 10M bps.

Cable Length ● 500 meters per cable segment; 1,500 meters with repeaters; 2,500 meters with remote repeaters.

Application ● general-purpose, electronic mail, word processing, industrial environments.

Configuration ● user equipment attaches to Network Interface Units (NIUs); NIUs attach to network bus via passive transceiver ● Model 150 (NIU-150) supports up to 6 user ports; NIU-2 supports up to 24 user ports ● network requires Net/One System Software and Network Management processor with Network Storage Module to provide network software configuration/distribution, network debugging, network monitoring ● up to 250 devices on 4,000-foot cable.

Interfacing ● RS-232C asynchronous and synchronous; CCITT V.35, IEEE-488; DEC DR11-10/13; RS-449, 8-bit, 16-bit, 32-bit parallel.

Gateways ● remote bridges for interconnecting Net/One networks via high-speed communication links; local bridges for interconnecting adjacent networks; remote and local bridges are media-independent for baseband-to-baseband, baseband-to-broadband, and broadband-to-broadband Net/One connections.

First Announced ● July 1980 shipped.

Systems Installed ● 200.

Pricing ● pricing for minimum configuration connecting RS-232 devices is $21,000 and includes one-time $5,000 software charge, transceiver, and network management station; prices vary according to number and types of devices interconnected.

☐ Net/One Broadband

Type ● CATV-compatible broadband coaxial mid-split dual-cable system; uses CSMA/CD access protocol; fully Ethernet-compatible; can interconnect with Net/One Baseband; conform to physical and link layers of ISO reference model ● supports any vendor's text/data processing equipment ● VLSI circuits services with symbolic name support.

Transmission Speed ● 5M bps on each of 5 standard TV 6-MHz channels.

Cable Length ● up to 10 miles from head end.

Application ● general-purpose, electronic mail, word processing, industrial environments.

Configuration ● user equipment attached to NIUs which attach to network bus via RF modems; Model 150 (NIU-150) supports up to 6 user ports; NIU-2 supports up to 24 user ports; each network requires network management processor with Network Storage Module for software configuration/distribution to NIUs, network debugging, and network monitoring ● system supports up to 250 devices on a 4,000-foot cable segment maximum extension up to 10 miles ● Network Configuration Facility (NCF-1) operates as downline loader and network configuration device; can also be used for software development for user applications that run in NIU; NCF runs Net/One software in CP/M operating system environment.

Interfacing ● requires Network Interface Unit (NIU) between user device and network; NIUs have RS-232C serial interfaces and 8-bit parallel interfaces to connect to user devices.

Gateways ● remote bridges for interconnecting Net/One networks via high-speed communications links; local bridges for interconnecting adjacent networks; remote and local bridges are media independent, enabling baseband-to-baseband, baseband-to-broadband, and broadband-to-broadband Net/One connections.

Local Area Networks for Microcomputers

First Announced • February 1982.

Systems Installed • 20.

Pricing • essential difference in price between baseband and broadband configuration is in the use of transceiver for baseband at $395 and R.F. modem for broadband at $1,200.

■ VECTOR GRAPHIC, INC

500 North Ventu Park Road, Thousand Oaks, CA 91320 • 805-499-5831.

□ LINC (Local Interactive Network Communications)

Type • baseband local area network using twisted-pair cable; token passing access scheme, and modified SDLC protocol; SABER-NET (Self-Amplifying Bus Extended Ring) architecture • supports LINC CP/M-based workstations in shared-disk environment.

Transfer Speed • 750K bps.

Cable Length • 2,000 feet between computers; up to 10,000 feet with repeaters.

Application • automated office environments; accounting, sales, order entry, shipping/receiving applications.

Configuration • uses 4-wire (twisted-pair) telephone cable: 1 pair for transmission; second pair for reception • supports up to 16 LINC CP/M-based computer workstations, each computer capable of supporting a printer; CP/M operating system supports bidirectional direct access to peripheral devices to other workstations; all resources shared by all systems, thus no services required • distributed control with each workstation equipped with its own SABER-NET controller with processor and memory to manage high-speed data transfer and individual tasks; each workstation automatically retransmits data along network, thereby requiring no amplification devices; other system components required in addition to controller are LINC Modular Wall Sockets • SABER-NET topology combines ring and bus topology characteristics: a physical ring is looped into a bus; rings at ends are broken; 1 bus is used to send messages; the other bus is used to return messages • network features error detection and recovery: variable-length block transmission with 16-bit CRC protection and immediate acknowledgement; automatic retransmission upon error detection.

Interfacing • network interface through a printed circuit board assembly (PCBA) within each workstation; computers plug into cable with telephone-type modular wall jack connectors; PCBA runs own programs concurrently to handle all network tasks.

Gateways • none, in development stages.

First Announced • November 1982.

Systems Installed • Beta test only.

Pricing • purchase price of each computer/terminal workstation is $4,495 plus $750 for each hardware interface; purchase price of a minimum 2-workstation configuration is $10,490 and of a maximum 16-workstation configuration is $83,920.

