

Local Area Networks (LANs)

This Product Survey summarizes local area networks now on the market. Details on 101 local area networks produced by 83 computer or communications vendors are presented. Specifics on the physical cable, transmission rate, applications, overall configuration, interfacing, and gateways are included.

For quick reference, an outline precedes the survey entries, offering a dot (•) chart access to the more salient features of the local area networks. Complete entries in the Survey are arranged alphabetically by company name.

LOCAL AREA NETWORKS OUTLINE

COMPANY	NETWORK	NETWORK TYPE Baseband Broadband	ACCESS METHOD Conventional 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
A.B. Dick	The Loop	• —	• • —	• — —	• — —	— — — •	• • • —
Alspa Computer Inc	ALSPA-NET	• —	• — —	• — —	• — —	— — — —	• • • —
Altos Computer Sys	WorkNet	• —	• — —	• — —	• — —	• — — —	• — — •
AT&T Teletype	Teletype 4540 LC	• —	— — •	• — —	• — —	— — — —	• — — —
Amtel Systems	Messenger	• —	— — •	• — —	• — —	— — — —	• — — •
Apollo Computer	DOMAIN	• —	— • —	— — — •	— • —	— • • •	— — — •
Applitek Corp	UniLAN	• •	— — •	— — • —	— — — —	— — — —	• • • •
AST Research	PCnet	• —	• — —	• — —	• — —	• — — —	• — — —
AST Research	PCnet II	— —	— — —	— — —	— — —	— — — —	— — — —
Braegen Corp	ELAN	• —	• — —	— • —	— • —	• — — —	— — — •
Bridge Comm Inc	Ethernet	• —	• — —	— — —	— — —	— • • —	— — — •
Codenoll Tech	Ethernet	• —	• — —	— — —	— — •	— • — —	— — — •
Codex Corp	Net/One	• •	• — —	— • —	— — •	— — — —	• — — •
Complexx Sys, Inc	XLAN	• —	• — —	• — —	— — —	— — — •	• — — •
CompuCorp	OmegaNet	• —	• — —	• — —	— • —	— — — —	• — — —
Computer Network	DLX-10	• —	• — •	• — —	— • —	— — — —	— • — •
Computer Network	DLX-320	• —	• — •	• — —	— • —	— — — —	— • — •
Concord Data Systems	Token/Net	— •	— • —	— • —	— • —	— — — —	• • • •
Contel Info Sys	ConTelNet	• •	• — —	— • —	— • —	— • — —	• • — —
Contel Info Sys	STAR-Eleven	• —	— — •	• — —	• — —	— — — —	• — — •
Convergent Systems	Local Resource Shar	• —	— — •	• — —	• — —	• • — —	• • • —
Corvus	Omninet	• —	• — —	• — —	— • —	— • — —	• • • •
Cromemco	C-Net	• —	• — —	• — —	— — —	— — — —	• • • •
Data General	XODIAC Network Bus	• —	— • —	— • —	— • —	• — — —	• • • •
Datapoint	ARCnet	• —	— • —	— • —	— • —	• • — —	• • • •
Davong Systems Inc	MultiLink	• —	— • —	— • —	— • —	— — — —	• • — —
DBS International	DBS-NET	• —	— • —	— • —	— • —	— • — —	• • • •
DESTEK Group	DESNET	• •	• — —	— • —	— • —	— — — —	• • • •
Develcon Elect Inc	Develnet	• —	— • —	— • —	— • —	— • — —	• — — —
Digital Equipment	DECdataway	• —	— — •	• — —	— • —	— — — •	— — — •
Digital Equipment	Ethernet	• —	• — —	— • —	— • —	• • — •	— • — •
Digital Microsystems	HiNet	• —	— — •	• — —	• — —	— — — •	• • • •
Doeltz Network Inc	Doeltz Network	• —	— — •	• — —	— — —	— — — —	— — — •
Gandalf Data	PACXNET	• •	— — •	— • —	— • —	• • — —	• — — •
Gateway Comm, Inc	G/Net	• —	• — —	— • —	— • —	• • — —	• • — —

Local Area Networks (LANs)

COMPANY	NETWORK	NETWORK TYPE		ACCESS METHOD		TRANSMISSION SPEED		CABLE LENGTH		GATEWAYS		APPLICATION AREA												
		Baseband	Broadband	Contention	Token Passing	Other	to 1M bps	to 2M bps	to 10M bps	over 10M bps	to 2000 ft	to 5000 ft	over 5000 ft	IBM SNA	X-25	X.25/SDLC	Other	Ethernet	General Business	Electronic Mail	Word Processing	Industrial	Other	
General Electric	GENet	—	•	•	—	—	•	—	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Gould	MODBUS	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Gould	MODWAY	•	•	—	•	•	•	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Hewlett-Packard	Interface Bus	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Hewlett-Packard	LAN 9000	•	—	•	—	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Hewlett-Packard	SRM	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Honeywell	TDC 3000	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Iconix Corp	Cinchnet	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Inforex, Inc	ULTRANET	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Intecom	LANmark	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Interactive Sys/3M	VIDEODATA	—	•	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Interactive Sys/3M	LAN/1	—	•	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Interlan	NET/PLUS	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Int'l Bus Mach (IBM)	8100 Loop	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Int'l Bus Mach (IBM)	Series/1 Ring	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Int'l Bus Mach (IBM)	PC Cluster	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Intertec Data Systems	CompuStar	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Lanier	LBS 5000	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Logica	Polynet	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
M/A-COM DCC	Infobus	—	•	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
M/A-COM Linkabit	IDX-3000	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Micom Systems	INSTANET	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Molecular Company	SuperMicro Multiuser	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Morrow	MORROW NETWORK	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
NBI, Inc	NBINET	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
NCR Corp	Decision Net	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
NCR Corp	MIRLAN	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Nestar Systems	PLAN 4000 Series	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Network Systems	HYPERchannel	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Network Systems	HYPERbus	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
North Star Computer	North Net	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Novell Data Systems	ShareNet	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Orange Compuco	ULCnet	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Orchid Technology	PCnet/PCnet Plus	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Percom Data Corp	PerComNet	—	•	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Perq Systems	Ethernet	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Pragmatronics	TIENET	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Prime Computer	RINGNET	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Prolink	Proloop	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Proteon	proNET	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Racal-Milgo	PLANET	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Santa Clara Systems	PCnet	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Scientific Data	SDSNET	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Sidereal Corp	MIC-LINK	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Sperry	SHINFADS	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Starnet Data Systems	Starnet II	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Stratus Computer	StrataLINK	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Syntech	MARS/NET	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Syntrex	SYNNet	•	—	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•
Sytek	LocalNet 20	—	•	—	•	•	—	—	•	—	—	—	—	—	—	—	—	—	—	—	—	—	—	•

Local Area Networks (LANs)

COMPANY	NETWORK	NETWORK TYPE		ACCESS METHOD			TRANSMISSION SPEED			CABLE LENGTH		GATEWAYS		APPLICATION AREA										
		Baseband	Broadband	Contention	Token Passing	Other	to 1M bps	to 2M bps	to 10M bps	over 10M bps	to 200 ft	to 5000 ft	over 5000 ft	IBM SNA/SDLC	X-25	Xerox Ethernet	Other	Generals Business	Electronic Mail	Word Processing	Industrial	Other		
Sytek	LocalNet 40	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
Tandy Corp	ARCnet	●—	●—	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
Teltone	DCS-2/2S Data Carrier	●—	●—	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
3COM	Ethernet/UNET	●—	●—	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
3COM	Etherlink	●—	●—	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
Ungermann-Bass	Net/One Baseband	●—	●—	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
Ungermann-Bass	Net/One Broadband	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
Ungermann-Bass	Fiber Optic Net/One	●—	●—	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
Ungermann-Bass	Net/One Thin Coax	●—	●—	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
Valmet	Millway	●—	●—	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
Vector Graphics	LINC	●—	●—	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
Wang Laboratories	Wangnet	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
Xerox	Ethernet	●—	●—	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
Xyplex, Inc	XYPLEX System	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
Zilog	UNET	●—	●—	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●
Ztel	AXIS	●—	●—	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●	—●

LOCAL AREA NETWORKS FEATURES

Initially, the concept of local area networking became familiar as a data communication scheme dependent on private lines, public switched service, and private switched systems accommodating specific systems and application environments. The local networking concept evolved to include a general-purpose, multivendor/system environment that provides interconnection of a variety of terminals and computers within one building or in several buildings in close physical proximity. Significantly, modern local networking systems are usually characterized by bandwidths of consecutive frequencies and high data rates of several million bits per second. These systems use coaxial cable, twisted-pair wire, or fiber optic transmission media. The baseband/broadband LAN development is now centered on the standards developed by the IEEE-802 Standards Committee. The ISO Committee on Open Systems Interconnection (OSI) has begun work on incorporating the IEEE-802 Committee LAN standards into the OSI model.

In the past two years, a subset of LAN systems has evolved—the Personal Computer Network (PCN). The PCN is a natural outgrowth from the automated office environment dependent on desktop personal computers for data and word processing applications. Therefore, personal computer users requiring low-to-moderate performance are looking to PCNs as a low-cost but effective networking solution. Many PCN configurations, for example, require support for no more than 6 personal computers. The key requirement for PCNs is resource sharing: letter-quality printer and high-capacity disk systems. File/print and communication servers can provide shared access for personal computers/workstations in a PCN environment. Electronic Mail and Electronic Files are often enhanced application features. Usually, twisted-pair or coaxial cable supports up to 1M-bps data rates (some are 2.5M bps or higher), and typical price ranges for a single node-to-network interface is from \$200 to \$600 per computer connection. Many new entries to this LAN survey are PCNs.

The IEEE-802 Committee has been the force behind the development of a family of LAN standards. Eight subcommittees are now working on proposed standards that define physical and link layers as defined by the ISO Open Systems Interconnection (OSI) reference model.

The IEEE-802.1 subcommittee is charged with establishing the relationship among the IEEE-802 standards and the OSI reference model. This group is working with OSI committee groups that are incorporating the LAN standard into the OSI model. It now appears that the IEEE standards will probably be identical to those adopted for the OSI model.

The IEEE-802.2 subcommittee has submitted a draft proposal (DP) for a standard to provide a common logical link control protocol. It is now in the first stages of the voting required to establish the DP as an IEEE standard. The voting should be completed by the end of April 1984.

The IEEE-802.3 proposal is now the standard for a **baseband bus LAN** using **CSMA/CD** as the access control method for the physical layer. Four transmission rates are endorsed—1M, 5M, 10M, and 20M—although the adopted standard is for 10M-bps transmission rate. The committee is now evaluating a proposal for a 1M-bps version of the 802.3 LAN.

The IEEE-802.4 proposal is now a standard for a **baseband or broadband bus LAN** using **token passing** as the access control method for the physical layer. The standard is now being revised to overcome problems implementers have encountered in some of the specifications. The revision is loosening up some of the broadband specifications, changing the differential Manchester coding scheme to straight Manchester encoding, and incorporating some appendix material into the main body of the report. Transmission rates are 1M, 5M, and 10M bps.

The IEEE-802.5 proposal is for a **baseband ring LAN** using **token passing** as the access control method for the physical layer. This standard has reached the DP stage, and ballots are going out in April for final voting. The voting should be completed by the summer. It provides for using 100-ohm twisted-pair cable and data transmission rates of 1M and 4M bps.

The IEEE-802.6 subcommittee is working on proposals for metropolitan area networks. Proposals have been made for TDMA (time division multiple access), polling, and cellular Ethernet networks. The company that submitted the TDMA proposal went out of business, and no one else has submitted another TDMA proposal. The polling proposal will probably reach the DP stage by the end of 1984.

Local Area Networks (LANs)

The IEEE has two more subcommittees that operate as technical advisors on broadband LANs (802.7) and fiber optic LANs (802.8) to the other subcommittees.

The PCN vendors, however, 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 OSI guidelines (7-layer computer-network architecture) in their network systems' design in anticipation of a need for standards.

The IEEE-802.3, 802.4, and 802.5 subcommittees are all considering 1M-bps versions of their respective standards. Once VLSI chips are available to implement the protocols, the IEEE-802 LAN standards will be appropriate to implement PCNs.

Another important development in the past year is the increase in the use of fiber optic cable in LANs. Ungermann-Bass now offers a total fiber optic version of its Net/One LAN. The primary use of fiber optic cable, however, is to extend a coaxial cable LAN or to interconnect coaxial cable LANs in separate buildings. A number of fiber optic LANs are in fact installed, but vendors appear reluctant to offer them as standard products.

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 transmission, a device "listens" to determine if another device is "talking" (sending a data stream). The device waits until the line is clear before transmitting its data. During transmission, a device "listens" for collision of data streams from 2 or more local net users. When a collision 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. One way that token bus differs from token ring is that the token bus passes the token to the device with the next address no matter where it is physically located. For token ring, the token is passed to its physical neighbor.

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 using the CSMA access scheme. 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.

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 the boundary from local network 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

■ **A.B. DICK COMPANY**

5700 West Touhy Avenue, Chicago, IL 60648 • 312-763-1900.

□ **The Loop**

Type • baseband network system in 2 versions: using either CSMA/CD or token passing ring protocol; interconnects multiple workstations and printers using 2-conductor cable; modem can be used to connect remote locations with local computers via telephone lines.

Transmission Speed • bisynchronous data rates up to 0.25M bps for contention and 1M bps for token passing access schemes.

Cable Length • stations from 8 to 4,000 feet apart in loop formation.

Application • word/text/data processing in automated office environment using A.B. Dick Magna III word and text processing package • electronic mail applications.

Configuration • minimum loop configuration supports 2 to 20 workstations; large practical system supports 50 workstations; maximum loop supports up to 255 workstations • basic Magna III workstation consists of keyboard, 20-line CRT, and 55-cps daisywheel printer; system uses 5.25-inch double-sided, double-density diskettes, each with capacity of 273K characters • expanded loop accommodates mass storage devices, data processing terminals, and OCR.

Interfacing • through workstation.

Gateways • Communication Concentrators open channel to outside environment for each station on Loop.

First Announced • April 1981 (Magna Loop CSMA/CD).

Systems Installed • about 1,000 networks.

Pricing • purchase price of a minimum configuration is \$13,000; includes 2 workstations, each priced at \$2,700 (including hardware interface to network), a printer at \$2,700, and cabling.

■ **ALSPA COMPUTER, INC**

477 Division Street, Campbell, CA 95008 • 408-370-3000.

□ **ALSPA-NET Local Area Network**

Type • baseband network using bus topology, twisted-pair bus cable, and CSMA/CD access protocol.

Transmission Speed • 800K bps.

Cable Length • 2,000 feet.

Application • general business applications such as electronic mail that require resource sharing; resource sharing facilities include dedicated batch processing at network nodes, print spooling, and disk sharing using direct addressing without going through intermediate system • TurboDOS operating system

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compatible with CP/M and MP/M; provides password security and privilege level operations.

Configuration • networks up to 255 ALSPA computers and workstations; any computer can be designated as a batch processor accepting processing tasks; a network master operates as the network controller, managing transmissions • TurboDOS, the network operating system, was written for Z80 and is compatible with CP/M and MP/M; thus, application programs that run under CP/M or MP/M will run under TurboDOS • interconnects ALSPA-NET MC Series, ALSPA-NET CN Master Computer, 4001 Network computers, and WS4004 Intelligent workstations; MC master computers include hard disks; CN4001 Network Computers can attach floppy or hard disk drivers with/without tape backup • ACI, Kaypro, and Eagle computers can also interface to ALSPA-NET as slave nodes.

Interfacing • through RS-422 network port on CN4001 Network Computer, MC Series Master Computer, and WS4004 Network workstation; through Network Interface Kit for ACI, Eagle, and Kaypro computers.

Gateways • standard communication links.

First Announced • ZERO NET—November 1982; ALSPA-NET—March 1983.

Systems Installed • 550 networks with 2,585 nodes.

Pricing • purchase price is \$4,495 (MC4010), \$5,495 (MC4020), \$6,495 (MC4035), \$7,495 (MC4050) for master computer with 10M/20M/35M/50M-byte hard disk, TurboDOS operating system, and electronic mail; \$1,995 for WS4004 Workstation based on Z80A with 64K-byte memory; \$1,195 for CN4001 Network Computer based on Z80A with 64K-byte memory; \$595 for Network Interface Kit for ACI, Eagle, or Kaypro computer; \$750 for TurboDOS operating system; and \$495 for Business Graphics software.

■ ALTOS COMPUTER SYSTEMS

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

□ WorkNet

Type • baseband network with bus topology using CSMA/CA (Collision Avoidance) access protocol • connects UNIX-/XENIX-based Altos computers in local/distributed network configurations.

Transmission Speed • 800K bps on RS-422 4-wire twisted-pair link; 10M bps over Ethernet coaxial cable.

Cable Length • 500 feet on twisted-pair link; 1500 feet on Ethernet cable.

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 • UNIX oriented and can run same applications as UNIX.

Configuration • up to 30 16-bit 8086 microprocessor-based Altos 586 and 986 Series (XENIX) computer systems; intelligent I/O controller support • can use Altos 586 and 986 as print, file, or communication server; software makes disks on network appear as one file hierarchy; RUN command allows user to run a program on a second or third processor • each 586 system supports up to 5 user terminals on RS-232C channels when connected to network, and 986 supports 9 terminals when connected to network.

Interfacing • RS-232C serial channels to local terminals; RS-422 computer interface to WorkNet.

Gateways • to IBM networks through IBM 3270 and 3780 emulation; X.25 (second quarter 1984).

First Announced • August 1983, successor to Altos-Net announced in May 1983; Altos-Net no longer marketed.

Systems Installed • over 300 networks.

Pricing • purchase price is \$250 per network for network software regardless of number of nodes implemented; \$9,000 for minimum 586 with 512K-byte memory, Z80-controlled terminal controller with 6 ports, 20M-byte Winchester disk, RS-422 port,

port for second hard disk, slot for additional 512K-byte memory, Multibus slot, and slot for 4-port expansion.

■ **AMDAX CORPORATION (acquired by Ungerman-Bass February 1983)**

■ AT&T TELETYPE CORPORATION

5555 Touhy Avenue, Skokie, IL 60077 • 312-982-2000.

□ Teletype 4540 Local Connect

Type • baseband 2-pair twisted wire network using selector channel transmission access method; can use coaxial cable with optional adapter • controller operates with processors supporting IBM 3272-2/3274-1B/3274-21B-compatible controllers.

Transmission Speed • 200K bytes per second parallel.

Cable Length • printers located up to 2,000 feet from controller; displays up to a mile from controller.

Application • data processing in general or specialized business/office environments.

Configuration • 4540 Local Connect processors support IBM-compatible controllers; can support up to 32 devices, 8 of which can be printers; CRT displays can be located 1 mile from controller; printers, up to 2,000 feet away; stations can also be located up to 2,000 feet away on user's coaxial cable with optional coaxial adapter • dual twisted-pair wire and coaxial cables can be intermixed on same controller.

Interfacing • cluster of terminals to many host processors are connected via byte multiplexer, selector, or block multiplexer channel.

Gateways • none currently; remote controllers with SNA/SDLC access planned.

First Announced • June 1978.

Systems Installed • approximately 125,000 display units installed in networks.

Pricing • configuration pricing for a cluster with 5 displays, controller, and a 300-lpm quiet printer is \$22,600 (no cabling included); a cluster with 14 displays/keyboard, controller, and a 300-cps printer is \$49,900.

■ AMTEL SYSTEMS CORPORATION

1293 Anvilwood Avenue, Sunnyvale, CA 94086 • 408-734-5092.

□ Messenger

Type • automated message system using existing power lines or cable; remote facilities can use modems or dedicated cabling and optional single- or multiple-line auto-dialing • utilizes distribution transmitter to inject low-power radio frequency signal for message delivery access through terminal channel • can be used with existing switchboard or message center to provide answering service • TWX/TLX option supports nucleus of distributed processing system for receiving incoming or preparing/transmitting outgoing TWX and Telex messages from/into various networks; automatic message routing from 1 network to another or to multiple destinations; includes code and speed conversion • provides Glass TTY/Dumb Terminal and IBM 2780/3780 emulation.

Transmission Speed • 300 bps on local CPU I/O channel • 50 bps over TLX/TWX link; 110 bps over DDD link; up to 1200 bps over IBM 2780/3780 bisynchronous link • up to 9600-bps aggregate data rate.

Cable Length • up to 1,000 feet.

Application • supports communication for message entry, electronic filing, transmission/retrieval of printed communication, phone messages, memos, announcements, and answering service; generates instant printouts of messages on individual desktop printer.

Configuration • system consists of central processor with disk file supporting up to 16 message entry terminals; optional system printer and page printer; optional TWX/TLX gateway via Electronic Mail Processor • 3 types of systems: MESSENGER I,

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MESSENGER II Level 1, and MESSENGER II, Level 2 • MESSENGER I supports up to 250 stations (devices) and 16 terminal channels; provides message transmission rate at 200 per hour for 1120-character messages (plus header), handles up to 250 directory entries, and stores up to 500 messages; the CPU provides 64K-byte memory, 256K-byte diskette storage, and 2 RS-232C input/output (I/O) ports; can support optional system printer • MESSENGER II-1 supports up to 500 stations and 16 terminal channels; provides message transfer rate of 1K per hour, handles up to 2K directory entries, and stores up to 10K messages; the CPU provides 320K-byte memory, 5M-byte disk storage, 2 RS-232C I/O ports; can support optional system printer and page printer and TWX/TLX module • MESSENGER II-2 supports up to 2K stations and 16 terminal channels; provides a message transfer rate of 1K per hour, handles up to 8K directory entries, and stores up to 30K messages; its CPU provides 320K-byte memory, up to 18M-byte disk storage, 6 RS-232C I/O channels; supports optional system printer, page printer, and TWX/TLX module • TWX/TLX configuration supports Electronic Mail Processor providing up to 32 ports for environments in any mix of TLX, TLX/TWX, DDD, IBM 2780/3780 bisynchronous communication; the E-Mail Processor provides 16K- or 48K-byte memory, supports messages up to 10K characters, stores up to 3M characters for MESSENGER II-1 (500 stations) configuration and up to 9M characters for MESSENGER II-2 (2K stations); handles up to 2K directory entries.

Interfacing • RS-232C channels on CPU; AC powerline or RS-232C/ASCII interface to printers; 1200-bps modem to remote message entry terminals • supports Glass TTY/Dumb Terminal Emulation and IBM 2780/3780 Emulation.

Gateways • TWX/TLX from MESSENGER II systems only; networks include WU and WUI (Western Union International), IIT (Worldcom and USTS), TRT, and RCA.

First Announced • 1978.

Systems Installed • 60.

Pricing • typical purchase price is \$12,000 for MESSENGER I system, \$25,000 for MESSENGER II-1, and \$35,000 for MESSENGER II-2 system.

■ APPLITEK CORPORATION

107 Audubon Road, Wakefield, MA 01880 • 617-246-4500.

□ UniLAN

Type • media-independent network which can run on baseband, broadband, or fiber optic cable with appropriate media access unit (MAU); uses bus or tree topology and UniLINK access method; UniLINK is proprietary access scheme that can operate like CSMA/CD when network traffic consists of primarily short, bursty, asynchronous messages but guarantees access like token passing access method when synchronous devices or computers are added to network.

Transmission Speed • 10M bps.

Cable Length • 30 miles end-to-end for broadband network; uses dual CATV cable.

Application • generic network that can interconnect all types of computers, terminals, interactive graphics workstations, and word processors in general business or industrial environment.

Configuration • can interconnect up to 40,000 user devices on broadband network and up to 1,000 on baseband coaxial or fiber optic cable; network management distributed among NI10/T Interface Units; management and diagnostic functions available from any NI10/T with an attached interactive terminal.

Interfacing • through NI10/T Interface Unit which implements UniLINK access protocol and provides 8 ports to connect user devices to the network; user port interfaces are standard RS-232C or RS-449 interfaces or parallel interfaces like the Multibus or high-speed computer interfaces • NI10/T based on Multibus Architecture; includes 2 modules for network control and processing and a module for device interface functions; contains a single diskette system for storing system parameters and programs and for downline loading of software updates • requires media access unit (MAU) to connect NI10/T to cable; Applitek provides RF modem to connect to broadband network.

Gateways • none; under development.

First Announced • November 1983.

Systems Installed • deliveries began in April 1984.

Pricing • purchase price is \$150,000 for network for 200 terminals, 25 NI10/Ts, and software.

■ APOLLO COMPUTER, INC

15 Elizabeth Drive, Chelmsford, MA 01824 • 617-256-6600.

□ DOMAIN (Distributed Operating Multi-Access Interactive Network)

Type • baseband network using coaxial cable in ring topology for interactive, user-dedicated computer systems (nodes) with resource sharing capability; token passing protocol.

Transmission Speed • 12M bps.

Cable Length • 3,000 feet node-to-node.

Application • scientific, engineering, research, finance, CAD/CAM, text processing, and transaction processing environments; multiprogram applications.

Configuration • single-user node includes a 32-bit processor • peripherals include printers, 300M-byte disks, and magnetic tape devices • minimum network consists of 2 or more computational nodes; computational node includes a processor with 512K to 3.5M bytes of memory, I/O subsystem, and display system; a range of disks from 34M- to 158M-byte capacities are connected to the processor I/O system • a peripheral node adapter (PNA) interfaces disks to the network so they can be shared by multiple computational nodes • configuration can range from 1 node to several hundred nodes per ring • Multibus DOMAIN server processor supports Intel Multibus-compatible peripherals.

Interfacing • through block multiplexer channel on processor in computational node.

Gateways • to other DOMAIN networks • IBM 3270 link and HASP to IBM SNA, X.25 gateways, Ethernet gateway.

First Announced • November 1980.

Systems Installed • 800.

Pricing • purchase price of a minimum 2-node configuration is \$40,300; includes 1 node with 34M-byte disk, the other node shares the disk; diskette backup, operating software license, and language software license (FORTRAN, Pascal, "C") • purchase price of add-on node with software is \$15,400 • quantity discounts available for larger configurations.

■ AST RESEARCH, INC

2121 Alton Avenue, Irvine, CA 92714 • 714-863-1333.

□ PCnet

Type • baseband local area network using CSMA/CD access protocol for networking up to 238 IBM PCs and/or PC/XTs running PC-DOS Version 2.0 or 2.1 • 100% software compatible with PCnet II (uses Orchid PCnet technology).

Transmission Speed • 800K bps.

Cable Length • 5,000 feet maximum using RG-11/U 75-ohm coaxial cable; 2,000 feet maximum using RS-59B/U 75-ohm coaxial cable.

Application • sharing disk drives and printers attached to shared PCs with user PCs that can access the resources; shared PC can also be used as workstation • provides PC-to-PC and network broadcast Datagram transmissions.

Configuration • up to 238 PCs and or XTs running PC-DOS Version 2.0 or 2.1 can be interconnected on a network; IBM PC or XT must include a floppy diskette drive, 128K-byte memory, and an expansion slot for AST-PCnet controller card • Model P-001 AST-PCnet includes 1 network controller card, 1 AST-PCnet software package with AST Super Pak (Super Drive and Super Spool), 1 BNC "T" connector, 1 AST-PCnet User's Manual, and 1 AST Super Pak Manual • Model PC-002 AST-PCnet Starter Kit (required for initial installation) includes 2 network controller cards, 1 AST-PCnet software package with AST Super Pak, 1 50-foot RG-59B/U coaxial cable, 2 BNC "T" connectors, 2 BNC

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75-ohm terminators, 2 AST-PCnet User's Manuals, and 2 AST Super Pak Manuals.

Interfacing • direct PC-to-bus coupling using BNC "T" connector; requires AST-PCnet network controller card in PC expansion slot.

Gateways • AST-3780 on a shared PC or XT allows other PCs and XTs on network to transfer files to/from an IBM host system; PCnet-to-PCnet (BSC) and AST-3270 (BSC and SNA/SDLC) gateways scheduled for second quarter 1984; sharing of asynchronous modem on shared PC or XT scheduled for second quarter 1984.

First Announced • May 1983.

Systems Installed • 15,000 network connections.

Pricing • purchase price is \$695 for Model PC-001 for connecting a PC or XT to the network and \$1,490 for a Model PC-002 starter kit for 2 PCs or XTs.

□ PCnet II

Type • baseband local area network using CSMA/CA (collision avoidance) access protocol for networking up to 160 IBM PCs and/or XTs; CA technique provides a randomized back-off when line becomes idle; random time-out interval is adjusted as load on network increases • 100% software compatible with AST-PCnet.

Transmission Speed • 800K bps.

Cable Length • up to 2,500 feet maximum of twisted-pair wire trunk cable using 4 repeaters; up to 500 feet between repeaters, and up to 32 PCs can connect to a 50-foot segment.

Application • sharing disk drives and printers located on shared PCs or XTs that can also function as workstations; user PCs or XTs can access resources on remote shared PCs or XTs using standard PC-DOS commands • provides PC-to-PC and network broadcast Datagram transmissions • Remote Execution feature allows remote processing at a shared PC or XT; includes compiling, database sorting, and AST-3780 RJE mainframe links.

Configuration • up to 160 PCs or XTs on up to 2,500 feet of cable with 4 repeaters; IBM PC or XT connected to network must include a diskette drive, 128K-byte memory, and an expansion slot for the AST-PCnet II controller card • Model NTP-001 includes AST-PCnet II controller card, 15-foot drop cable, trunk cable tap box, AST-PCnet II User's Manual, and AST Super Pak Manual • Model NTP-002 Starter Kit (required for initial installation) includes 2 network controller cards, AST-PCnet II software package with AST Super Pak (Super Drive and Super Spool), 2 15-foot drop cables with RJ-11 connectors, 2 trunk cable tap boxes, 2 AST-PCnet II User's Manuals, Installation Manual, Technical Reference Manual, and 2 AST Super Pak Manuals.

Interfacing • IBM PC bus; requires AST-PCnet II network controller board in expansion slot of IBM PC or XT.

Gateways • AST-3780 on a shared PC or XT allows PCs and XTs on the network to transfer files to/from IBM host system • PCnet-to-PCnet (BSC) and AST-3270 (BSC and SNA/SDLC) gateways scheduled for second quarter 1984; sharing of asynchronous modem or shared PC or XT scheduled for second quarter 1984.

First Announced • March 1984.

Systems Installed • still in Beta test; none delivered.

Pricing • purchase price is \$595 for Model NTP-001 board that interfaces PC or XT to PCnet II, \$1,290 for Model NTP-002 AST-PCnet II Starter Kit, and \$695 for Model NTP-001R AST-PCnet II Repeater.

■ BRAEGEN, THE BRAEGEN CORPORATION

525 Los Coches Street, Milpitas, CA 95035 • 408-945-1900.

□ ELAN

Type • baseband network using bus topology, IBM 3270 RG62A coaxial cable, and CSMA/CA (collision avoidance) access method.

Transmission Speed • 1.5M bps.

Cable Length • up to 10,000 feet without repeaters.

Application • IBM 3270 environment applications • controller/terminal family allows connection of up to 60 devices on a single cable (LAN); controller can support 2 LANs (120 devices; reduces number of cables; adds greater mainframe access; allows shared resources (channel interfaces to host, printers, and disk drives); provides local personal computing in addition to host processing.

Configuration • up to 60 user devices can communicate with single 8500 Series controller which can connect to 2 LANs for total of 120 devices; up to 3 additional controllers can be added to each LAN to serve individual networks or to link the system with other host computers; these controllers in turn can connect to 2 LANs to expand network configurations • 8500 controller requires only host mainframe computing capability; can support up to 4 mainframe hosts simultaneously; 8510 Cluster Controller also supports local personal computing in addition to host processing; 8510 PC Remote Controller distributes computing power to 8 authorized terminals simultaneously • 8510 can serve as IBM 3274 control unit, provide personal computing capability, and support access by up to 16 terminals concurrently; also provides SNA support • 8520 terminal family compatible with IBM 3278 Models 2 and 5 or with Models 2, 3, and 4; 8500 printers compatible with IBM 3286 Model 2, 3287 Model 2, 3262 Model 13, and 3203 Model 5.

Interfacing • included in the current 8500 Series; interface for foreign devices planned.

Gateways • to IBM SNA hosts as 3274.

First Announced • August 1983.

Systems Installed • deliveries began in October 1983; about 100 systems (less than 1,000 nodes with node being a controller or user device).

Pricing • purchase price is \$34,300 for an 8500 System with 8 Model 8522 displays (equivalent to IBM 3278 Models 2 and 5), \$4,800 for Model 8563 printer (comparable to 3286-2), \$9,900 for a 400-lpm printer, and \$27,900 for 1200-lpm printer.

■ BRIDGE COMMUNICATIONS, INC

10440 Bubb Road, Cupertino, CA 95014 • 408-446-2981.

□ Ethernet

Type • baseband network using CSMA/CD access control scheme; transmits over Ethernet coaxial cable.

Transmission Speed • 10M bps.

Cable Length • 500 meters (1,500 feet) between repeaters; 2,500 meters (7,500 feet) end-to-end.

Application • Bridge markets high-performance communication processors which provide bridges between devices and networks; Communication Server/1 (CS/1) and CS/100 connect devices with standard RS-232C/-422 interfaces to Ethernet networks; Gateway Server/1 (GS/1) interconnects Ethernet networks with X.25 networks; and Gateway Server/3 (GS/3) interconnects up to 8 Ethernet networks over a variety of media • suitable for use by OEMs, system integrators, and end users • also provides software development tools • GS/2 is under development to connect Ethernet to the Sytek broadband LocalNet network.

Configuration • up to 100 stations per cable segment; up to 1,024 stations per network • CS/1-A is a serial communication server for up to 32 low-speed ports to 19.2K bps or 16 medium-speed ports to 64K bps; runs under CS/1 operating system that implements Xerox Network System (XNS) protocols and device drivers • CS/1-488 is an IEEE-488-compatible communication server • CS/1-V is Versatec printer-/plotter-compatible communication server • CS/100 is an asynchronous communication server for up to 10 RS-232C asynchronous ports • GS/1 is an Ethernet to X.25 Gateway Server that can provide up to 4 RS-232 synchronous ports with data rates up to 19.2K bps or 4 RS-422 ports with data rates up to 64K bps • GS/3 is an Ethernet point-to-point gateway that can provide up to 8 RS-232 synchronous ports with data rates up to 19.2K bps or up to 8 RS-422 synchronous ports with data rates up to 64K bps.

Interfacing • through Ethernet Transceiver; user ports are

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RS-232C, RS-422/449, IEEE-488, or Versatec printer-/plotter-compatible interface.

Gateways • X.25, Sytek LocalNet (under development).

First Announced • 1982.

Systems Installed • 480 servers and gateways.

Pricing • purchase price is \$9,900 for CS/1-A Serial Asynchronous Communications Server with 8 RS-232C or 4 RS-422 asynchronous ports; \$1,900 for 8-port expansion for CS/1-A; \$11,100 for CS/1-488 IEEE-488-Compatible Communication Server with an IEEE-488 Bus Interface module; \$2,500 for an IEEE-488 Bus Interface Expansion Module; \$11,300 for CS/1-V Versatec Printer-/Plotter-Compatible Communication Server for one device (expandable to 4 devices); \$3,300 for Versatec "Green Sheet" Interface; \$3,900 for CS/100 Asynchronous Communication Server with 4 RS-232C asynchronous ports, expandable to 10 ports; \$1,000 for 6-port expansion for CS/100; \$5,100 for CS/100-488 Communication Server/100 with an IEEE-488 Bus Interface Module; \$10,500 for GS/1 Ethernet to X.25 Gateway Server with 2 synchronous RS-232C or RS-422 ports, expandable to 4 ports; \$1,900 for 2 RS-232C or RS-422 expansion ports for GS/1; \$9,900 for GS/3 Ethernet Point-to-Point Gateway with 2 RS-232C or RS-422 ports expandable to 8 communication lines for internetworking Ethernets; and \$1,900 for 2-port expansion for GS/3 • first-year license fee is \$100 for CS/1 or CS/100 operating system, and \$100 for one-year renewal; \$1,500 for SW/2-ICS to interconnect Ethernets via X.25 with \$250 for one-year renewal; \$2,000 for SW/2-CS which permits Ethernet-attached devices to access X.25 resources with \$250 one-year renewal; \$150 for SW/3 for point-to-point synchronous communication between Ethernets with \$150 for one-year renewal.

■ CODENOLL TECHNOLOGY

1086 North Broadway, Yonkers, NY 10701 • 914-965-6300.

□ Codenet

Type • baseband Ethernet-compatible fiber optic LAN; uses star topology and CSMA/CD access control scheme • many other networks can be configured using other Codenoll fiber optic products.

Transmission Speed • 10M bps.

Cable Length • distance between nodes is function of number of nodes on network; about 3 miles between nodes on network with 2 nodes down to 0.75 miles between nodes on network with 32 nodes.

Application • can operate as general-purpose Ethernet LAN in environments that have high levels of electrical interference; can extend coaxial cable Ethernet LAN; can be used to interconnect buildings wired with coaxial cable Ethernet LANs • components also available for sale to OEMs.

Configuration • consists of Codenet 2020 Transceivers, Codestar Passive Fiber Optic Couplers, and Codenet Repeaters • Codenet 2020 Transceiver required at each node to connect node to the fiber optic cable • Codestar Passive Fiber Optic Coupler interconnects nodes in LANs with more than 2 nodes • usually a Codenet Repeater will be used between 2 Codestar Couplers; Repeaters are available for fiber-to-fiber, coax-to-fiber, and coax-to-coax connections • a Codebeam-20 using a Line-of-Sight Light Beam can be used to interconnect Codestar couplers or nodes located in separate buildings up to 0.6 miles apart without using cable • supports up to 1,024 Ethernet nodes which can be connected over area covering up to 3 square miles.

Interfacing • to fiber optic cable through Codenet 2020 Transceiver; user devices connect to transceiver using standard Ethernet interfaces with no hardware or software changes.

Gateways • none.

First Announced • September 1982 (first Codenet 2020 Transceiver).

Systems Installed • undisclosed.

Pricing • purchase price is \$1,200 for Codenet-2020R Transceiver and \$845 (4-port)/\$1,545 (8-port)/\$2,365

(16-port)/\$3,995 (32-port) for the Codestar Passive Fiber Optic Coupler • purchase price is \$400 for Codenet-2020S chip sets for OEMs buying in quantities of 1,000.

■ CODEX, MOTOROLA INC INFORMATION SYSTEMS GROUP

20 Cabot Boulevard, Mansfield, MA 02048 • 617-364-2000.

□ Codex LAN

Type • initially, Codex will operate as a reseller of the Ungermann-Bass Net/One baseband and broadband versions • Net/One is compatible with the Ethernet specification • network access uses the CSMA/CD access control scheme • baseband version provides one channel using a bus topology; broadband version provides 5 channels on a coaxial, midsplit, or high-split single cable or on a dual cable.

Transmission Speed • 10M bps (baseband) and 5M bps per channel (broadband).

Cable Length • 1,500 feet per segment and up to 7,500 feet using repeaters on baseband network, and up to 50,000 feet on broadband network using standard CATV cable.

Application • general-purpose LAN appropriate for any application: automated office, industrial plants, manufacturing, and resource sharing among personal computers.

Configuration • up to 100 taps for 4001 and 4002 Entryway devices on each baseband cable segment; up to 1,024 Entryways per network • up to 300 Entryways per broadband channel with up to 24 ports per Entryway for total of 4,200 user devices per channel; 5 channels can support up to 36,000 user devices • Network Operating System Software (NOSS) provides virtual circuit support for devices connected to network and file transfer facilities for intelligent devices • a Data Link Monitor collects and displays statistics and performance data on LAN operation.

Interfacing • through intelligent Entryway interface unit: 4002 Entryway provides up to 6 ports; 4001 Entryway provides up to 24 ports • transmission can be synchronous or asynchronous • the Entryway interfaces to cable through RF modem for broadband network and through baseband transceiver for baseband network • device interfaces include asynchronous, 8-bit parallel, extended RS-232C, synchronous (BSC), IEEE-488 interface bus, 32-bit parallel, DEC DR11-W/B, V.35, RS-449 ports.

Gateways • bridge unit can interconnect baseband and broadband LANs.

First Announced • February 1984.

Systems Installed • deliveries began in March 1984.

Pricing • purchase price of a network is about \$450 to \$750 per port.

■ COMPLEX SYSTEMS, INC

4930 Research Drive, Huntsville, AL 35805 • 205-830-4310.

□ XLAN

Type • baseband network using CSMA/CD access control scheme; uses shielded twisted-pair wire or cable for interconnection of personal computers or other devices.

Transmission Speed • 1M bps.

Cable Length • up to 3,000 feet using Belden 9271 or Alpha 9821 cable; up to 10,000 feet using Belden 9860 or Alpha 9820 cable.

Application • resource sharing and fast file transfers in general business environment.

Configuration • up to 64 nodes can interface to XLAN using a tap or a daisychain connection; a node can be a 4-port Station Mate or a 3-port Interface Processor • Station Mate provides 3 local ports, 1 remote port using the integral 103 modem with auto-dial and the XLAN interface; IP3 provides 2 RS-232C ports and XLAN interface; and IP3.P provides 2 RS-232C ports, a parallel printer port, and XLAN interface • maximum of 192 local devices can be connected to a network; networks can be interconnected through communication link.

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Interfacing • through XLAN interface (a baseband transceiver) integrated in the Station Mate or IP node.