■ XEROX CORPORATION

1341 West Mockingbird Lane, Dallas, TX 75247 • 213-536-9129.

□ Ethernet

Type • baseband network using CSMA/CD; packet switched; data field ranges from 46 to 1500 bytes; uses shielded coaxial cable, base-band signaling.

Transmission Speed • 10M bps.

Cable Length • up to 500 meters per cable segment; multiple segments allowed per network; maximum distance between hosts is 2.5 kilometers.

Application • distributed data/word processing; office automation.

Configuration • Xerox 8000 Network System • minimum configuration: single Xerox 860 Information Processing system-based workstation programmed for integrated office applications, print server (Xerox electric printer at up to 3000 wpm), file server (8000 NS file system with up to 58M bytes

storage), and the communication server (8000 intra-/inter-communication interface) • maximum configuration supports up to 1,024 stations.

Interfacing • Ethernet transceiver.

Gateways • Models 872 and 873 communications servers provide 4 and 8 ports, respectively, for communication link connection to remote Xerox workstations, terminals, and host computer systems, as well as with other manufacturers' systems using Teletype or IBM 2770/2780/3270 protocols; transmission rates up to 9600 bps; other processors and their transceivers can be used as gateways to other networks.

First Announced • 1980.

Systems Installed • over 50.

Pricing • purchase price of the 860 Ethernet Interface Board is $655 ($100 annual maintenance); various cable packages: 75-foot Teflon insulated cable is $202.50 and for 385-foot cable is $1,039.50; 75-foot PVC insulated cable is $37.50 and 385-foot cable is $192.50; drop cables are from $140 (15 feet) to $350 (60 feet) connectors and terminators are $20 each; the transceiver is $200 • purchase price of the 8000 Network Systems processor is $13,020 ($1,200 annual maintenance); the 872 Communication Server Processor is $12,155 ($1,140 annual maintenance); and the 873 Communication Server is $16,655 ($1,560 annual maintenance); discounts are available for purchases of 5 or more systems; software is not included • 58M-byte disk file module is $11,035 ($1,320 annual maintenance).

■ ZEDA COMPUTERS INTERNATIONAL LTD

1662 West 820 North, Provo, UT 84601 • 801-377-9948.

□ InfiNET

Type • baseband single twisted-pair cable; conforms to RS-422 conventions; common-bus CSMA/CD-based network supports Zeda microcomputers and peripherals; planning proprietary support for other vendor equipment • implements 3 lower layers of ISO model: physical, data link, and network levels.

Transmission Speed • multispeed; preamble always at 25K bps; remainder of transmission can be performed at data rate established by 2 end points.

Cable Length • 5 kilometers.

Application • office environment supporting word processing, graphics, simulation in multiprocessing mode.

Configuration • from 2 to 30 interconnected Zeda microcomputers running under ZEDOS, a superset of CP/M: ZEDOS supports InfiNET with imbedded communication software modules; adapting InfiNET product for other vendor equipment/proprietary uses • the ZEDA 580 microcomputer family combines DMA hardware and intelligent, multisector RAM buffering for disks; the 520 family consists of plug-in PC-board microcomputers that range from a low-cost single-user workstation to a 1M-byte timesharing system with local networking and hardware management • peripherals include hard disks, printers, magnetic tape, and time-of-day clock.

Interfacing • UART (Universal Asynchronous Receive Transmit) chips; National Semiconductor 8250 UART interfaces serial cable directly to microprocessor parallel I/O bus for data transfers; 8250 provides serial I/O for connection with network cable through its driver and detection circuits.

Gateways • proprietary gateways developed to customer specifications.

First Announced • Spring 1981.

Systems Installed • undisclosed.

Pricing • purchase price is typically $250 per computer interface; possibly as low as $10 on Zeda configuration.

■ ZILOG, INC

1315 Dell Avenue, Campbell, CA 95008 • 408-370-8000.

□ UNET (formerly Z-NET)

Type • baseband network; common bus, packet-switched,

Local Area Networks for Microcomputers

contention-based system with CSMA/CD access control; packet includes message information and up to 579 bytes of user data.

Transmission Speed ● 800K bps.

Cable Length ● maximum 2 kilometers or approximately 7,000 feet end-to-end.

Application ● office environment and data processing.

Configuration ● each station supports from 1 to 24 users ● network supports up to 254 stations ● each station is a Zilog S8000 computer with 256K-byte memory expandable to 1M bytes and running under the UNIX operating system; the S8000 is offered in 3 models; Model 11 supports 8 users; Model 21 supports 16 users; and Model 31 supports 24 users; other system components required for network operators include the ICP 802 (Intelligent Communication Processor) and the NST 2/01 interface ● languages include COBOL, BASIC, C, PLZ/SYS, and FORTRAN.

Interfacing ● Network Station Transceiver (NST) 2/01.

Gateways ● none currently.

First Announced ● Z-NET 1979; UNET January 1983.

Systems Installed ● 10 Z-NET systems ● UNET in Beta test.

Pricing ● pricing of a minimum configuration is based on Model 11 for 8-user support and is $15,000; additional price requirements are $3,900 for the 802 ICP and that of the NST 2/01 (price not released at this printing).

● **END**