Gateways • Station Mate can operate as a bridge to remote XLANs and to remote devices through teleprocessing links.

First Announced • June 1983.

Systems Installed • over 100 networks which implement over 1,000 nodes.

Pricing • purchase price is \$1,450 for Station Mate; \$1,290 for IP3; \$1,340 for IP3.P; \$2,995 for XLAN kit to connect up to 6 devices on 2 nodes with 2 Station Mates; \$2,695 for XLAN kit to connect up to 6 devices on 2 nodes with 2 IP3s; \$995 for TriMux Switching Concentrator with 3-channel switching multiplexer with speeds up to 9600 bps on each channel; \$1,045 for TriMux.P Switching Concentrator with 2 RS-232C ports and one parallel port; and \$1,625 for TriMux.M Switching Concentrator Modem that includes 3-channel (RS-232C) statistical multiplexer with integral 201B, 2400-bps modem.

■ COMPU CORP

1901 South Bundy Drive, Los Angeles, CA 90025 • 213-820-2503.

□ OmegaNet

Type • baseband network using coaxial cable and CSMA/CD access protocol to interconnect CompuCorp products to distributed resources • OmegaNet features networks interconnected by gateways • OmegaNet fits within the CompuCorp Network Architecture (CNA).

Transmission Speed • 500K bps.

Cable Length • up to 5,000 feet per network; repeaters are used to extend network; networks can be interconnected to attain any desired length.

Application • word processing, data processing for business accounting applications; electronic mail by second quarter 1983; network typically supports communication within a department and interconnecting to other departments.

Configuration • network typically supports up to 3 disk-based file processors, each of which supports 8 workstations sharing disk storage or diskette-based workstations, and 2 printers • theoretical network capacity is 240 workstations; practical limit is about 32; theoretical maximum number of networks is 1,000, thus, theoretically, OmegaNet can support an unlimited number of workstations; practical limit on networks supported is 16 • OmegaNet currently supports CompuCorp products such as the 600 and 700 Series workstations • 90% of communication is generally within network; only 10% of communication is across networks (internetworking).

Interfacing • 600 Series are interfaced to OmegaNet through Network Adapter (NA), which includes microprocessor, RS-232 port, and Network Communications Controller (NCC) located on PC board in the device; 700 Series interface is BNCC board (BCU Network Communications Controller) • to other OmegaNet networks through store-and-forward communication processor; 2 NAs and 2 modems provide gateway to another network.

Gateways • none currently.

First Announced • February 1982.

Systems Installed • over 25.

Pricing • purchase price of the interface connection for any standalone 600 or 700 Series workstation is \$845; diskless 745 workstation prices begin at \$4,495; purchase price of any 600 or 700 Series unit is \$4,500 to \$7,500, based on disk configuration; a file processor purchase price can range from \$10,500 to \$25,000 for a 5M-byte or 45M-byte storage capacity (including 17M-byte tape backup).

■ COMPUTER NETWORK CORPORATION (formerly ElectroSound Systems, Inc)

4030 North 27th Avenue, Phoenix, AZ 85017 • 602-274-3233.

□ Data Loop Exchange 10 (DLX-10)

Type • single 2-wire data loop; Time Division Multiplexed (TDM) with bit interleaving; port contention resolution and polling.

Transmission Speed • maximum aggregate data rates of 153K bps asynchronous and 614K bps synchronous.

Cable Length • up to 0.5 miles between stations.

Application • to integrate personal computers of analysts/engineers requiring intertransfer of data; electronic message exchange; factory and office automation environment; also applied in timesharing and communicating workstation environments • provides simultaneous access to 3 computer ports on the loop by up to 10 users and to other users on contention/pollled basis.

Configuration • DLX-10 is subset of larger DLX-320 system; both include 32 time slots (channels) on TDM loop • includes loop controller, up to 3 computer communication ports, and any number of users attached via RCI modules; only 10 can be active simultaneously; controller handles TDM transmissions; synchronizes RCI devices; detects and adjusts timing errors; uses 3MHz clock to maintain loop timing.

Interfacing • RCI (Remote Communication Interface) provides full-duplex RS-232C interface between terminal and data loop; operates in either originate or answer (polled) mode to any given time; user required to complete whatever ID procedure is required by computer program after a clear-to-send signal has been received • RCIs can connect terminals, printers, modems, minicomputers, and other devices to TDM channel on the loop and to computer communication ports or to other devices connected to RCIs • channels selected via thumbwheel dial on RCI, user can switch channels as desired; shared channels are used on contention basis.

Gateways • passive device; independent of protocols and data rate types.

First Announced • November 1981.

Systems Installed • undisclosed.

Pricing • purchase price of a minimum network is approximately \$10,000; includes controller, network interface units, and computer port interfaces.

□ Data Loop Exchanges 320 (DLX-320)

Type • single 2-wire data loop; Time Division Multiplexed (TDM) with bit interleaving; port contention resolution and polling.

Transmission Speed • maximum aggregate data rates of 153K bps asynchronous and 614K bps synchronous.

Cable Length • up to 0.5 miles between stations.

Application • to integrate personal computers of analysts/engineers requiring intertransfer of data; electronic message exchange; factory and office automation environment; also applied in timesharing and communicating workstation environments • provides simultaneous access to 3 computer ports on the loop by up to 32 users and to other users on contention/pollled status basis.

Configuration • supports up to 32 independent and secured communication channels; multiple DLX systems can be interconnected for users requiring more than 32 channels • subloop switch (SLS) can be used to partition loop into subloops; can isolate subloops from rest of loop if device on subloop exceeds error tolerance level; automatic isolation and return on line when error level becomes acceptable • controller handles TDM transmissions; synchronizes RCI devices; detects and adjusts timing errors; uses 3-MHz clock to maintain loop timing.

Interfacing • RCI (Remote Communications Interface) provides full-duplex RS-232C interface between terminal and data loop; the RCI operates in either originate or answer (polled) mode at any given time; user is required to complete whatever ID procedure is required by computer program after a clear-to-send signal has been received • RCIs can connect terminals, printers, modems, minicomputers, and other devices to TDM channel on the loop and to computer communication ports or to other devices connected to RCIs • channels selected via thumbwheel dial on RCI, user can switch channels as desired; shared channels are used on contention basis.

Gateways • passive device; independent of protocols and data rate types.

Local Area Networks (LANs)

First Announced • November 1981.

Systems Installed • undisclosed.

Pricing • purchase price of a DLX 320 controller supporting 32 TDM channels is approximately \$11,000; the CCI (Central Communication Interface) approximately \$2,000; and the RCI (Remote Communication Interface) approximately \$350.

■ CONCORD DATA SYSTEMS

303 Bear Hill Road, Waltham, MA 02154 • 617-890-1394.

□ Token/Net

Type • broadband network using CATV-compatible coaxial cable; implements token bus access method; turnkey system with frequency agile radio frequency (RF) modem conforming to IEEE-802.4 committee and ECMA modulation standards.

Transmission Speed • 5M bps.

Cable Length • unlimited, but probable practical desired maximum about 20 miles.

Application • office, manufacturing, engineering, business, campus environments, word processing, and electronic mail.

Configuration • network built around TIM (Token/Net Interface Module), which is available in 2 basic unit configurations: the TIM-200 and TIM-220; each TIM includes a frequency agile RF modem that operates at up to 5M bps on mid-split, single, or dual cable CATV channels; the ACCESS unit that facilitates token passing rotation rates and includes diagnostic functions; and the control unit, which provides 2 serial interface ports communicating at up to 1200 bps, 1 of which is used as console port, and provides such functions as session/transport and memory configuration and diagnostic testing controls • TIM-200 provides interface for up to 2 data devices (CRT terminals) • TIM-220 provides 2 ports in base unit and larger power supply to support 2 Quad Serial Port boards for up to 10 user interfaces; TIM-220 is used in office or engineering environments with cluster terminal/equipment configurations that share the modem, access unit, control unit among 10 users • Quad Serial Port Board is intelligent microprocessor; provides RS-232C/CCITT V.241/O for up to 4 data terminals operating synchronously (from 1200 to 19.2K bps) or asynchronously (75 to 19.2K bps).

Interfacing • through Token/Net Interface Module (TIM) available with RS-232C/CCITT V.24 interface devices via Quad Serial Port Board on TIM • console port can be a general user interface on control unit when not used for console in 2 versions: TIM-200 provides 2 ports for devices such as CRT terminals and TIM-220 provides 2 option boards and allows up to 10 user interfaces.

Gateways • none currently • X.25 LAPB interface developed for special product involved with General Motors Manufacturing Access Protocol (MAP).

First Announced • February 1983.

Systems Installed • several special GMMAC products that offer subset of Token/Net functions installed; Token/Net Beta sites only, commercially available summer 1984.

Pricing • purchase price is \$3,450 for 4-port TIM; \$5,000 for 10-port TIM; and \$995 for Quad Serial Port Board.

■ CONTEL INFORMATION SYSTEMS, INC

130 Steamboat Road, Great Neck, NY 11024 • 516-829-5900.

□ ConTelNet

Type • baseband/broadband packet-switched network, based on intelligent interface, using standard 75-ohm coaxial cable as bus; baseband system can be converted to broadband by substituting RF modem for transceiver; standard broadband system uses midsplit frequency converter on single bus but specially designed modem allows dual cable topology or conversion can optionally be done at BIU • access method consistent with IEEE-802.3 Committee recommendation; uses

CSMA/CD access method with protocol similar to HDLC as the link protocol • provides datagram service and HDLC asynchronous balanced mode service, called asynchronous per mode (APM).

Transmission Speed • 2M-/10M-bps data rate standard for both baseband and broadband systems; 1M- and 5M-bps data rates also available by retuning BIUs.

Cable Length • up to 5-mile radius or 10 miles end-to-end for 2M-bps system; up to 1-mile radius or 2 miles end-to-end for 10M-bps system • generally baseband used for short networks (up to 4,000 feet) and broadband for long ones.

Application • general-purpose network for interconnection of multivendor hosts and terminals and sharing of network controller, print servers, file servers, and gateways to Ethernet, PBX, and X.25 public data networks • modular flexible system that can be used for intraoffice communication for distributed processing applications with gateways to company PBX (future), X.25 public data networks (GTE Telenet now), and Ethernet LAN; users can share file servers, print servers, network control center, and gateways • future plans for voice interfaces, additional gateways/interfaces (IBM 3278 terminal support, second quarter 1984; satellite transmission, 1985; X.25 expansion, ongoing), and additional bus interface units (BIUs) • when economically feasible, will allow data, voice, and video information to share same network components: Dial in/Dial out, first quarter 1984; PBX, no announced schedule; and Digital T1 1984.

Configuration • up to 251 BIUs per network; 1,000 stations per segment on baseband or per channel on broadband network • single baseband channel can operate at 2M bps or 10M bps • broadband system uses 5 6-MHz standard CATV channels for transmission (T10 through T14) and 5 for reception (8 through 12); on single cable, can use midsplit organization with headend converter or no headend and distributed conversion in BIUs; on dual-cable system with headend, the 10 6-MHz channels can be organized to provide 5 data channels or can be organized with various combinations of distributed conversion at BIUs to implement up to 40 channels • each 2M-bps to 5M-bps broadband data channel uses 1 5-Hz CATV channel; each 10M-bps broadband data channel uses 2 5-MHz CATV channels making it possible to configure 1 10M-bps channel and 3 2M- to 5M-bps channels or 2 10M-bps channels and 1 2M- to 5M-bps channel • once initiated, a small network can run without a Network Control Center (NCC), but one is required for initiation or reconfiguration; Micro NCC is BIU-based system with some additional buffering to store status information and can handle network with up to 15 BIUs; Standard NCC is required on network more than 15 BIUs; it includes Micro NCC plus 16-bit minicomputer based on the Motorola 68000; only 1 required for any size network but can be duplicated for backup • baseband and broadband systems can be expanded using repeaters/amplifiers, but they are generally not recommended because they are expensive; baseband systems are generally relatively short while broadband systems are recommended for longer runs.

Interfacing • Bus Interface Unit (BIU); available in 4/8/12/16-port models for both baseband and broadband systems; user terminal interface is RS-232C serial port operating at 50 bps to 19.2K bps; 56K bps is optionally available; a 16-bit parallel port is available for interfacing to a mainframe or printer • a high-speed host computer interface is planned.

Gateways • through BIU to Ethernet, host computer, and GTE Telenet.

First Announced • August 1982.

Systems Installed • 25.

Pricing • purchase price for various baseband BIUs adjustable from 1M to 5M bps are \$2,250 for 4-port model, \$3,750 for 8-port model, \$5,250 for 12-port model, and \$6,750 for 16-port model; option to add 10M-bps transceiver to baseband BIU is \$1,500 • purchase prices for various broadband BIUs with RF modem that operate at 5M bps are \$250 more for model with comparable number of ports; option to increase broadband data rate to 10M bps is \$7,000; option for distributed headend is \$200 per BIU • purchase price is \$5,500 for Micro NCC, \$20,000 for standard NCC, and \$6,650 for single-cable centralized headend.

Local Area Networks (LANs)

■ CONTEL INFORMATION SYSTEMS, INC

4330 East-West Highway, #200, Bethesda, MD 20814 • 301-654-9120.

□ STAR-Eleven

Type • twisted-pair cable network • host/satellite star configuration with concurrent access to host resources via hardware record-locking (INTERLOCK) system • software is extension to Digital Equipment's RT-11 Operating System for PDP-11; designed to make RT-11 a multiuser system.

Transmission Speed • 300K to 1.2M bps.

Cable Length • up to 600 feet.

Application • multiuser/multiprocessing environment; real-time processing for university, hospital, and industrial control applications.

Configuration • PDP-11 or LSI-11 processors running multiuser STAR-Eleven operating system (extension of DEC single-user RT-11); completely RT-11 compatible • host supports up to 15 satellite computers, which share resources (disks, printers, tapes) on host; Shared-Eleven feature allows 4-user and 8-user satellite configuration; all satellites operate independently of each other and 1 user can access multiple satellites for multiple applications • host dedicated to satellite service can be any PDP-11 or LSI-11 processor with RT-11/FB (foreground/background) monitor configuration; foreground monitors satellite I/O; background is used as RT-11 workplace or to run STAR-Eleven CACHE software, which is required where 4 or more satellites are supported; host processor is not always assigned most powerful CPU in larger configurations (10 satellites or more), where host serves I/O requests only and is not used for processing (11/04 host can support 11/34 satellite configuration) • independent computer satellite running unmodified RT-11 program is dedicated to processing tasks and can be any PDP-11 (16K-byte memory) in minimum configuration (and up to 56K or 60K bytes for larger configuration) or LSI-11 (64K-byte memory) in typical configuration; satellite processor supports any console device (usually VT-110) and VT-11 graphics; can access local RT-11 devices; real-time devices (ADC and DAC) are located on satellite.

Interfacing • WB-11/WBV-11 interface connected to host system in UNIBUS (quad-slot) or Q-BUS (dual-slot) configuration; WB-11B/WBV-11B interface connects to satellite computer in UNIBUS/Q-BUS configuration • interface devices feature INTERLOCK system which regulates transmission and synchronizes access to shared files among cooperative programs.

Gateway • none provided by vendor.

First Announced • 1975 (first installed).

Systems Installed • 50 throughout world, including 6 in U.S.

Pricing • a minimum configuration requires host interface and satellite interface, \$750 and \$795, respectively, for total of \$1,545 plus STAR-Eleven software at \$4,000; each additional satellite interface costs \$795 • Shared-Eleven feature costs \$1,250 for 4-user configuration and \$1,500 for 8-user configuration.

■ CONVERGENT TECHNOLOGIES

2500 Augustine Drive, Santa Clara, CA 95051 • 408-727-8830.

□ Local Resource-Sharing Network

Type • twisted-pair wire; an RS-422 multidrop serial link for cluster system dependent on master workstation which runs applications and provides resources to cluster stations • uses modified ADCCP (Advanced Data Communication Control Procedure) bit-oriented synchronous protocol.

Transmission Speed • up to 307K bps.

Cable Length • maximum 1,200 feet.

Application • real-time and interactive functions include word processing integrating text, numeric, and graphic processing with data entry, document preparation, and data communi-

cations; distributed data processing using executive workstations and small business computers; electronic mail.

Configuration • master workstation includes dedicated 16-bit CPU with dual-bus structure (proprietary bus and Multibus), video display, keyboard, RAM memory, and optional mass storage up to 120M bytes • supports 1- to 3-station cluster, adding 1 or 2 Communications I/O Processors supports up to 16-station cluster • workstations include I/O workstations (IWS) and application workstations (AWS) designed around 16-bit processors; the IWS is offered with up to 1M-byte memory and supports up to 5 IEEE-796 Multibus slots; each AWS supports up to 512K bytes of memory and is generally used as cluster station with or without local mass storage; AWS-260 model with up to 16M bytes of disk storage and AWS-270 model supports 36M bytes of storage; also serve as Master Station; the AWS also offers a color graphics controller feature • standard systems support an RS-232C port on IWS and 2 on AWS for synchronous/asynchronous communication at up to 9600 bps • optional multiline communications processor supports 4 serial data lines on multibus-comparable IWS workstation • special communication adapter (communication I/O processor) supports cluster of 1 master station and 16 workstations.

Interfacing • through cluster or master workstation • Multibus compatible with IEEE-796 standard.

Gateways • SNA Network gateway supports IBM 3276/3278 terminal emulation, SNA 2780/3780 RJE, and 3270 terminal emulation; asynchronous terminal emulation for interfacing to networks that support TTY terminals • X.25 packet-switching networks.

First Announced • IWS October 1980; AWS September 1981.

Systems Installed • undisclosed number of network systems; up to 60,000 processors (IWS and AWS) have been installed.

Pricing • purchase price of 2-Multibus slot IWS workstation with 129K-byte memory \$6,500; with 5 Multibus slots \$10,500; with 1M-byte dual diskette system \$15,000; with 10M-byte Winchester disk and 500K-byte diskette \$20,000 • purchase price of optional Multiline Communications Processor supporting 4 serial data lines is \$1,800; of special adapter (I/O processor) for support of up to 16 workstation and 1 master workstation cluster is \$1,400, and of single line SNA interface \$2,000.

■ CORVUS SYSTEMS, INC

2029 O'Toole Avenue, San Jose, CA 95131 • 408-559-7000.

□ 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 • gateway to IBM SNA networks through emulation of IBM 3274 controller, 3278 terminal, and 3287 printer; plan to implement gateway to X.25 and other standard networks.

First Announced • mid-1981.

Systems Installed • 20,000.

Pricing • purchase price of transporter interface is \$495 for Apple II and IBM PC, and \$750 for Digital Equipment LSI-11 • purchase price is \$1,895 for transporter pack for IBM PC or Apple II; includes 4 Omninet interface cards, 4 15-foot cables, 4 tap boxes, and an installation guide.

Local Area Networks (LANs)

■ CROMEMCO, INC

280 Bernardo Avenue, Mountain View, CA 94039 • 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.

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.

■ DATA GENERAL CORPORATION

4400 Computer Drive, Westboro, MA 01581 • 617-366-8911.

□ XODIAC Network Bus (NBS) Local-Area Network

Type • baseband network using token-passing access method and coaxial cable to interconnect multiple systems.

Transmission Speed • 2M bps.

Cable Length • up to 1 mile (1.6 kilometers).

Application • automated office applications, word processing, data processing, electronic mail, electronic filing, electronic administrative support, and graphics.

Configuration • NBS consists of Network Bus Adapter (NBA) and NBS coaxial cable; supports up to 32 data processing systems or terminals communicating with one another • XODIAC network management software runs under Data General's AOS and AOS/VS operating systems; supports Eclipse and CEO (Comprehensive Electronic Office) systems that include enhanced Dasher D450 text-graphic CRT terminals.

Interfacing • Network Bus Adapter (NBA) connects multiple CPUs to NBS cable.

Gateways • XODIAC supports public and private X.25 packet-switched network interface; provides IBM SNA-compatible communication.

First Announced • February 1982.

Systems Installed • over 25.

Pricing • purchase price is \$4,500 per computer, including transmitter, receiver and wall box junction to coaxial cable; quantity discounts available.

■ DATAPOINT CORPORATION

9725 Datapoint Drive, San Antonio, TX 78284 • 512-699-7059.

□ ARCNET

Type • baseband network using token passing access scheme; consists of coaxial cable, active or passive hubs, and RIM (Resource Interface Module).

Transmission Speed • 2.5M bps • 2.5M bps over LightLink extension between remote processors up to 1 mile apart.

Cable Length • maximum 200-foot segment with passive hubs (4-way interconnectors) for up to 4 RIMs; up to 2,000-foot segment

with active hub (8-/16-way interconnectors); up to 20,000 feet maximum.

Application • Manufacturing, Quality Control, Sales, Purchasing, Administration, Warehouse/Finished Goods, Finance, Personnel, Accounting, Marketing, Advertising, Engineering, Legal, Research and Development; automated office, including electronic-mail, color graphics, financial modeling, facsimile transmission, high-speed printing, and word processing.

Configuration • minimum system includes file processor and 2 application processors • maximum configuration can connect 255 processors to 1 ARCNET bus; largest application processor supports up to 24 timesharing users under Datashare; maximum configuration includes 26 file processors and 229 application processors connected to 24 terminals each for a total of 5,496 terminals • DOS or RMS operating system • 1560, 6600, 8600, and 8800 Datapoint processors can all co-reside on ARCNET.

Interfacing • Resource Interface Module (RIM) manages data transfer; allows users direct access to up to 6 ARCNETs concurrently • user devices connect to a Datapoint processor.

Gateways • to IBM 360/370-compatible computers through Direct Channel Interface Option (DCIO), which connects directly to the byte multiplexer channel; accessed by IBM computers as unit record equipment, through 3270 terminal emulation and through IBM 2780/3780 RJE • X.25 packet-switched network through MULTILINK LAPB driver; provides 24 logical connections.

First Announced • 1977.

Systems Installed • over 5,000 worldwide.

Pricing • purchase price of an application processor can range from \$5,995 for a 1560 system with 64K-byte memory (including I/O) system to \$28,100 for an 8800 system with 256K-byte memory system; the RIM is included in packaged network systems • purchase price of file processors can range from \$53,300 for a system with 128K-byte memory, 2 60M-byte disks to \$66,950 for a system with 256K-byte memory and 135M-byte non-removable disk • purchase price of a RIM adapter is \$1,650.

Network Components From Outside Vendors • Standard Microsystems Corporation (35 Marcus Boulevard, Hauppauge, NY 11787 • 516-273-3100) produces a number of components for implementing ARCNETs • SMC COM 9032 Local Area Network Transceiver (LANT) for connecting a network controller to ARCNET; companion product to SMC COM 9026 • SMC COM 9026 Local Area Network Controller (LANC) is a special-purpose adapter for connecting processors and intelligent peripherals to ARCNET; implemented on a single VLSI chip; includes microprogrammed sequencer and all logic necessary to control the ARC token-passing access method; 2K-byte RAM buffer retains up to 4 508-byte messages • ARCNET-PC provides an interface between IBM PC bus and an ARCNET local area network on a single board; includes COM 9026 LANC and COM 9032 LANT • ARCNET-S100 provides an interface between S100 (IEEE-696) bus and ARCNET local area network on a single board; includes COM 9026 LANC and COM 9032 LANT • ARCNET-LINC is a self-contained box that connects an RS-232C port to an ARCNET node with switch-selectable data rates of 1200 to 19.2K bps; includes COM 9026 and COM 9032 • purchase price for quantity one is \$95.10 in ceramic and \$63 in credit for COM 9026, \$23.20 for COM 9032, \$595 for ARCNET-PC, \$535 for ARCNET-S100, and \$995 for ARCNET-LINK.

■ DAVONG SYSTEMS INC

217 Humboldt Court, Sunnyvale, CA 94086 • 408-734-4900.

□ MultiLink

Type • baseband network using token passing for access control • based on Datapoint ARC technology • designed for interconnection of IBM PCs.

Transmission Speed • 2.5M bps.

Cable Length • maximum cable length is 100 feet for passive hub, 2,000 feet for active hub, and 20,000 feet between any 2 workstations • uses RG62 (93-ohm) coaxial cable (same as that used for IBM 3270 clusters).

Local Area Networks (LANs)

Application • resource sharing; printers, plotters, and disk; electronic mail • servers can function as local workstations in addition to the server function.

Configuration • can connect up to 255 IBM PCs, PC/XTs, and PC-compatible systems; supports IBM DOS 1.1 and 2.0, CP/M-86, Concurrent CP/M-86, and Pascal operating systems • PC on network must include 128K bytes of memory • file server can be PC or PC/XT with 192K bytes of memory • system designed around high-performance disk cache; any PC on network can have up to 128K bytes of hard disks; each hard disk can be divided into volumes, 6 of which can be mounted at one time; the mounted volumes can be shared, local, or remote; file/record locking and password protection provided • maximum network with 255 nodes can provide 32.6G bytes of disk storage • implements Xerox Network Standard (XNS) protocols • provides pacing to prevent overloading a PC server and shutting out local use.

Interfacing • through Network Multifunction Card (NMC) that plugs into slot of PC or PC/XT; NMC connects to cable that connects to network through a 4-port passive or an 8-port active hub.

Gateways • bridge to interconnect MultiLink networks through electronic mail package • through agreement between Ungermann-Bass and Davong, MultiLink software is available to run on Ungermann-Bass Net/One baseband.

First Announced • June 1983.

Systems Installed • over 3,500 nodes.

Pricing • purchase price is \$595 for NMC, \$100 for passive hub, \$800 for active hub, \$1,995 for 5M-byte disk, \$2,395 for 10M-byte disk, \$2,795 for 15M-byte disk, \$3,295 for 21M-byte disk, \$3,995 for 32M-byte disk, and \$4,495 for 40M-byte disk • one-time charge (OTC) for MultiLink software for a network is \$100.

■ DBS INTERNATIONAL INC (formerly Digilog Business Systems, Inc)

Welsh Road & Park Drive, P.O. Box 425, Montgomeryville, PA 18936 • 215-628-4810.

□ DBS 16 DBS-NET

Type • baseband bus connects multiple DBS 16 CPUs; 4-wire cable connects workstations • DBS 16 desktop works as network controller (multimaster prioritized interrupt access scheme; terminals operate as workstations; CP/M-based 8-bit DBSI computers can also operate as workstations.

Transmission Speed • 50M bps.

Cable Length • unlimited with use of repeaters; up to 1,000 feet without repeaters.

Application • office automation; distributed processing.

Configuration • system is based on 80186 microprocessor; basic installation requires DBS 16 desktop, which can support up to 4 workstations; up to 24 additional workstations can be supported via the expansion chassis for a maximum 28-workstation network • DBS 16 desktop consists of one 80186 processor, with the expansion chassis containing up to 6 additional processors for a maximum of 7 processors; operates under MP/M-86 or Concurrent CP/M-86; supports up to 3.58M bytes of RAM; RS-232C asynchronous port and printer port; via the Multibus-compatible expansion chassis a variety of communication protocols can be supported including synchronous, bisynchronous, 3270, X.25, and Ethernet; the DBS 16 provides dual 360K-byte diskettes, dual 820K-byte diskettes, 6M-, 12M-, 19M-, or 40M-byte hard disks with 360K- or 820K-byte diskette backup, or dual 40M-byte hard disks with 360K- or 820K-byte diskette backup; also supports optional 20M-byte cartridge tape backup • minimum network configuration requires DBS 16 desktop and supports up to 4 users; maximum network configuration requires desktop and expansion chassis and supports up to 28 users.

Interfacing • RS-232C terminal interface; parallel interface for printers.

Gateways • through synchronous communication port on desktop unit; Ethernet, X.25, 3270, and bisynchronous through Multibus-compatible expansion chassis.

First Announced • 1983.

Systems Installed • over 500.

Pricing • purchase price is about \$12,000 for minimum network based on DBS 16 desktop with one workstation and 10M-byte disk, \$12,000 for DBS 16 supporting 40M-byte disk and 4 workstations, and \$39,000 for maximum 28-workstation system with 40M-byte disk and 1.79M-byte main memory.

■ DESTEK GROUP

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

□ DESNET

Type • baseband network using coaxial cable CSMA/CA access method and bus topology; network interface server (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 NIBs 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, a parallel I/O port either general-purpose or Centronics-compatible port, or an IEEE-488 port • NIS is media independent.

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; electronic mail • support file transfers throughout network; file server allows file, printer, and console sharing.

Configuration • NIS-level network can interconnect almost any combination of dissimilar processor/peripheral devices; practical limit up to 350 nodes on baseband single coaxial cable (RG-590); 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; LANOS (Local Area Network Operating System) available in CP/M 2.2, PC-DOS, and MS-DOS versions; S-100 bus interface is single intelligent controller • DESNET supports file/disk/printer/console sharing; features transparent CP/M and MS-DOS applications mode; record locking • guaranteed message delivery and network statistics functions supported on boards • CRS (Central Resource Server) provides routines to create, manage, and access files and to implement shared printer functions on network; includes file/record locking facilities.

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 • NIS also supports RS-422, modem 300/1200, and IEEE-488 interfaces.

Gateways • Ethernet via NIB • to mainframes through communication servers.

First Announced • first quarter 1982.

Systems Installed • over 100, with S-100, Multibus, and IBM PCs in individual or mixed network environments.

Pricing • purchase price of Network Interface Board for baseband network is \$500 to \$700 in quantities of more than 2; purchase price to connect a station is about \$1,000 to \$1,500 for fiber-optic cable and \$1,200 to \$2,500 for broadband cable.

Local Area Networks (LANs)

■ DEVELCON ELECTRONICS INC

744 Nina Way, Warminster, PA 18974; 215-443-5450 • Canada Home Office: Develcon Electronics Ltd; 856 51st Street East, Saskatoon, SK S7K 5C7; 306-664-3777.

□ Develnet

Type • a hierarchical network of local switches or nodes interconnected through both parallel and serial internode data links; creates a bus/star topology.

Transmission Speed • internode parallel transmission speed is 3M cps over ribbon cable; internode serial transmission speed is up to 6.312M bps over fiber optic or coaxial cable.

Cable Length • maximum distance from star node is one mile for end-to-end distance of 2 miles; maximum internodal distance is limited only by the media a user selects to interconnect nodes.

Application • interconnection of all the devices that need to exchange data in any business environment.

Configuration • hierarchical system built around Develcon's intelligent Develswitch which is a freestanding or rackmount unit that operates as a node controller; manages up to 248 communications lines served by the node; battery backed up memory and syntax-oriented Operator Command Language (OCL); logs faults and activity events at node • if more lines are needed, a cluster controller can be used to coordinate the activities of up to 8 node controllers for up to 2,000 communication lines • if more lines are needed, a network controller can coordinate the activities of up to 8 cluster controllers for a network of up to 16,000 lines.

Interfacing • parallel interface to the parallel internode channel (backed up by redundant internodal channel) and standard RS-449 synchronous line interface to serial channel • user devices interface to Develnet nodes over twisted-pair wire or local RS-232C cables; synchronous and asynchronous local line cards or data sets available for 1200- to 19.2K-bps data rate with range of 1 mile (synchronous); 75- to 19.2K-bps data rates with range of 1 mile (asynchronous).

Gateways • multichannel X.25 gateways with up to 255 virtual circuits per gateway; Ethernet; remote Develnets.

First Announced • April 1984.

Systems Installed • in controlled sales environment until September 1984; 2 installed internally.

Pricing • prices have not been released yet.

■ DIGITAL EQUIPMENT CORPORATION

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

□ DECdataway

Type • baseband network using twisted-pair cable and block mode transmission, connects up to 32 Distributed Intelligent Systems (DISs) to VAX-11 computer.

Transmission Speed • 56K bps.

Cable Length • 15,000-foot links; maximum 4 links; device can be 21,000 feet away from host.

Application • real-time data acquisition/local processing and large-scale data processing in industrial/manufacturing environments; specific applications include process monitoring/control, numerical control, robotics, and data concentration.

Configuration • 1 DECdataway supports up to 31 Distributed Intelligent Systems, remote PDP-11/23-based intelligent terminals; VAX-11 host can support up to 4 DECdataways and up to 252 ASCII devices; or up to 126 PDP-11/23 Plus or LSI-11/23 systems; also mix and match environments; supporting software is layered on the VAX/VMS operating system; communications in block mode are managed by microprocessor-based controller, to free host resources from network management.

Interfacing • DECdataway controller; microprocessor-based interface.

Gateways • to Digital Network Architecture (DNA) through VAX-11 computer.

First Announced • 1977.

Systems Installed • 300.

Pricing • purchase price of 2 interfaces to cable plus all appropriate software with diagnostics as well as maintenance support is \$25,000.

□ Ethernet

Type • baseband local area network conforming to Ethernet specifications; 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 node to node; aggregate up to 3 miles.

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 and DECnet-RSX; maximum length of cable between any 2 nodes is 4,500 feet • 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, DEUNA, and DEQNA • H4000 serves 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 • DEQNA is Qbus controller interface for LSI-11-based and MicroVAX DEC computers • both DEUNA and DEQNA can interface to DELNI multiplexer to connect up to 8 stations to Ethernet transceiver.

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 • over 100.

Pricing • purchase price of the H4000 unit is \$300; in quantities of 500 or more, price goes down to \$200 • purchase price is \$3,500 for DEUNA, \$1,150 for DEQNA, \$995 for DELNI, \$17,000 for DECnet Router/X.25 Gateway, and \$26,995 for DECnet/SNA Gateway.

■ DIGITAL MICROSYSTEMS, INC

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

□ HiNet

Type • distributed baseband microcomputer network 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-

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23M-, or 46M-byte disk (optionally up to 92M bytes) 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 of unformatted and 614.4K bytes of formatted storage; the DMS-15 supports 3 RS-232C serial ports at up to 9600 bps data rate 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 • also supports workstation that is CP/M, MS-DOS, and PC-DOS compatible.

Interfacing • to HiNet through RS-422 interface • RS-232C interface 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), HiNet 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 • purchase price is \$1,695 for CP/M-, MS-DOS-, and PC-DOS-compatible workstation.

■ DOELTZ NETWORKS, INC

18581 Teller Avenue, Irvine, CA 92715-1693 • 714-851-2223.

□ Doeltz Network

Type • universal network that can be used as local area network; based on interconnection of Elite One multipoint concentrator switches to provide bidirectional transmission paths independent of transmission media, attached devices, device protocols, speed, locations, and topologies • universal network that can be used as local area network.

Transmission Speed • 72K bps between Elite One Units.

Cable Length • any length, based on leased telephone line.

Application • generic, suited to any communication environment.

Configuration • Elite One provides up to 32 asynchronous or synchronous ports with data rates up to 9600 bps and can connect to up to 4 data links at rates up to 72K bps; data links can connect other Elite Ones to form a local area network or to Esprit One high-speed concentrator switch for wide area networks (available fourth quarter 1984) • Elite One network link can address up to 60 nodes • Elite One contains 10-MHz M68000 microprocessor with 256K-byte EPROM chip and 128K-byte RAM; the microprocessor runs under a proprietary operating system.

Interfacing • can be RS-232C, V.35, or integral modem at data rate up to 72K bps; interface at user port is RS-232C at 9600-bps data rate; next release will support RS-422 and V.35 (June 1984); user ports can support asynchronous, synchronous, SNA/SDLC, and X.25 protocols.

Gateways • independent of protocols.

First Announced • March 1984.

Systems Installed • deliveries beginning first quarter 1984 for Elite One and August 1984 for Esprit One.

Pricing • purchase price is \$4,500 for an 8-port Elite One and \$40,000 for Esprit One high-speed concentrator switch.

■ GANDALF DATA, INC

Corporate Headquarters; 33 John Street, Manotick, ON KOA 2N0
• U.S. Headquarters; 1019 South Noel Avenue, Wheeling, IL 60090; 312-541-6060.

□ PACXNET

Type • a network system based on PACX IV switching nodes interconnected by coaxial cable or copper wire • flexible configurations for either baseband or broadband (CATV) transmission; limited distance and long-haul modems and multiplexers • each node provides contention and switching functions for a wide variety of terminals/devices accessing IBM or non-IBM hosts; contention access based on class identification and routing procedures interface signals (DCD, DSR, CTS).

Transmission Speed • baseband or broadband transmissions at 5.3M bps • asynchronous channel transmissions between nodes over twisted-pair wire at 9600 bps; synchronous between nodes over coaxial cable at 19.2K bps.

Cable Length • 5.4 miles; with appropriate modem up to 15 miles • up to 4,000 feet between nodes on copper wire.

Application • switching management and contention access controls for various terminals/facilities at small and large computer centers; automated office and information resource centers include research laboratories, government, hospital, financial, publishing, production process control, universities, military installations • electronic mail.

Configuration • single PACX IV (Private Automatic Computer Exchange IV) node supports 128 host computers in quad configuration providing 512 ports for up to 1,024 terminals; up to 8 nodes can be interconnected on single copper wire network for a total of 12,000 devices • new PACX IV SE can support up to 2,048 terminals • interconnection of nodes by 3 methods, depending on distance: copper wire to connect nodes up to 4,000 feet apart; limited distance modems to connect nodes 15 miles apart; and long-haul modems/multiplexing units for unlimited distances • point-to-point and multipoint, star or ring topologies • terminal attachments for asynchronous keyboard terminals; synchronous terminals with EIA RS-232C or RS-449 connection; communicating word processors; personal computers • information resource attachments include IBM and non-IBM mainframes, mini-/microprocessors for specialized functions; externally provided computer databases and services • new APB III 8-channel asynchronous port board prevents users from tying up computer ports without actually using them; if no activity within time interval (10 to 1,280 minutes), the user is disconnected.

Interfacing • standard interface is RS-232C; optional interfaces include RS-422, FED-STD-1030, and MIL-STD-188-114 • terminal interface boards: Asynchronous Modem Terminal Board (AMTB) for use with direct cable or modem; 125 TB terminal board with 4 integral short-haul modems running up to 9600 bps over 5.5-mile distance; 135AA TB terminal board with 4 FSK for dedicated lines or switched networks operating DAA; and Synchronous Modem Terminal Boards (SMTB) with 4 RS-232C channels per board • port (host) interface boards include APBII asynchronous board with 8 EIA RS-232C channels per board; SPB synchronous port board with 8 EIA RS-232C channels; remote standalone modem compatible with 125 TB above and standalone FSK modem for use with 135 TB on dedicated lines.

Gateways • X.25 networks, IBM 3270 networks, and PBX systems • PIN 9102 (Private Intelligent Network) is X.25 interface multiplexer providing access to X.25 packet-switched networks for computer systems with asynchronous ports; up to 16 asynchronous computer ports can be connected via RS-232C interfaces through single synchronous link to packet-switched networks • PIN 3270E-5 is IBM 3270 terminal emulator for up to 4 ASCII CRT terminals/printers to access IBM 3270 Information Display System: terminals/printers appear as IBM 3271 Model 2 Bisync Cluster Controller with attached 3277/78 display stations and 3287 printer; supports 1 BSC half-duplex non-switched multipoint communication line up to 9600 bps • PIN 3270E-7 3270 protocol emulator enables ASCII terminals/printers and

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ASCII serial printer to operate as IBM Information Display System; appear to IBM host as IBM 3271 Model 1 or Model 2 controller with attached 3277 display station and/or 3284 printer; standard 8-port configuration supports up to 7 asynchronous devices to communicate with an IBM host or up to 6 asynchronous devices to communicate with 2 IBM host ports; 8-port unit is field upgradeable and provides 16-port capacity; communicates over point-to-point or multipoint lines in half-duplex mode with BSC at speeds up to 9600 bps on single IBM host; on 2 IBM hosts, concurrent communication runs at 4800 bps per host; ASCII terminals/printers access PIN 3270E-7 via direct attachment or by dial-in access at speeds up to 9600 bps; PIN can co-exist on multipoint communication lines with other PIN units or other 3271 display station controller • Line Miser device enables existing telephone wire networks to be used as local area data communication networks for simultaneous voice/data communication; 1 Line Miser is installed at telephone location; the other "mate" is located near PBX and accommodates synchronous/asynchronous point-to-point serial binary data up to 9600 bps full-duplex; remote units operate up to 15,000 feet point-to-point.

First Announced • fourth quarter 1982.

Systems Installed • Beta test sites only.

Pricing • purchase price of a 2-node configuration begins at \$17,000; price can approach \$1 million for large installations.

■ GATEWAY COMMUNICATIONS, INC

16782 Redhill Avenue, Irvine, CA 92714 • 714-261-0762.

□ G/NET

Type • baseband network using bus topology and CSMA/CD and CA (Collision Avoidance) for access control.

Transmission Speed • 1.43M bps.

Cable Length • up to 7,000 feet: 3,500 feet using RG-62 cable, 4,000 feet using RG-59 cable, and 7,000 feet using RG-11 coaxial cable.

Application • interconnection of IBM PC, PC/XT, and IBM PC-compatible computers in multiuser office automation environment for file sharing, print spooling, electronic mail, and database management; provides access to X.25 and SNA Wide Area Networks (WANs) through gateway processor.

Configuration • connects up to 255 physical drops with up to 256 addresses per physical drop • file server runs on an IBM PC/XT with 256K-byte memory; provides data integrity and system security features; supports print spooling for up to 3 printers; supports DOS 1.1 and 2.0 • new IFS-X integrated file is IBM PC/XT compatible and will support 60M bytes of hard disk expandable to 300M bytes • can be configured with Gateway Processors.

Interfacing • IBM PCs interface to G/NET through a PC-LNIM (local network interface module) adapter board that plugs into a slot on an IBM PC or PC/XT; PC-LNIM is Z80B processor-based module that operates in parallel with IBM PC • Gateway Processor (GP) interfaces to G/NET through GP-LNIM that plugs into a slot of the GP.

Gateways • Gateway Processor (GP) supports program modules that let it operate as a communication server to access X.25 and SNA networks and an asynchronous server to connect asynchronous devices to G/NET • G/NET-SNA/PLUS software runs on GP and allows it to operate as network concentrator allowing multiple connected devices to share SDLC trunks; other software packages that operate with SNA/PLUS are PC/3270 PLUS for 3270 emulation and PC/FILEX to support bidirectional file transfers; future products include BSC/3270 PLUS, BSC/3780 PLUS, and Async/3767 PLUS • WNIM is a wide area network interface module that provides same bridge and gateway functions as GP but plugs into slot on IBM PC.

First Announced • began delivery in September 1983.

Systems Installed • over 1,000 nodes.

Pricing • purchase price is \$595 for PC-LNIM Adapter (includes

G/NET software), \$1,095 for file server (IBM PC/XT-based), \$1,560 for Gateway Processor (Z80-based) with 64K-byte RAM, \$595 for GP-LNIM to interface GP to G/NET, \$295 for Flexible Disk Controller for GP, \$295 for 2-port serial interface for GP, \$195 for 2 additional ports for GP, \$450 for 4-port serial interface for speeds up to 19.2K bps for GP, and \$695 for WNIM board that plugs into slot in IBM PC • purchase price of IFS-X integrated file server has not been announced.

■ GENERAL ELECTRIC

G.E. Industrial Automation Systems Department, 1425 Seminole Trail, Charlottesville, VA 22906 • 804-979-6922.

□ GENet

Type • broadband network using single, standard, CATV coaxial cable; bandwidth divided into channels dedicated to data, voice, and video transmission; data channels use CSMA/CD access protocol (alternate token passing access scheme planned); transmission protocol conforms to IEEE-802.3 Committee recommendation.

Transmission Speed • 5M-bps aggregate data rate over 20-channel cable configuration; 10M-bps aggregate data rates over 10-channel cable configuration.

Cable Length • 1,500 feet each cable segment • greater distances with repeaters.

Application • factory applications such as robotics, programmable/numerical control, and Management Information Systems (MIS); office automation and business applications such as word processing, transaction processing, facsimile transmission, and CAD/CAM functions; teleconferencing (voice/video); datagram service.

Configuration • network accommodates up to 20 broadband transmission channels on single, standard CATV coaxial cable • the Versatile Communications Controller (VCC) can connect to I/O channel of Bus Interface Unit (BIU); operates as protocol converter for network gateway to different local and remote computers; supports up to 64 channels • VCC also accommodates asynchronous terminals for IBM 3270 BSC communication links; emulates IBM 3271 control unit; supports up to 32 asynchronous terminals per BSC link; terminals appear as IBM 3277-compatible devices; supports multiple BSC hosts simultaneously • Intelligent Statistical Time Division Multiplexer (ISM 5300) can interface VCC or computer that connects to VCC and to BIU; 32 asynchronous data channels share single line; individual channel and composite link buffering accommodates peak load; data rates up to 9600 bps; transparent error-free point-to-point communication between terminals, CPUs, and other RS-232C-compatible devices; serves as remote concentrator for VCC through protocol conversion of multiplexed data • standard CATV components used for voice and video.

Interfacing • GENet Bus Interface (BIU) connects digital equipment to network; consists of CATV modem, network access module, and up to 4 user I/O modules; I/O cards inserted to accept different protocols: I/O card provides ASCII to BSC and ASCII to 4400 (Sperry 400) protocols • BIU available in 2 models; BIU/4004 utilizes 1 I/O module and supports 4 user channels; BIU/4016 contains up to 4 I/O modules and supports up to 16 user channels; any channel can be connected to VCC; BIU complies with IEEE 802.3 Committee recommendations for CSMA/CD access protocol • BIU implements 4 lowest levels of OSI recommendation to ISO.

Gateways • Versatile Communication Controller (VCC) serves as gateway to GENet from different computers • expansion planned for VCC to serve as gateway to DECnet, IBM SNA, Sperry 400, SDLC/HDLC, and GRTS (Honeywell) networks.

First Announced • March 1982.

Systems Installed • 5.

Pricing • network configuration costs include BIU, cable, and TAPs; purchase price for a single BIU with 4 RS-232C ports is \$5,800; a user can install the cable or it can be installed through General Electric services.

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■ GOULD INC/Modicon Programmable Control Division

P.O. Box 3083, Andover, MA 01810 • 617-475-4700.

□ MODBUS

Type • common carrier or single shielded, twisted-pair cable, multifunction host-controlled system; asynchronous byte-oriented proprietary protocol; supports Modicon 184/384/484/584/884 and Micro 84 programmable controllers • integrates with MODWAY under MONADS—Modicon's Network Architecture for Distributed Systems.

Transmission Speed • from 50 bps to 19.2K bps (depending on host and slave devices).

Cable Length • up to 15,000 feet.

Application • industrial functions include energy management, environmental control, security monitoring, process control, management information, production monitoring, quality control, pipeline monitoring/control.

Configuration • minimum configuration includes host and slave; programmable controllers, computers, and smart terminals are the hosts (masters) • maximum configuration per network consists of host and up to 32 slaves; protocol allows addressing for up to 247 slave devices when networks are interconnected; family of programmable controllers includes 184, 384, 484, 584, 884, and Micro 84 • Micro 84 functions only as slave.

Interfacing • MODBUS programmable controller interface unit with MODBUS/RS-232 Modem to drive up to 32 devices; for common carrier facilities, programmable controllers use commercial modems.

Gateways • to MODWAY.

First Announced • October 1979.

Systems Installed • over 500.

Pricing • purchase price of controller (PC) ranges from \$600 to \$50,000, depending on configuration; the RS-232C Modem Interface is \$900 • Micro 84 MODBUS Interface RS-232 port is \$420; MODBUS Modem is \$245 • 484 MODBUS Interface with modem is \$1,795.

□ MODWAY

Type • baseband coaxial cable (passive) or active broadband CATV system • peer-to-peer masterless system with time division multiplexed access (TDMA) channel; synchronous bit-oriented protocol; expected to be made compatible with IEEE standard • supports 3 types of devices: primary units initiate communications and token-pass; secondary units respond to query only; and secondary demander device operates briefly as primary device in response to an event in that device.

Transmission Speed • 1.544M bps.

Cable Length • up to 5,000 meters or 15,000 feet end-to-end.

Application • real-time factory/plant data processing, supervisory control, time/attendance monitoring, and transaction processing.

Configuration • device combinations include Modicon's line of programmable controllers (PC), computers, CRT/hard copy terminals, printers, A/D converters, badge readers, robots, I/O devices, programmed panels, microprocessors, NC equipment, CAD/CAM systems • minimum configuration: primary and secondary device • maximum configuration: up to 250 devices on passive coaxial cable; different topology will support more devices; up to 10,000 on an active CATV network.

Interfacing • interface box for Modicon products; also allows various equipment from other vendors.

Gateways • communication path to X.25 networks.

First Announced • March 1982.

Systems Installed • none except those at Beta sites.

Pricing • currently not available.

■ HEWLETT-PACKARD

1501 Page Mill Road, Palo Alto, CA 94304 • 415-857-1501.

□ Interface Bus (HP-IB)

Type • baseband host-controlled parallel bus, designed to connect local devices to a controller; conforms to IEEE-488 Standard; extended by serial fiber optic link.

Transmission Speed • up to 1M bytes per second on HP-IB; up to 20K bytes per second on serial fiber optic extender link.

Cable Length • 60 feet on HP-IB and 3,000 feet on serial fiber optic extender link.

Application • factory, laboratory, and office environments.

Configuration • any HP computer can act as system controller with up to 15 devices; some can be active controllers when selected by system controller; controller specifies (addresses) the device which sends and the devices which receive.

Interfacing • IEEE-488 1978 standard interface.

Gateways • none currently.

First Announced • 1978.

Systems Installed • over 20,000 systems have been installed in HP-IB networking configurations.

Pricing • purchase price of a Series 200 computer interface controlling up to 14 devices is \$330.

□ LAN 9000

Type • baseband network using bus technology and CSMA/CD access control system • Ethernet compatible.

Transmission Speed • 10M bps.

Cable Length • same as Ethernet: 500 meters (1,500 feet) between repeaters; 2,500 meters (7,500 feet) end-to-end.

Application • for interconnection of HP 9000s, primarily for scientific and engineering applications; network services include file transfer, remote file access, interprocess communication, and remote process management, and are integrated into the HP-UX operating system.

Configuration • same as Ethernet: up to 100 stations per cable segment and up to 1,024 stations per network.

Interfacing • through system package that includes Ethernet Interface, transceiver, drop cable, and software; one required for each HP 9000 on network.

Gateways • none currently.

First Announced • July 1983.

Systems Installed • undisclosed.

Pricing • purchase price is \$5,035 for interface package with Ethernet interface, transceiver, drop cable, and software.

□ SRM (System Resource Management)

Type • baseband network with star topology using Shared Resource Manager for interconnection of workstations (HP desktop computers); uses twisted-pair cable.

Transmission Speed • 700K bps.

Cable Length • up to 60 meters (180 feet) between workstation and manager; can be extended to 120 meters (360 feet); area covered is a circle around manager with 240-meter (720-foot) diameter.

Application • shared resources in scientific and engineering applications (limited only by primary applications of the interconnected workstations).

Configuration • up to 68 workstations per SRM controller; workstations can be HP 9835, 9845, Series 200, and Series 500 computers.

Interfacing • through 4-port SRM Multiplexer which can connect up to 4 workstations to network; each workstation also requires an interface card that plugs into the workstation; HP 9835 and 9845 also require a ROM card; Series 200 requires additional software; other systems include all the required software.

Gateways • none.

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First Announced • 1982.

Systems Installed • 200 systems (about 1,000 workstations).

Pricing • purchase price is \$10,000 for a typical SRM controller with software; \$860 for SRM Multiplexer; \$755 (HP 9835/9845), \$655 (Series 200), and \$2,115 (Series 500) for an interface card; \$657 (HP 9835) and \$530 (HP 9845) for required ROM; and \$100 for required unbundled software for Series 200.

■ **HONEYWELL, INC**

16404 North Black Canyon Highway, Phoenix, AZ 85023 • 602-997-3000.

□ **TDC 3000 Local Control Network (LCN)**

Type • baseband local area network based on IEEE-802.4 Standard for token-passing access protocol using coaxial or fiber optic cable.

Transmission Speed • 5M bps on LCN; 250K bps on Data Hiway.

Cable Length • about 1,000 feet for LCN per TDC 3000; unlimited when TDC 3000 are interconnected; up to 20,000 feet per branch of each Data Hiway which can have up to 3 branches.

Application • interconnection of microprocessor-based process control modules in an industrial environment: universal station module controls process; history module stores historical data; application module implements advanced control routines; and computing module performs sophisticated optimization routines • computing module can also be a DPS-6 which can access Honeywell and IBM hosts.

Configuration • a network supports up to 64 modules and gateways; any number of networks can be interconnected through coaxial or fiber optic cable • LCN can connect to up to 64 (minus number of other gateways and modules) dual Hiway Gateways for connection of Data Hiways; up to 63 boxes (basic, programmable, or multifunction controllers) can connect user devices to Data Hiway.

Interfacing • modules connect to network through transformer-coupled, Manchester-encoded transceiver • user devices interface to a Data Hiway through controllers connected to Processor Interface Units (PIUs) which provide up to 252 (analog) or 512 (digital) inputs and up to 122 analog or 256 digital outputs.

Gateways • network gateway computer module connects to other TDC 3000s through fiber optic link; DPS-6 computer module provides IBM 4300 connect through IBM 2780/3780, Hasp Multileaving Workstation, or 3777-3 emulation for interactive processing or RJE applications.

First Announced • October 1983.

Systems Installed • none; deliveries scheduled for fourth quarter 1984.

Pricing • depends on environment and configuration; minimum system under \$100,000; large systems can be multimillion dollar installations.

■ **INCONIX CORPORATION**

10 Tech Circle, Natick, MA 01760 • 617-655-1170.

□ **Cinchnet**

Type • baseband network using bus topology and CSMA/CD for access control.

Transmission Speed • 28.8K bps.

Cable Length • up to 4,000 feet for dual twisted-pair cable.

Application • distributed digital control using Cinch Pac local control units with intelligent front-end controller that downline loads parameters • once Cinch Pacs are loaded, they can run independently of front end; Cinch Pacs can signal front end for attention.

Configuration • front-end controller can be an IBM PC or any RS-232C device (Hewlett-Packard, DEC computer, or other PC); the network can connect up to 124 Cinch Pac controllers to the front-end • each Cinch Pac includes an Intel 8051 microprocessor, EPROM to store application program, RAM, A/D controller, A/D converter, D/A converter, program gain

amplifier, comparator, and I/O controller; it is self-calibrating and can handle up to 15 analog inputs, 16 analog outputs, and 64 digital I/O points.

Interfacing • cable interface is RS-485 (modified RS-422); front-end controller interfaces to cable through a Communication Interface Unit which converts ASCII information into Cinch Pac information and vice versa.

Gateways • none.

First Announced • January 1983.

Systems Installed • over 200 Cinch Pacs.

Pricing • purchase price is \$1,400 to \$3,000 for Cinch Pac depending on its configuration and \$1,200 for the communication interface for the front-end controller; price of front-end controller depends on system selected.

■ **INFOREX, INC/A Datapoint Company**

186 Middlesex Turnpike, Burlington, MA 01803 • 617-272-6470.

□ **ULTRANET**

Type • baseband network using bus topology and the Datapoint ARC token-passing access protocol.

Transmission Speed • 2.5M bps.

Cable Length • using passive hubs, up to 200 feet of coaxial cable; using active hubs, up to 2,000 feet between hubs and a maximum of 10 active hubs for an end-to-end length of about 4 miles.

Application • distributed processing using dedicated application and file processors on the network • source data entry and file management.

Configuration • up to 8/16 processors per active hub with a maximum of 255 processors per network; interconnects System 9000 processors (based on Datapoint 6600, 8600, and 8800 processors) running under the Datapoint DOS or RMS operating system.

Interfacing • through integrated Bus Interface Module (BIM) integrated in the System 9000.

Gateways • to IBM hosts through IBM 3270 (SNA) or 3780 (BSC) emulation.

First Announced • April 1981.

Systems Installed • over 150 processors.

Pricing • purchase price is \$12,300 for small 9040 Expansion Processor (based on Datapoint 6600) with CPU and 248K-byte memory, CRT display, keyboard, and \$28,700 for a packaged Ultranet starter package.

■ **INTECOM, INC**

601 Intecom Drive, Allen, TX 75002 • 214-727-9141.

□ **LANmark**

Type • baseband using single twisted pair wire • facility-wide wiring plan • IBX (Intecom's Integrated Business Exchange)-based system with nonblocking voice data digital private branch exchange offers Ethernet interface connection and allows both format and protocol conversion, simultaneous voice and data transmissions, IBM 3270 emulation, and local area network communication.

Transmission Speed • 50 to 10M bps.

Cable Length • 14,500; up to 54,000 feet maximum between devices.

Application • general business, automated office, word processing, industrial.

Configuration • a system module supports up to 256 terminations • maximum 32-module system supports total 8192 devices • can provide switching for 3278 devices.

Interfacing • RS-232C, RS-449, CCITT V.35; Ethernet interface connection or BNC connector; word processor IPC (W-IPC) interfaces word processors to network; X.25 IPC provides interface to X.25 networks and includes PAD function.

Local Area Networks (LANs)

Gateways • Z-Net (Planned) • 3270 IPC supports up to 12 ASCII terminals for emulation of all common functions of IBM 3271 control unit, 3277 CRTs, 3284 or 3286 host-controlled copy and print functions; provides gateway to IBM SNA hosts • to X.25 packet data (PAD) networks.

First Announced • 1980.

Systems Installed • 80,000 lines installed in configurations consisting of from 750 lines to 8,192 lines.

Pricing • purchase price of the IBX costs \$1,000 per port connection plus minimal cost for LANmark connection.

■ 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 • up to 100K bps for general TDM and FDM applications; up to 5M bps for OEM applications.

Cable Length • up to 35 miles.

Applications • general-purpose network for terminals, minicomputers, and front-end processors (distributed data processing); automated office, energy management, teleconferencing, security, production control.

Configurations • a single broadband cable can support all of the following: 225 point-to-point or multidrop 9.6K-bps data channels, each with 1 or more terminals; 38 100K-bps full-duplex TDM channels, each connected up to 248 9.6K-bps terminals; 14 64K-bps data channels for graphics or CAD/CAM applications; 100 point-to-point voice links; 2 videoconferencing channels; 2 TV security channels; and 1 1.5M- to 10M-bps intelligent network channel.

Interface • through radio-frequency (RF) modems.

Gateways • none.

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 and a desktop version (820B4) \$1,860; purchase price is \$715 for 460 Channel Switch, \$1,935 for 450 Channel Converter, and \$2,285 for Remodulator.

□ VIDEODATA LAN/1 Local Area Network

Type • broadband packet-switched network using coaxial cable bus topology to implement logical ring; uses token-passing access method implemented with the Datapoint ARC RIM chip • provides virtual circuit service among devices connected to the cable.

Transmission Speed • up to 2.5M-bps network data rate per channel; terminal data rate is 300 bps to 19.2K bps.

Cable Length • up to 14 miles end-to-end; tree structure can be arranged in 7-mile radius around head-end channel converter.

Application • generic network that supports any vendor's hosts, any vendor's terminals, and any applications • operates as "information utility" for data processing, word processing, security systems, energy management, video training programs, production control, and electronic mail • Interactive Systems/3M has formed relationships with Allan Bradley and Diagnostic Imaging to provide internet connections to Allan Bradley's factory control networks and to the Diagnostic Imaging standardized medical LAN; thus many LAN/1s will be used in industrial and medical applications.

Configuration • cable arranged in branching tree topology; includes 5 channels operating in the frequency range of 53.75 to 83.75 MHz for transmission and 246 to 276 MHz for reception with channel spacing of 6 MHz; head-end channel converter

intercepts transmissions, and converts all transmit frequencies to receive frequencies; devices interface to LAN/1 through 2/4/8-port Network Interface Unit (NIU); the optional Network Monitor Unit (NMU) operates as conventional user port as well as network monitor for system management; NMU consists of an IBM Personal Computer, 2-port NIU, and LAN/1 network monitoring software • up to 250 NIUs can connect to each of the 5 channels for a total of 1,250 NIUs (10,000 users) per system • network cable is one-half inch in diameter with solid aluminum outer shield • NIUs are intelligent, thus LAN/1 does not require NMU for network operation.

Interfacing • 2/4/8-port Network Interface Unit (NIU) is a microprocessor-based intelligent Radio Frequency (RF) modem; includes 1 or more logic cards; uses Motorola 6809 microprocessor • RF modem is fixed frequency, thus all NIUs on a channel use the same transmission and receiver frequencies; the RF modem converts digital data to the required RF frequency on transmission and converts the RF signal from the cable to digital data at the receiver • logic cards format user data into packets for transmission on the network and implement the communication token-passing protocol • 2- and 4-port NIUs provide the RS-232C interface, 8-port NIUs provide RS-232C, RS-449C (RS-422), or CCITT V.35 interfaces for devices connected to the ports; currently, NIU supports only asynchronous serial connections to user devices; standard auto-baud data rates up to 9600 bps; user switch selectable to 19.2K bps.

Gateways • planned internet connections with Allan Bradley instrument networks for industrial applications and with Diagnostic Imaging standard LAN for medical applications.

First Announced • August 1983.

Systems Installed • 350.

Pricing • purchase price is \$1,400 for 2-port NIU, \$2,100 for 4-port NIU, \$3,200 for 8-port NIU, \$5,700 for NMU, and \$2,285 for head-end channel converter • software is included with system hardware.

■ INTERLAN, INC

3 Lyberty Way, Westford, MA 01886 • 617-692-3900.

□ NET/PLUS

Type • baseband, packet-switched network using coaxial cable; bus topology • based on Ethernet and IEEE-802.3 specifications • provides over 20 LAN networking products.

Transmission Speed • 10M bps.

Cable Length • 500 meters (1,500 feet) between repeaters, 2,500 meters (7,500 feet) end-to-end between stations for point-to-point communication; 50 meters (150 feet) station-to-transceiver.

Application • multivendor environment for host-to-host, terminal-to-host, and device-to-device communication, and personal computer networking • interfaces DEC PDP-11 and VAX-11 computers to Ethernet and supports all DECnet III functions over Ethernet-compatible network; provides Ethernet which supports 4 levels of Open System Interconnection (OSI) standard of ISO, based on Xerox Network System (XNS) architecture; and networks the most popular personal computers using terminal emulation and file transfer software running on PC.

Configuration • up to 100 stations per segment, up to 1,024 stations per network; infinite number of stations using internetwork connections • supports DEC LSI-11 (Qbus), PDP-11, VAX-11, Multibus, and Data General Nova, Eclipse, and MV/Eclipse computers at Ethernodes; supports Apple, IBM, DEC, Intel, Motorola, Osborne, Televideo, Radio Shack, and Xerox PCs with multivendor PC software, and NTS terminal server for PC networking on Ethernet.

Interfacing • through NT10 Ethernet transceiver connected to Interlan communications controller or Network Terminal Server which contains an Ethernet Protocol Module.

Gateways • through Etherway (software) modules to DECnet; through Ethernodes to other Ethernets • planning SNA gateway products as cooperative venture with XICOM.

First Announced • January 1982 for first communication controller.

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Systems Installed • 4,200 nodes (estimated); 80 percent of which are active; 20 percent are used for spares.

Pricing • purchase price is \$290 for NT10 Ethernet Transceiver, \$2,000 for network repeater, \$3,190 for Unibus Communication Controller Board, \$2,290 for Qbus Communication Controller Board, \$1,390 for Multibus Communication Controller Board, \$2,490 for Data General Communication Controller Board, \$3,200 for 8-port NTS10, \$2,500 for 4-port NTS10, \$150 for PC Terminal Emulation Software for various PCs, and \$150 to \$250 for file transfer facility for various PCs.

INTERNATIONAL BUSINESS MACHINES (IBM) CORPORATION

Information Systems Group (ISG); 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

□ 8100 Loop

Type • host-controlled loop; privately provided cable.

Transmission Speed • 9600 bps or 38,400 bps.

Cable Length • 2,000 feet.

Application • commercial data processing, word processing, electronic message/mail.

Configuration • requires IBM 8100 as controller; up to 19 loops per 8100 • supported devices include PC, 3274/3278 cluster display terminals; 3274/3279 cluster color display terminals, 8775 Display, 3262/3287/3289 Printers, 3501/3521, 2502-A1 Punched Card Equipment, 3640 Series Plant Communication Devices; number of devices limited by line speed, not connections.

Interfacing • ports support attachment of a local loop (data link attached), a remote terminal, or a local terminal.

Gateways • to IBM SNA and to X.25 through IBM 3705 Communications Processor and S/370-compatible system.

First Announced • first delivery of 8130 and 8140 in August 1979.

Systems Installed • over 30,000 systems.

Pricing • purchase price for predefined loop/communication attachment sets are as follows • features for 1 to 4 ports on 8140C: set of 2 direct-attached loops, 2 SDLC/EIA/CCITT line interfaces up to 9600 bps for \$4,138 (\$44 monthly maintenance); set of 3 direct-attached loops, an SDLC/EIA/CCITT line interface up to 9600 bps for \$4,289 (\$44 monthly maintenance), with an SDLC/X.21 switched line interface up to 48K bps for \$4,860, and with non-switched \$4,685; 3 direct-attached loops, an SDLC/V.35 line interface to 56K bps is \$4,476 (\$43 monthly maintenance) • features for 5 to 8 ports on 8140C includes set of 1 direct attached loop, 3 SDLC/EIA/CCITT is \$4,447 (\$45 monthly maintenance); 4 SDLC/EIA/CCITT line interfaces for \$4,296 (\$45 monthly maintenance) • features for 9 to 10 ports: 2 SDLC/EIA/CCITT line interfaces for \$2,376 (\$23 monthly maintenance) • network adapter for non-switched X.21 network up to 48K bps is \$770 (\$2 monthly maintenance), switched up to 48K bps for \$945 (\$2 monthly maintenance) • contact IBM for detailed pricing; the pricing of single items in this survey cannot accurately reflect the specific user configuration requirement.

□ Series/1 Ring

Type • baseband ring network using CSMA/CD variation as access protocol; supports resource sharing among Series/1 processors in peer-to-peer relationship; variable frame length up to 1000 bytes.

Transmission Speed • 2M bps.

Cable Length • 5,000 feet between any 2 Series/1 processors using twinaxial cable and 2,000 feet using coaxial cable.

Application • general data processing: airline customer service/baggage environment, manufacturing plant-floor environment, shipping/receiving functions.

Configuration • up to 16 Series/1 processors are supported in

ring configuration, communicating with each other in peer-to-peer relationship; by use of Local Communication Controller (LCC), units can share resources while each performs different tasks; LCC is supported by Communications Monitor under Event Drive Executive (EDX).

Interfacing • Local Communication Controller (LCC) provides high-speed serial data communication between 2 or more (up to 16) Series/1 processors in peer-to-peer full-duplex mode to access common files/data/resources.

Gateway • to SNA via IBM 3270 emulation and Multileaving Remote Job Entry (MRJE) facility; Series/1 can appear as multiple SNA Logical Unit 1s • host connection support under both EDX and RPS operating systems • Series/1 can also connect directly to I/O channel of S/370-compatible host.

First Announced • 1982.

Systems Installed • undisclosed.

Pricing • purchase price for the Local Communication Controller (LCC) is \$4,370 (\$16 monthly maintenance).

□ IBM Personal Computer Cluster

Type • baseband bus network using coaxial cable and CSMA/CA (collision avoidance) access protocol to interconnect IBM PC models including PCjr, PC/XT, and PC Portable • features message and file transfers, message broadcast capability, and disk server option.

Transmission Speed • 375K bps.

Cable Length • up to 1,000 meters (3,280 feet) of 75-ohm coaxial cable; maximum length of cable drop is 5 meters (18 feet).

Application • sharing of disk and exchanging of data and messages among up to 64 IBM personal computers • disk server provides one public volume shared by cluster and one private volume for each PC on the cluster; other volumes are used by disk server.

Configuration • clustered, multiuser configuration includes any mix of up to 64 IBM PCs, PC/XTs, PC Portables, and PCjr; supports PCjr without diskettes by downline loading DOS and an application program • PC/XT or PC with expansion unit, 256K-byte memory, and double-sided diskette drive can be designated as a disk server • all PCs require a minimum of 128K bytes of memory; each PC requires a PC cluster adapter and each PCjr requires PCjr cluster attachment to connect to the cable and to designate the PC's station address; the PC adapter switch specifies remote IPL; PCjr attachment is pre-set for remote IPL; requires one full-sized expansion slot • supported by PC Cluster Program which runs under PC-DOS 2.1; requires 29K bytes of memory on remote PC, 34K bytes on remote PCjr, and 136K bytes on disk server station; Information Transfer Program supports message broadcasts, message creation and transmission, and file transfers between any 2 computers in the cluster whether or not the cluster contains a disk server • one of the computers in the cluster must have a double-sided diskette drive • implemented using PC cluster cable kit option that provides connection of 2 IBM PCs to form a cluster; includes about 10 meters (32 feet) of main coaxial cable bus, 2 cable drops (about 3 meters/9 feet), 2 BNC T-connectors, and 2 terminator plugs; 3 or more PCs can be interconnected using multiple cluster cable kits; one required per PC added to the cluster.

Interfacing • through PC Cluster Adapter for IBM PC, Portable PC, and PC/XT; through IBM PCjr Cluster Attachment for PCjr; adapter and attachment include switches to select the station address on the cluster; PC adapter includes facility to select remote IPL of DOS and application program; PCjr attachment is pre-set to remote IPL.

Gateways • none.

First Announced • February 1984.

Systems Installed • first deliveries are scheduled for second quarter 1984.

Pricing • purchase price is \$400 for IBM PCjr Cluster Attachment, \$340 for IBM PC Cluster Adapter, \$110 for Cluster Cable Kit, and \$30 for BIOS Update Kit to allow older PCs to attach PC Adapter; volume discounts are 5% for quantity 3 to 10

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and 8% for quantity 11 to 19; maintenance service is not offered for the IBM PC Cluster Cable Kit • one-time license fee is \$92 for IBM PC Cluster Program use on a single PC and \$400 for a 5-pack version that allows the PC Cluster Program use on 5 PCs; volume discounts are 12% for quantity 20 to 49 licenses, 16% for 50 to 149 licenses, and 20% for 150 or more.

■ INTERSIL SYSTEMS, INC—See GENERAL ELECTRIC

■ 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 • about 6,500 in U.S. and 4,500 abroad (estimated).

Pricing • a user can begin with a single VPU and DSS and add 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 \$2,495, and Model 30 \$2,995 • purchase price of the 10M-byte DSS is \$3,995, 144M-byte DSS is \$7,995, and multiuser controller interface is \$2,995.

■ LANIER BUSINESS PRODUCTS, INC (A HARRIS COMPANY)

1700 Chantilly Drive NE, Atlanta, GA 30324 • 404-329-8000.

□ Lanier Business System 5000

Type • baseband network using coaxial cable bus architecture and token-passing access protocol.

Transmission Speed • 1.25M bps.

Cable Length • up to 3,000 feet.

Application • office applications including electronic mail, word

processing, executive applications, graphics processing, database management, scientific calculations, personal computing, and communication.

Configuration • Lanier Business System 5000 operates as the network controller that connects up to 10 nodes to the network; multiple LBS 5000s can connect to the network; a node is single workstation (EZ-1 or LBP 1000), a dual workstation (EZ-2), or another network controller (LBS 5000) • LBS 5000 includes a CPU, 256K to 1.7M bytes of memory, network controller, and file server with 100M bytes of disk storage; provides network management, database service, background processing, and communication processing for its workstations; runs under LEXS operating system.

Interfacing • through LBS 5000.

Gateways • to IBM networks through IBM 2780/3780 and IBM 3270 (SNA/SDLC) emulation and to Digital Equipment through VT52 and VT100 emulation.

First Announced • July 1983.

Systems Installed • undisclosed; deliveries began January 1984.

Pricing • purchase price is \$8,900 for minimum LBS 5000 Network Processor, \$4,995 for EZ-1 Workstation, \$8,400 for EZ-2 with dual keyboard/displays, \$2,995 or LBP-1000 Word Processing System, and \$8,995 for color graphics terminal.

■ LOGICA, INC

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

□ Polynet

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

Transmission Speed • 10M bps.

Cable Length • 350 meters (750 feet) maximum between nodes; about 5 miles with use of 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, IBM PC, VAX, Prime, and Tandem computers.

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

First Announced • 1977.

Systems Installed • 75.

Pricing • purchase price is approximately \$1,000 per connection, including interface and software.

■ M/A-COM DCC, Inc

11717 Exploration Lane, Germantown, MD 20874-2799 • 301-428-5500.

□ Infobus

Type • broadband local area network using CATV coaxial cable organized in dual cable design, each cable providing 300- to 400-MHz bandwidth for inbound/outbound communication • uses CSMA access method • supports permanent and switched connections in application-oriented environment • designed for data/voice/video applications.

Transmission Speed • 1M bps synchronous on coaxial cable; device channels support 50 to 9600 bps asynchronous in half-/full-duplex mode.

Cable Length • up to 3 miles.

Application • laboratory analysis, patient scheduling, project management, electronic mail, inventory control, customer billing.

Configuration • dual cable topology; the system includes multiple Cable Access Processors (CAPs), 1 or more Network Management Facilities (NMFs), and customer-supplied RS-232C

Local Area Networks (LANs)

devices • the microprocessor-based CAP supports 2 to 4 device ports; up to 500 CAPs (1024 ports) can be supported on a single network • the NMF is a Convergent Technology workstation (supplied by M/A-Com) based on Intel 8086 16-bit processor; includes high-resolution 15-inch video display, keyboard, printer, up to 1M bytes of RAM, and mass storage; memory and mass storage are optionally available in varying capacities to support the size of the network; 1 NMF can support full-capacity network • user-supplied RS-232C devices can include printers, CRTs, workstations, word processors, front-end processor, and hosts computers • software resides in either the NMF or CAP • NMF software includes real-time multitasking operating system written in Pascal for downline-loading CAPs, system generation and configuration, maintenance and diagnostics, and continuous monitoring of system • CAP software is real-time Communication Executive (CAPEXEC); controls execution of processes in multiprogramming environment; includes database management, memory management, services for user application requests, and protocol implementation (CSMA).

Interfacing • through CAP which provides RS-232C interface to devices; CAP supports up to 4 synchronous/asynchronous ports with 1 bus port.

Gateways • currently none; planned X.25 to packet-switched networks.

First Announced • January 1983.

Systems Installed • Beta test only.

Pricing • purchase price of each port interface is \$650; 1 4-port CAP is \$2,600 • purchase price of an NMF system is between \$25,000 and \$35,000 plus \$700 per port.

■ M/A-COM LINKABIT, INC

3033 Science Park Road, San Diego, CA 92121 • 619-457-2340.

□ IDX-3000 Local Communication Network

Type • digital data switch network system providing non-blocking switching and multiplexing, management and controls for interconnecting large numbers of distributed computers/terminals/peripherals • twisted-pair wire cable; user access to network through host processor or dedicated processor independent of Network Interchange System • microwave or satellite connections.

Transmission Speed • 1.544M bps between MX24/MX48 and Network Interchange System; supports groups of 24 full-duplex channels at 19.2K bps for asynchronous communications; supports up to 128 high-speed full-duplex I/O trunks, each providing 1.544M bps full-duplex data stream for 24 multiplexed channels.

Cable Length • up to 1.2 miles.

Application • network switching and control functions for distributed data processing • M/A-Com Linkabit software on controller processor supports module self-test, system diagnostics, prioritization of user statistics, policy enforcement, and automatic switchover capability in event of system failure.

Configuration • network supports 128 multiplexers, each supporting 24 lines, for a total of 3,072 devices • network based on 2 components: the IDX-3000 multiplexers (MX24/MX48 Series) and the Network Interchange System • each MX24 multiplexer supports 24 RS-232C asynchronous connections to terminals (the MX48 is a dual MX24 in a single cabinet) and serves as communication path for all computers/terminals to the Network Interchange System • Network Interchange System provides controls and switching for 128 multiplexers and consists of 2 types of modules: control module(s) and switch module(s); at least 1 control module is required per IDX-3000 but up to 4 can be installed for increased throughput or to provide redundancy; switch module provides switching for up to 4 MX24 multiplexers (96 lines); system supports up to 36 switch modules and 7 backup switch modules on a full 3072-line network • Network Interchange receives control commands for user access from up to 16 user control computers or dedicated processors external to Network Interchange, each computer connects to switch through its attached multiplexer; Network Interchange includes equipment rack that holds 1 or 2 card cages, each card cage

supports 1536 lines; each Network Interchange also contains dual power busses for connection to redundant power supplies • a standalone network controller that works with any asynchronous minicomputer is under development; permits manager to access controller from any terminal on the network.

Interfacing • through host or dedicated processor and MX24/MX48 multiplexer; 2 electrical interfaces between multiplexer and Network Interchange are optionally available; an 8-wire RS-422 for distances up to 200 feet; and a 4-wire (2 twisted pairs) T1 modem interface for distances up to 6,000 feet • rear panel of each Network Interchange card cage contains 64 D connectors for MX24 multiplexers; also contains 64 MX24 transceivers (either RS-422 or T1).

Gateways • through standard AT&T 1.544M-bps DS-1 format, the IDX-3000 can interface with standard microwave, satellite links, or leased lines • planned synchronous capability at 56K bps per line.

First Announced • May 1982.

Systems Installed • undisclosed number of systems in field.

Pricing • costs are from \$150 to \$300 per line, depending on network size and options.

■ MICOM SYSTEMS, INC

20151 Nordhoff Street, Chatsworth, CA 91311 • 213-998-8844.

□ INSTANET Local Network

Type • digital data switch network "piggybacking" full-duplex transmission over a voice conversation on a single pair of wires; uses 4 wires (2 twisted pairs) for T1 links.

Transmission Speed • up to 19.2K bps per port over single pair; up to 9600 bps per port on T1 link local multiplexer; and up to 1.544M bps on T1 link.

Cable Length • over a mile between port and data PBX over 2-wire slow-speed or 4-wire high-speed link; distance of high-speed link can be expanded to 5 or 10 miles using radio or microwave instead of 4-wire line.

Application • designed to provide an optimum shared network for many asynchronous terminals to access multiple host computers; emphasis is on low cost per terminal hookup and convenient terminal installation and relocation.

Configuration • heart of network is Micro 600 data PBX that provides switched access to thousands of terminals simultaneously, operates as network manager, controls computer access on basis of priority or security assignment, and performs fallback switching for critical applications • other components include INSTALINK, a voice/data multiplexer that piggybacks data transmissions on voice transmissions by using high-frequency bandwidth above range of human hearing; includes telephone port and terminal port and connects existing telephone line; at the switch site, INSTALINK demultiplexes voice and data and provides one port for voice PBX and one port for data PBX; provides asynchronous transmissions at up to 19.2K bps • INSTAMUX provides 4/8 ports to allow multiple terminals to share a single 2-wire line and a line driver; at Micro 600 PBX site, another INSTAMUX module demultiplexes data from the different terminals • INSTATRUNK is T1 local multiplexer that supports up to 128 terminals or computer ports each operating at 9600 bps over a T1 link; also available as plug-in module for Micro 600 data PBX to provide direct connection between a remote INSTATRUNK and Micro 600 or between 2 data PBXs • PBX can be configured with over 1,500 ports • multiple Micro 600s in an INSTANET can increase number of ports supported.

Interfacing • single terminals interface to 2-wire telephone facility through INSTALINK voice/data multiplexer; clusters of 4/8 terminals interface to 2-wire telephone facility INSTAMUX local multiplexer; large clusters of 32/64/96/128 terminals and computers interface to T1 link through INSTATRUNK • port interface is RS-232C, serial asynchronous, and full- or half-duplex for INSTALINK or INSTAMUX; port interface for INSTATRUNK is the same except operates only in full-duplex mode.

Gateways • provides modem pooling with automatic outdial for gateway to public telephone network; Micro 800/2 Data

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Concentrator allows a remote cluster of up to 16 asynchronous terminals to use a single leased line operating at 19.2K bps to communicate with Micro 600 PBX; a card module version of Micro 800/2 plugs directly into the Micro 600 • special version of Micro 800/X.25 Concentrator PAD provides 16 asynchronous access ports to a single X.25 access link operating at 19.2K bps • an optional Interconnect Facility allows multiple Micro 600s in an INSTANET • INSTATRUNK multiplexer provides access to telephone company's T1 links for communication with remote computer centers and local networks.

First Announced • 1979.

Systems Installed • over 1,000 INSTANETs (many include multiple Micro 600s).

Pricing • purchase price of a Micro 600 data PBX is \$6,000 for a tabletop model with 60 lines/ports and \$10,000 for a standalone model with 120 lines/ports; additional lines/ports range from about \$25 to \$50 each in groups of 120/128 lines/ports • purchase price is \$250 for an INSTALINK for a single-line telephone/terminal, \$695 for a 4-channel INSTAMUX, and \$3,200 for a 32-channel INSTATRUNK • purchase price is \$1,850 for a 4-channel data concentrator and \$2,750 for an 8-channel X.25 Concentrator PAD.

■ MOLECULAR COMPUTER

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

□ SuperMicro Multiuser Microcomputers

Type • Z80A or Z80B 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, CP/M-86, MP/M, MP/M-86, and MS-DOS-compatible environments.

Configuration • network environment consists of a single File Processor running n/STAR Network Operating System compatible with CP/M, CP/M-86, MP/M, MP/M-86, and MS-DOS; supports 8-, 16-, or 32-user application processors; File Processors offered by Molecular Computer are Z80A or Z80B 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 16X supports 16 user application processors and includes 1M-byte diskette drive and up to 180M bytes of disk storage; the SuperMicro 32X supports 32 user application processors and includes 1M-byte 8-inch diskette drive and up to 240M bytes of disk storage • 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.

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

Systems Installed • over 2,500.

Pricing • purchase price is \$5,995 for a SuperMicro 8 with 10M-byte disk, \$14,995 for SuperMicro 16X with 30M-byte disk, and \$18,995 for SuperMicro 32 with 60M-byte disk • 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 16X systems.

■ MORROW MICRO DECISION

600 McCormick Street, San Leandro, CA 94577 • 415-430-1970.

□ MORROW Network

Type • baseband network using CSMA/CA access control method; uses twisted-pair telephone lines.

Transmission Speed • 500K bps.

Cable Length • up to 1,000 feet.

Application • interconnection of Morrow Micro Decision business and personal computers; resource sharing.

Configuration • includes front end, basic workstation, printer, file server, server interface, and back end • front end allows a computer with diskette to access workstations, printers, and central file server on the system; back end operates as central server with cache manager to handle multiple overlapped I/O operations; central file server provides 3 levels of record and file locking with file access for application programs on the network.

Interfacing • baseband transceiver which plugs into connector on workstations and computers • developing interface board for IBM PC.

Gateways • none; IBM SNA through 3270 emulation by fourth quarter 1984.

First Announced • November 1983.

Systems Installed • none; first shipments scheduled for May 1984.

Pricing • purchase price is \$250 per baseband transceiver interface; \$1,595 for minimum workstation; and \$2,400 for file server that includes disk, controller, interface to network, and software.

■ NBI, INC

P.O. Box 9001, Boulder, CO 80301 • 303-938-2795.

□ NBINET

Type • baseband local area network that conforms to IEEE-802.3 Committee recommendation; uses CSMA/CD access method.

Transmission Speed • 10M bps.

Cable Length • up to 500 meters (1,640 feet) per cable segment; multiple segments allowed per networks for maximum distance between nodes is 2.5 kilometers (8,200 feet).

Application • distributed data/word processing for office automation applications using NBI products.

Configuration • provides interconnection for NBI OASys systems, SYSTEM ONE Integrated Work Stations, and SYSTEM ONE Integrated System Server • server provides file, communication, and print services for the other systems on the network and manages the database, electronic mail system, scheduling, and the calendar system; also translates programs and data between the OASys and SYSTEM ONE • can also connect to other vendor's devices with interfaces that conform to the IEEE-802.3 Committee standard • up to 1,024 devices can connect to NBINET.

Interfacing • through baseband transceiver.

Gateways • none currently.

First Announced • April 1983.

Systems Installed • none, still in internal test; first deliveries scheduled for second quarter 1984.

Pricing • purchase price is \$12,500 for SYSTEM ONE Integrated Workstation, \$29,500 for System Server, and \$2,995 for OASys 2000 Personal Computing Workstation; cost to connect one port to NBINET will be about \$900.

■ NCR CORPORATION

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

□ Decision Net

Type • baseband local area network; uses Corvus Omninet network combined with NCR MODUS file sharing system and

Local Area Networks (LANs)

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 can 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, 10M- 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 • IBM 2780/3780 RJE through MODUS; X.25 and IBM 3270 (SNA) under development.

First Announced • January 1983.

Systems Installed • company declined to disclose; deliveries began October 1983 and on target; average system has 5 to 6 PCs per network.

Pricing • purchase price for 8-bit processor model of Decision Mate V begins at \$2,800; for dual-processor model is \$3,340 • the MODUS file sharer sells for \$6,000 for average system price of about \$13,000 • purchase price is \$895 for RJE hardware and software • hardware LAN interface costs \$500 per personal computer.

□ MIRLAN (Mid-Range Local Area Network)

Type • baseband network using bus topology and CSMA/CD protocol; conforms to IEEE-802.3 Committee recommendation although standard built around 10M-bps data rate.

Transmission Speed • 1M bps.

Cable Length • 4,000-foot cable segments; with repeaters, cable length (end-to-end) can be up to 12,000 feet; cable can be shielded twisted pair or CATV coaxial cable.

Application • primarily interconnection of point-of-sale terminal clusters where high-speed network not required.

Configuration • up to 40 connections (nodes) per cable segment between repeaters; up to 1,600 connections (nodes) maximum.

Interfacing • through baseband transceiver and Intel 82586 controller (3-chip set) to implement the CSMA/CD access protocol.

Gateways • none; under development.

First Announced • May 1983.

Systems Installed • still under development; first retail product will be a mass merchandising product with first delivery by end of 1984.

Pricing • not released yet.

■ NESTAR SYSTEMS, INC

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

□ PLAN (Personal Local Area Network) Series

Type • baseband network using coaxial cable and token-passing access scheme; designed around ARCnet and Ethernet

technologies using physical and data link layers of ARCnet and Ethernet protocols as network and transport layers of ISO model • connects Apple II and Apple III families, and IBM Personal Computers (excluding PCjr) in a shared-resource environment.

Transmission Speed • 2.5M bps.

Cable Length • up to 4 miles between stations.

Application • automated office; shared-resource environments; electronic mail through MESSENGER application program.

Configuration • each network segment can support up to 255 workstations that include Apple II, Apple III, 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 for PLAN 4000, 15M bytes for PLAN 3000, and 10M/20M bytes for PLAN 2000 • PLAN 4000 includes integral high-speed tape unit with 20M- 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 • PLAN 2000 File Server can run on IBM PC/XT under PC-DOS or UCSD p-System; 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 hard copy, 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 Apple II or III, or IBM PC slot and connects the system to the 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 for PLAN 3000 or 4000 to network is built into cabinet; LID in PLAN 4000 File Server Cabinet provides 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 • Ethernet 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, PLAN 4000; November 1983 for PLAN 3000 and PLAN 2000.

Systems Installed • about 500 PLAN 4000s with average of about 20 stations (computers) per network; about 500 PLAN 2000s with average of 2/4 stations per network; PLAN 3000 deliveries beginning with average of 10/15 stations per network.

Pricing • purchase price of Network Interface Card for Apple II/III or IBM PC is \$595 • purchase price of PLAN 4000 File Server (floor unit) with streaming tape backup is \$16,000 for 30M-byte disk drive, \$20,000 with 60M-byte disk drive, \$24,000 for 137M-byte drive, and \$14,000 for additional 137M-byte drive • purchase price of PLAN 3000 File Server (tabletop unit) is \$9,995 • PLAN 2000 File Server is a program that converts IBM PC/XT and its 10M-/20M-byte disk into a file server; purchase price of PLAN 2000 starter kit with 2 Network Interface Cards, network software, and cabling bundled with 1 or more application programs is \$1,995.

■ NETWORK SYSTEMS CORPORATION

7600 Boone Avenue North, Brooklyn Park, Minneapolis, MN 55428 • 612-425-2202.

Local Area Networks (LANs)

□ HYPERbus

Type • baseband network using single multidrop coaxial cable data trunk; uses CSMA/CA (Collision Avoidance) access method • packetized data transmission protocol; 16-byte control envelope with up to 4,096 data bytes.

Transmission Speed • 10M bps.

Cable Length • function of number of taps and type of cable: with 2 taps to support up to 128 terminals, up to 4,080 feet; with 128 taps to support up to 2,048 terminals/devices up to 1,320 feet • can be extended to a maximum of 15,000 feet using low-loss coaxial cable.

Application • general-purpose network for interconnection of terminals, minicomputers, and processors; supports high-speed digital communication for computer terminals, graphic subsystems, and test stands in single- or multivendor environment; also operates in IBM 3270 terminal environment.

Configuration • NSC has arbitrarily limited a coaxial cable segment to 128 Bus Interface Units (BIUs); the total number of BIUs using multiple segments connected together using link BIUs is virtually unlimited • depending on type, a BIU can provide 1, 2, 4, 8, 12, or 16 ports to HYPERbus • local HYPERbusses can be extended geographically and interconnected through communication link BIUs; adjacent HYPERbusses (cable segments) can be interconnected using direct link BIUs • direct link BIUs can link to HYPERchannel and gain access to mainframe computers • can be configured with Centralized Bus Service Center (BSC) for network control.

Interfacing • through intelligent Bus Interface Units (BIUs) which support asynchronous and synchronous devices, IBM 3270 controllers and terminals, minicomputer DMA channel (16-bit), standard communication links, and HYPERchannel.

Gateways • through link BIUs to other HYPERbusses, HYPERchannel, standard communication links (RS-232C and AT&T T1), and minicomputers.

First Announced • January 1983.

Systems Installed • 35 network systems (1,700 nodes) as of January 1984.

Pricing • purchase price is \$7,200 for a 16-port BIU for asynchronous RS-232C DTEs with port data rate up to 19.2K bps, \$6,000 for a minicomputer BIU with 16-bit interface and data rate up to 10M bps, \$5,000 for Direct Bus Link BIU to interconnect adjacent HYPERbusses, \$6,150 for HYPERchannel Access BIU, and \$25,675 for Bus Service Center (BSC) for network control.

□ HYPERchannel

Type • baseband network using single multidrop coaxial data trunk, passive, with CSMA/CA (Collision Avoidance) access method • packetized data transmission protocol: 9- to 64-byte control messages with unlimited number of data bytes.

Transmission Speed • 50M bps.

Cable Length • up to 5,000 feet.

Application • high-speed computer-to-computer transmissions in manufacturing, financial, communications, airlines, laboratory, and research environments.

Configuration • a minimum system can attach up to 16 adapters—therefore 16 computers—to a 1,000-foot data trunk; for a maximum system, each adapter can attach to up to 4 data trunks—therefore to 64 adapters and computers • multivendor environment includes IBM 370-compatible, CDC CYBER, Sperry 1100, Honeywell Series 60 and 6000 (GCOS-3), Digital Equipment PDP-11 and VAX-11, Tandem NonStop, Gould SEL 32, APOLLO, and CRAY-1; interconnections include such equipment as host processors, front-end processors, storage systems, and I/O equipment.

Interfacing • HYPERchannel microprocessor-based network adapters for specific devices: processor adapters, 2 types of peripheral device adapters, and 2 types of link adapters; support multivendor environment • processor adapters interface processor data channel to network of data trunks; device adapters function as remote data channel for peripheral controller or as

data channel and controller for some peripherals; link adapters interconnect HYPERchannel with terrestrial and satellite communication links • Network Systems provide adapters for over 10 vendors' processors, for the IBM block multiplexer channel, for Cray and CDC disks, and for comm links up to 6.3M bps (satellite) and 44.7M bps (terrestrial).

Gateways • limited to network-to-network interconnection extensions via Link Adapters: B700 interfaces HYPERchannel to HYPERbus; Model A710 Link Adapter (block-to-block data acknowledgement) extends interconnection capabilities to hundreds of miles distance by communication over multimegabit T-1 land lines and T-3 private microwave systems (supports AT&T 303/306, military KG34, and RS-232C interfaces); and Model S720 Satellite Link Subsystem extends interconnecting capabilities to thousands of miles distance via digital communication satellite similar to SBS • access to multivendor hosts • NETEX (Network Executive) provides host-to-host communication and universal access to computer systems interconnected by HYPERchannel; allows any 2 applications programs in separate hosts to communicate.

First Announced • 1977.

Systems Installed • over 260 networks (2,000 nodes).

Pricing • purchase price per computer port is from \$12,000 to \$40,000 depending on system and configuration • purchase price of \$40,835 for the LINK adapter supporting 44.4M-bps data rate and \$6,150 for B700 connection to HYPERbus.

■ NORTH STAR COMPUTERS, INC

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

□ NorthNet

Type • baseband local area network using shielded 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.

Transmission Speed • 888K bps.

Cable Length • up to 500 feet (twisted pair)/1,000 feet (twinx cable) per segment between branching repeaters; repeaters extend length to maximum of 4,000 feet (twisted pair)/8,000 feet (twinx cable); can mix cable types.

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 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 HDLC-like communication facility • ADVANTAGE runs under Graphics CP/M, GDOS/BASIC, and the proprietary North Star ASP • printer server provides shared access to matrix, letter-quality, and high-speed printers; file servers provide access to 5M- to 30M-byte disks; workstations can also use local disk and diskette storage • from 2 to 64 ADVANTAGE microcomputers 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 microcomputers serial or parallel I/O interface.

Gateways • none.

First Announced • June 1982.

Systems Installed • over 300.

Pricing • purchase price of a minimum network system is approximately \$1,566, including a WS-PACK (\$399),

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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 MC68000 16-bit processor centrally located in a star-configured topology and functions as file server for up to 24 microcomputers and 5 printers; provides disk functions and supports concurrent file access for 1 IBM PC running under PC-DOS and Z80-based microcomputers running under CP/M-80, CP/M-86, and p-System; via synchronization commands, workstation can simultaneously operate transaction processing, file and record locking/unlocking functions; "pipe" feature provides direct communications between 2 or more workstations • Network Processor configuration includes a Texas Instruments TMS99105 16-bit microprocessor acting as DMA controller for every 2 workstations supported on the network • from 20M- 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 • 714-261-8075 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.

■ ORCHID TECHNOLOGY

47790 Westinghouse Drive, Fremont, CA 94539 • 415-490-8586.

□ PCnet/PCnet PLUS

Type • baseband network with distributed bus topology using CSMA/CD access method.

Transmission Speed • 1M bps.

Cable Length • using standard 75-ohm CATV coaxial cable, 7,000 feet for RG11/U cable and 3,000 feet for RG59B/U cable.

Application • resource sharing and transparent networking for electronic mail and remote job execution.

Configuration • up to 256 addressable users, which are IBM PC, PC 2, XT, and PC compatibles running under PC-DOS 1.1 or 2.0, MS-DOS 1.25, and DOS BUBBLE • file server need not be dedicated • PCnet PLUS Multifunction Board (BLOSSOM) provides PCnet interface, up to 256 bytes of RAM, EPROM socket for Orchid-supplied or user-designed programs; an optional daughter board adds serial port, parallel port, and clock/calendar • PCnet PLUS Diskless contains firmware to allow PC to operate without attached disk drives • PCnet Floppy Controller includes controller and PCnet interface on single board • Orchid Turbo High-Speed Processor board increases PC performance and accommodates 640K bytes of memory for executing large programs; runs Orchid disk caching software.

Interfacing • through IBM PC Standard Bus.

Gateways • none.

First Announced • PCnet July 1982, PCnet PLUS August 1983.

Systems Installed • 20,000 PCnet boards, about 500 PCnet PLUS boards.

Pricing • purchase price is \$395 for the Orchid BLOSSOM (multifunction board with 64K-byte memory, serial and parallel ports, and a clock/calendar), \$795 for PCnet BLOSSOM (BLOSSOM with PCnet interface), \$495 for PCnet Daughterboard (adds PCnet to BLOSSOM), \$950 for PC Turbo-86 High-Speed Processor with 128K-byte RAM, \$1,095 for PC Turbo-186 High-Speed Processor with 128K-byte RAM, \$795 for PCnet PLUS Diskless adapter board, and \$1,490 for PCnet/PCnet PLUS Starter Kit (for setting up first 2 PCs in PCnet).

■ PERCOM DATA CORPORATION

11220 Pagemill Road, Dallas, TX 75243 • 214-340-5800.

□ PerComNet

Type • broadband network using physical bus but logical ring

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topology and token-passing access protocol.

Transmission Speed • 1M bps.

Cable Length • up to 10,000 feet overall, 500 feet between nodes or repeaters; each node acts as a signal amplifier, thus repeaters are needed only when distance between nodes exceeds 500 feet.

Application • business and industrial applications that require interconnection of personal computers for resource sharing.

Configuration • consists of up to 254 nodes interconnected through coaxial cable (standard Belden 9855/UL 2582 or Plenum Belden 89855); nodes currently can be IBM PCs or equivalents • IBM PC requires PN-IBM Interface Card which plugs into a slot on the PC • PN-IBM includes the Western Digital (WD) 2840 Network Control Processor, cable interface, Manchester modem, and 64K-byte RAM buffer; the WD2001 NBS Encryption module optional • PN-IBM interface card permits an IBM PC to be used as a network server for shared access to disks and printers • initially Percom will support MS-DOS, UNIX, and CP/M operating systems.

Interfacing • through Manchester-type modem in the PN-IBM Interface Card.

Gateways • none currently.

First Announced • September 1983.

Systems Installed • about 20 evaluation systems; deliveries to begin in May 1984.

Pricing • purchase price is \$595 for PN-IBM 64 Network Card with 64K-byte FIFO buffer, \$750 for PN-IBM 64C Network Card that adds data encryption capability, \$350 for Network Cable Repeater with terminator plug, and \$40 for PNC-10S (10-foot) cable • purchase price is \$1,695 for an Evaluation Kit that includes 3 PN-IBM 64 Network Cards, 2 PNC-10S 10-foot cables and a PNCT-2 set of 2 terminator plus, and Demo Diskette.

■ PERQ SYSTEMS, INC

2600 Liberty Avenue, P.O. Box 2600, Pittsburgh, PA 15230 • 412-621-6250.

□ Ethernet

Type • baseband network follows Ethernet specifications; supports up to 1024 single-user PERQ systems interconnected by coaxial baseband cable; uses CSMA/CD access protocol • Ethernet interface conforms to published specifications for physical and data link layers.

Transmission Speed • up to 10M bps.

Cable Length • 2,500 meters end-to-end.

Application • distributed processing environment supports office automation with text/processing and electronic mail facilities, business/engineering applications with interactive graphics and CAD/CAM, and online document generation.

Configuration • network supports up to 1024 PERQ independent workstations sharing printers, tape drives, and distributed file systems • PERQ system is microprogrammed minicomputer that executes Pascal Q-code; CPU supports 256K-byte RAM expandable to 1024K bytes; integral 12M- or 24M-byte disk; integral keyboard display supports high-resolution graphics; optional 9-track, 800-/1600-bpi magnetic tape unit with controller • PERQ operating system features 32-bit segmented virtual memory space mapped into 20-bit physical address (1 megaword) segments; Process Manager controls single-process environments; I/O system includes distributed file system with multiple tree-structured directories • I/O interfacing includes I/O card with I/O Channel Controller for high-speed devices and 8-bit microprocessor for low-speed devices; I/O channel multiplexes 4 high-bandwidth devices (disk, network, and 2 optional controllers); IEEE-488 interface available; RS-232 communication interface, line and protocol parameters are programmable, PERQ support for full-duplex, asynchronous communications at up to 9600 bps.

Interfacing • Ethernet Local Network Interface/Controller integral to PERQ systems; also provides access to shared resources such as printer and tape drives by connecting a resource to single PERQ on network.

Gateways • currently none.

First Announced • 1979.

Systems Installed • over 1,000 PERQ systems with approximately 80% installed in networks.

Pricing • \$25,000 to \$35,000 per workstation.

■ PRAGMATRONICS, INC

2015 10th Street, Boulder, CO 80302 • 303-444-2600.

□ TIENET

Type • baseband network using bus topology and CSMA/CD access control scheme.

Transmission Speed • 1M bps.

Cable Length • up to 500 feet from user station to cable (300 feet to TIE and 200 feet from TIE to transceiver tap); up to 10,000 feet of coaxial cable (50 or 75 ohm) end-to-end; with repeaters single-segment systems can be extended to 5 cable miles; data communication links can connect remote TIENETS, and the linked networks function as single network • can grow as unrooted tree.

Application • generic network suitable for any general business application: file sharing.

Configuration • up to 200 TIEs connecting 1,600 user stations (terminals or computers) per network cable segment with up to 65,000 station addresses per network • implement OSI model Levels 1, 2, and 3 and 80% to 90% of Levels 4, 5, and 6 • Station Boards in the TIE establish the computer or terminal "personality"; terminals can operate in command mode to make and break connections, change parameters, and so on; computers can operate as network server or network user for both terminal mode and file-transfer mode • other personality boards available for diagnostic and supervisory functions.

Interfacing • through baseband transceiver connected to a TIE, which supports up to 8 user stations installed within 300 feet of TIE; user interface is RS-232 or RS-449; supports synchronous or asynchronous, half- or full-duplex operation and BSC or HDLC DTEs and DCEs • supports data rates up to 9600 bps for terminals and 19.2K bps for computers.

Gateways • bridges to other TIENETS and NBSNET; Ethernet bridge and X.25 Gateway under development for fourth quarter 1984 delivery.

First Announced • October 1982.

Systems Installed • 100 nodes (over 600 user stations).

Pricing • purchase price is \$2,583 for an 8-station TIE and transceiver; \$552 for each computer or terminal personality board; \$774 for each network/packet/connection monitor board; \$663 for network debug interface board; and \$2,708 for an active digital repeater • average connection cost per station is \$773 in 40-station configuration.

■ PRIME COMPUTER INC

Prime Park, Natick, MA 01760 • 617-655-8000.

□ RINGNET

Type • baseband network using shielded twinax cable; peer-to-peer unidirectional packet-switched loop using token passing for access control; transmits frames 4 to 2,048 bytes long.

Transmission Speed • to 10M bps.

Cable Length • cable length of 230 meters (750 feet) node-to-node.

Application • distributed processing for commercial, financial, and industrial environments.

Configuration • up to 255 node controllers per ring, each controller attached to a Prime computer • supported by PRIMENET software running under PRIMOS.

Interfacing • through PNC (PRIMENET node controller).

Gateways • integral part of PRIMENET • Multiple Data Link Controller (MDLC) and Prime 50 Series Computer support X.25, BSC, CDC 200 UT, Sperry 1004, ICL 7020, and Honeywell GRTS.

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First Announced • 1979.

Systems Installed • undisclosed.

Pricing • depends on configuration requirements; the PNC (PRIMENET node controller) costs \$5,000 with additional charge for cabling.

■ PROLINK CORPORATION

5757 Central Avenue, Boulder, CO 80301 • 303-477-2800.

□ Proloop

Type • baseband coaxial cable system using bus or loop topology interconnecting Prolink intelligent devices • TDM 10-MHz baseband cable provides 16 full-duplex, 64K-bps channels reserved for bidirectional voice transfers; remaining bandwidth uses contention scheme for text/data transmission.

Transmission Speed • up to 10M bps.

Cable Length • 500 feet between active nodes; up to 1,000 feet.

Application • automated office environments including data/word processing, electronic spreadsheet, business accounting, and PBX functions.

Configuration • components include an applications processor unit (APU), workstation, hard disk, floppy disk, letter-quality and dot-matrix printer, tape drive, and programmed branch exchange (PBX) device; all devices interface to the LAN through the APU • APU is an Intel 8086-based microprocessor with 288K to 672K bytes of RAM; network will support up to 62 APUs (nodes) • an APU with a CRT and a keyboard becomes a workstation for interactive application processing • each node on the LAN can support up to 2 hard disks, 10M-/30M-byte Winchester drives, floppy disk, 600K-byte dual-sided, double-density drive is packaged as a single or dual drive unit as well as combined in one unit with the 10M-byte hard disk • supported printers include the Diablo 630 letter-quality printer, the GE 3404 Dot-Matrix Printer, and the Epson FX100 Dot-Matrix Printer; printers attach to one of the two RS-232C ports available on each APU • tape drive is a 20M-byte streaming cartridge tape • PBX can handle up to 40 trunks and 128 stations in increments of 5 trunks and 16 stations; the Prolink-2500 telephone handsets attach to the PBX, which also supports other selected multiline sets and single-line multifeature sets.

Interfacing • through APU built around Intel 8086 microprocessor with 288K to 672K bytes of memory; provides 2 RS-232 ports for adding local peripheral devices such as printers and modems; includes parallel I/O bus (PIO) for connection of disk, tape, and PBX units; provides Network Interface Module (NIM) controlled by separate Intel 8088 microprocessor to interface to Proloop Network • supports industry-standard protocols: TTY, IBM 3270 SNA/SDLC, IBM 3270 BSC, and DEC VT100.

Gateways • none.

First Announced • October 1981.

Systems Installed • 25.

Pricing • purchase price is \$17,000 for a minimum configuration including 2 workstations plus all software • purchase price of a large configuration supporting 14 workstations, telephone, and software is about \$135,000.

■ PROTEON, INC

24 Crescent Street, Waltham, MA 02154 • 617-894-1980.

□ proNET

Type • baseband star-shaped ring network architecture using token-passing protocol, twisted-pair wire for short-run connection or twin-axial cable for long-run connection; optional coaxial cable or fiber optic link; supports UNIBUS, MULTIBUS, Qbus-based computers, IBM PC, and minicomputers from Gould, Harris, and Perkin-Elmer.

Transmission Speed • 10M bps; 80M bps planned.

Cable Length • up to 300 feet (twisted pair), 1,000 feet (twinax cable), 2,000 feet (twinax with repeater), and 2 miles (fiber optic cable) between nodes.

Application • data processing in business, government, university environments, and factory automation.

Configuration • 4 models available to support UNIBUS-, MULTIBUS-, Qbus-based computers, and IBM PCs; each ring supports up to 255 nodes; each node connects to host computer or processor; each node consists of control (CTL) board and host-specific interface board (HSB); CTL module on ring performs bit-level network control/transmission functions; HSB module contains message packet buffers, control and status registers, and interface between host and CTL • star-shaped ring is physical adaptation of classic ring structure; provides interconnection of all nodes on ring through central point defined as Wire Center; non-active Wire Center allows each node to connect to ring or to operate off-line in loopback test mode via electronically activated relays; Wire Center provides high reliability and short repair time.

Interfacing • HSB provides full-duplex direct memory access (DMA) interface to DEC UNIBUS, MULTIBUS, Qbus, and IBM PC on single board; provides concurrent transmitter/receiver operations; 2 2046-byte packet buffers allow a maximum 2044 bytes of message data plus destination and origination address to be transmitted/received; each packet buffer converts between bytes at CTL interface and words at BUS interface • Terminal Interface Unit connects 16 RS-232C dumb terminals • Universal Bus Interface (UBI) is available for other computers such as those from Gould, Harris, and Perkin-Elmer.

Gateways • to other proNET rings in expanded configuration • to IBM I/O interface (360-/370-type); X.25 packet-switched networks and Ethernet local area networks • support RS-232C and V.35 standard interfaces.

First Announced • November 1980.

Systems Installed • 100 systems (about 1,000 nodes).

Pricing • purchase price is \$6,000 for an 8-node IBM PC network and about \$28,000 for an 8-node UNIBUS/MULTIBUS/Qbus network.

■ RACAL-MILGO

8600 NW 41st Street, P.O. Box 520399, Miami, FL 33152 • 305-592-8600.

□ PLANET

Type • baseband local area network using coaxial cable and token ring access method; twin-ring configuration provides complete network redundancy with automatic restoration in event of cable/power/equipment failure • supports synchronous and asynchronous devices in both half- and full-duplex modes • centralized or distributed system control • redundant controller option.

Transmission Speed • 10M bps; up to 19.2K bps per access channel/port.

Cable Length • up to 650 feet between TAPs; maximum length 15 miles.

Application • automated office or factory environments; data routing, resource sharing, word and data processing.

Configuration • consists of 3 main components in addition to cable: Cable Access Port (CAP), Terminal Access Point (TAP) and Director • Director is microprocessor-based desktop controller; it provides management/monitoring functions, permanent-connection switch plans, and user/port parameters for up to 500 devices on up to 250 TAPs per ring; provides up to 250 simultaneous connections; redundant ("Shadow Director") configuration is optional • Terminal Access Point (TAP) interface provides PAD function on permanent or switched connections; virtual circuits between ports can be dedicated, switched, multidrop, and broadcast • CAP provides cable interceptor with 4-port connector.

Interfacing • through CAP which provides 4 ports for connection to cable; TAP is interface between Planet network and any standard data device; provides 2 RS-232C DCE or DTE connections for synchronous, asynchronous, or mixed communications independent of user protocol; TAP includes PAD (Packet Assembler/Disassembler).

Gateways • none.

Local Area Networks (LANs)

First Announced • April 1982 in Europe; November 1982 in U.S.

Systems Installed • about 15 in U.S. and 100 systems abroad; about 5,000 ports worldwide.

Pricing • purchase price is in \$800 per port range for reasonably sized network (larger than 200 ports).

■ SANTA CLARA SYSTEMS

1860 Hartog Drive, San Jose, CA 95131 • 408-287-4640.

□ PCnet

Type • baseband network with distributed bus topology using CSMA/CD access method • uses Orchid Technology PCnet.

Transmission Speed • 1M bps.

Cable Length • standard 75-ohm CATV cable: 7,000 feet using RG11/U cable and 3,000 feet using RG59B/U cable.

Application • interconnection of IBM PCs and Santa Clara's PCterminal.

Configuration • PCterminal includes 8088 microprocessor, serial and parallel interfaces, 4 expansion slots for peripheral cards, 64K to 256K bytes of RAM, integral networking interface, and a connection for optional diskette drive • up to 16 PCterminals can be connected to an IBM PC or PC/XT in a network • PCterminal can be downline-loaded by remote diskette or hard disk on an IBM PC.

Interfacing • through IBM PC standard bus.

Gateways • none.

First Announced • February 1984.

Systems Installed • deliveries now beginning.

Pricing • purchase price is \$1,295 per PC terminal.

■ SCIENTIFIC DATA SYSTEMS (SDS)

344 Main Street, Venice, CA 90291 • 213-390-8673.

□ SDSNET

Type • baseband network using RG11 coaxial cable and CSMA/CD access method; bus topology • supports connection of independent SDS 420 Series computers sharing resources such as files, printers, and communication ports.

Transmission Speed • 1M bps.

Cable Length • maximum 3,000 feet between stations.

Application • office automation including word processing, electronic mail, and financial/patient billing/inventory control applications.

Configuration • single network supports up to 255 SDS 420 Series computer stations; station can have from none to 62M bytes of local private storage • single computer can be a file server supporting mass storage and printer; multiple servers require a master server configuration; other servers provide printer spooling and communication • SDSNET-to-SDSNET connections.

Interfacing • through SDS 420 Series Computer which connects to cable through transceiver.

Gateways • none currently, will provide SDSNET-to-SDSNET gateway.

First Announced • fourth quarter 1980.

Systems Installed • 20.

Pricing • purchase price of a 2-station network including 3 CPUs (Model 444) with 64K-byte RAM and server with 15M-byte Winchester disk is \$22,900; to increase network size, workstations can be added (no disk storage) at approximately \$6,000 each; purchase price of a large network requiring additional memory, 15M-byte disk and SDS 452 computer is \$13,600 • purchase price of transceiver is \$500.

■ SIDEREAL CORPORATION

9600 SW Barnes Road, Portland, OR 97225 • 503-297-5531.

□ MIC-LINK

Type • baseband using CSMA and collision avoidance through waiting pre-assigned time before transmitting; in future will be random time on twisted-pair wire.

Transmission Speed • 1M bps.

Cable Length • 1,000 feet.

Application • interconnecting Sidereal Office Systems for resource sharing and electronic mail.

Configuration • 64 nodes on RS-232C adapter for 4 ports (for attaching foreign equipment), as well as for interconnecting other Sidereal terminals to network; Micronet Switch and Micronet 85 have integral direct network connect port for resource sharing and electronic mail; switch operates as communication server; System 85 can be used as file server.

Interfacing • through RS-232C ports on Switch or through System 85.

Gateways • Switch is essentially gateway to services configured on Switch.

First Announced • September 1983.

Systems Installed • one in house; first deliveries scheduled for third quarter 1984.

Pricing • purchase price is \$1,400 for 4-port RS-232C adapter, \$65,000 to \$95,000 for Micronet Switch, and \$19,500 for base Micronet 85 multiuser office information system.

■ SPERRY

P.O. Box 500, Blue Bell, PA 19424 • 215-542-4011.

□ SHINPADS (Shipboard Integrated Processor And Display Systems)

Type • baseband network using triaxial cable, dual-cable bus system, using command and response polling protocol • one of the dual cables used for polling/control, other used for data transmission.

Transmission Speed • 10M bps • high throughput due to dual-cable bus structure.

Cable Length • 1,000 feet node-to-node with 100-foot leads from node-to-device for length of about 1,200 feet end-to-end.

Application • military • provides end-to-end connection between computers and displays, separated by communication links and/or 1,200-foot distance • totally transparent to end user.

Configuration • up to 256 nodes (terminals) per system • 1 node is designated system controller; initiates poll, queues transmissions, and maintains traffic on network • 2 dual-bus systems serve as backup for reconfiguration in case of damage or failure.

Interfacing • interface adapter for each device in microprocessor-based node.

Gateways • none.

First Announced • 1979.

Systems Installed • 2 large military installations.

Pricing • prices range from \$5,000 to \$25,000 per user equipment and includes all hardware/software interface.

□ SPERRYLINK

Type • Sperry has no products available to implement the local network architecture to support SPERRYLINK Office Systems • Sperry and Northern Telecom formally agreed in October 1982 to develop jointly their office automation and voice/data communication products; testing of NTI's SL-1 PBX system interconnected with the SPERRYLINK Office System is now complete; both companies express commitment to standards such as the Integrated Services Digital Network (ISDN) Standard proposed by CCITT, which includes provision for simultaneous voice and data transmission; both companies anticipate ISDN interfaces for data terminal devices, communication processors, and PBX system • Sperry is committed to the IEEE-802 token-passing access standard for both baseband and broadband

Local Area Networks (LANs)

LANs • tests with the broadband bus network system from the Interactive Systems Division of 3M proved the SPERRYLINK Office System is compatible with that of broadband network, integrating voice, data, and video.

■ STARNET DATA SYSTEMS

1331 West Evans Avenue, Denver, CO 80223 • 303-935-3566.

□ Starnet II

Type • baseband microprocessor-based network configured in star topology provides central control for direct communication between incompatible or various computers/devices linked to network; conceptually Starnet II operates like large switch, providing speed/protocol/code conversions • functions on existing cable • supports industry-standard RS-232C/V.28 serial, IEEE-488, RS-449, TTL Centronics, Dataproducts parallel, A/D, D/A, and current-loop interfaces • remote devices serviced by auto-dial/auto-answer integral AT&T 103- and 212-compatible modems.

Transmission Speed • soft selectable bps data rates; transmission speed mismatch compensation • multiple communication media support up to 38M bytes per record.

Cable Length • unlimited with use of Starbooster, an RS-232C/V.28-compatible repeater which can extend typical cable distances by correcting and boosting signals; each unit can be plugged into cable at intervals of 200 feet or more, extended distances via multiple Starboosters • bus media dependent.

Application • data processing in general business/office environments.

Configuration • Starnet II is centrally positioned in Star topology; operates as controlling node with conversion capabilities; provides direct communications/data processing between various devices • single Starnet supports 16 devices through 16 port interfaces; network can be stacked for Starnet-to-Starnet interconnection • typical network system supports shared printer/shared dial-up modems/multicomputer access; shared printers/terminals • minimum 4 port expandable to a maximum 4,100-port system.

Interfacing • Starnet II achieves system compatibility through serial, parallel, modem, and analog interfaces and speed/protocol/code conversions • 16 ports can be configured in any of the following combinations up to 16 RS-232C or current-loop serial ports; up to 16 digital TTL interfaces; up to 16 Centronics parallel interfaces; up to 16 Dataproduct-compatible parallel interfaces; up to 6 modem interfaces per node.

Gateways • X.25.

First Announced • October 1981.

Systems Installed • 15.

Pricing • purchase price per node interface is \$4,800 to \$20,000.

■ STRATUS COMPUTER, INC

17 Strathmore Road, Natick, MA 01760 • 617-653-1466.

□ StrataLINK

Type • baseband coaxial cable ring configuration using contention protocol; assumes token-passing characteristics when cable reaches throughput capacity.

Transmission Speed • up to 1.4M bytes per second on single StrataLINK bus; up to 2.8M bytes per second with second StrataLINK.

Cable Length • 750 feet between processing modules and StrataHUB network extended by 1,500 feet per link extender up to 25 miles.

Application • interactive, transaction-oriented, real-time business processing environment: industrial (processes control; assembly-line management); hospitals (patient care system); airline (reservations); financial (funds transfer); word processing.

Configuration • links Stratus/32 continuous processing systems; each system interconnects up to 32 processing modules with duplicate CPUs, memory, controllers, peripherals; each processing module supports up to 8M bytes of duplexed memory

(16M bytes of physical memory); up to 64 terminals, up to 2 tape drives, up to 16 disk drives (4.6G bytes) • each CPU that connects to StrataLINK requires a StrataLINK controller, cable, and connection to StrataHUB; each StrataHUB connects up to 6 processing modules; StrataLINK supports multiple StrataHUB.

Interfacing • dual StrataLINK controllers connect duplexed (duplicated) CPUs to StrataLINK which consists of cable and StrataHUB.

Gateways • X.25 protocol support for interface to public networks and private lines • Stratus RJE facility (BSC protocol) provides emulation of IBM 2780/3780 HASP; Stratus 3270 Emulation facility allows Stratus applications to communicate with IBM-compatible host (via IBM 3271/74/76); Stratus 3270 Terminal Support enables Stratus application programs to access IBM 3270-compatible terminals via communication line.

First Announced • November 1981; shipment began February 1982.

Systems Installed • 50.

Pricing • network configuration costs include the Stratus/32 Continuous Processing System (with all features duplexed and including software) at \$140,000; each Stratus/32 requires a duplexed StrataLINK controller interface at \$5,000; and the StrataHUB, which includes cable for connecting up to 6 nodes or another HUB at \$750; optional software available at additional cost.

■ 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 SDSsystem 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.

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 SDSsystem 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; SDSsystem 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.

■ SYNTREX, INC

246 Industrial Way West, Eatontown, NJ 07724 • 201-542-1500.

Local Area Networks (LANs)

□ SYNNet

Type • baseband network using Ethernet shielded coaxial cable to support GEMINI and POLARIS Systems in resource-sharing environment • uses CSMA/CD access scheme • SYNNet packets conform fully to Ethernet standards and can share a cable with Ethernet system, but SYNNet packets are not Ethernet compatible.

Transmission Speed • 10M bps.

Cable Length • 1,700 feet per cable segment.

Application • office/business applications in shared-resource environment.

Configuration • file-sharing clustered environment supports GEMINI electronic file cabinets and POLARIS Systems, which include front-end controller and back-end processors for interfacing to the computers and the network respectively; supports Syntrex Operating System (SOS) message-based distributed operating system; software resides in the front-end processor for control of transmission media, in the back end for network control, in terminals, and in the file system controller; network cluster runs diagnostics at startup • clusters are designated at installation as cabinets, drawers, folders, and documents and use this designation to identify themselves upon entering the network • up to 8 GEMINI and/or POLARIS file-clusters are supported per network; no-fail GEMINI clusters are fully redundant.

Interfacing • standard Ethernet transceivers on back-end processors.

Gateways • none currently.

First Announced • June 1982.

Systems Installed • 17.

Pricing • purchase price of a redundant GEMINI system is \$6,500 including software and interfaces; purchase price of a POLARIS is \$4,500; cable not included.

■ SYTEK, INC

1225 Charleston Road, Mountain View, CA 94043 • 415-966-7300.

□ LocalNet 20

Type • broadband terminal-oriented network supporting video, voice, data transmission on coaxial cable, using packet-switching, CSMA/CD, and FDM • can be piggybacked on existing CATV system • architecture based on layered set of services: transmission layer, network layer, and user device interface layer.

Transmission Speed • 128K bps per channel.

Cable Length • maximum 50-kilometer (35-mile) geographical radius.

Application • distributed data processing in government, education, aerospace, and financial application environments • teleconferencing.

Configuration • each of 120 channels supports up to 400 diverse, active, low-to-medium speed synchronous/asynchronous terminals with serial interfaces; maximum 50,000 devices • network control center (NCC) provides high-level network administration and control including secure communications; multiple NCCs can be configured for backup or division of services • interchannel bridge provides interconnection of up to 8 different frequency channels on one cable or on different cables; acts as store-and-forward gateway • statistical monitor operating as passive device gathers performance statistics for one channel during user-specified time interval.

Interfacing • through RF modem integrated in microprocessor-based Packet Communication Unit (PCU) 20/100, PCU 20/200, or 20/220 SMUX • 20/100 PCU handles CSMA/CD protocol and provides 2 full-duplex RS-232C ports that can operate at 75 to 19.2K bps; synchronous port option supports speeds of 1200 to 19.2K bps (only one port can operate at 19.2K bps) and 2780, 3780, 327X, and HASP Multileaving workstation protocols; also supports secure packet communication option • PCU 20/200 supports up to 8 RS-232C ports operating at 75 to 9600 bps with aggregate throughput of 16K bps • 20/220 SMUX provides up to

32 RS-232C ports in 2-port increments; operates at 75 to 19.2K bps • RF modem is frequency agile and can be tuned to any of the preselected frequency channels.

Gateway • to other LocalNet 20s • to X.25 packet networks • Ethernet.

First Announced • Fall 1980.

Systems Installed • 350 LocalNet 20s (32,000 ports).

Pricing • purchase price is \$1,090 for 20/100 PCU that interfaces 1 or 2 RS-232 ports to modem; \$3,750 for 20/200 PCU that interfaces up to 8 ports; \$2,200 for 20/220 SMUX base unit with 2 ports; \$550 for each 2-port SMUX expansion; \$18,000 for basic NCC; \$9,000 for Interchannel Bridge; \$1,890 for Statistical Monitor; and \$3,500 for head-end Frequency Translator.

□ LocalNet 40

(No longer actively marketed.)

■ TANDY CORPORATION/Radio Shack Division

1800 One Tandy Center, Fort Worth, TX 76102 • 817-390-2642.

□ ARCnet Local Area Network

(Available through Radio Shack Catalogue.)

Type • baseband network using Datapoint ARC (Attached Resource Computer) token-passing access protocol.

Transmission Speed • 2.5M bps.

Cable Length • up to 200-foot segments with passive hubs (4-way interconnectors) for up to 4 RIMs • up to 2,000-foot segments between active hubs (8-way interconnection); up to 20,000 feet maximum end-to-end.

Application • to interconnect TRS-80 computers for resource sharing in a business office environment for electronic filing and word processing.

Configuration • minimum system includes 2 application processors and one file processor • maximum configuration can connect up to 255 TRS-80 Model 12 and II computers to the network to share disk files and printers.

Interfacing • through RIM (resource interface module) mounted on the ARCnet Board which also includes the Applications Processor software.

Gateways • none.

First Announced • April 1983.

Systems Installed • undisclosed.

Pricing • purchase price is \$399 for ARCnet Board with Applications Processor Software; \$499 for ARCnet File Processor Software; \$995 for 8-port Active Hub; \$79 for 4-port Passive Hub; and \$0.21 per foot for the ARCnet RG62 coaxial cable.

■ TELETYPE CORPORATION—See AT&T TELETYPE

■ TELTONE CORPORATION

10801 120th NE, P.O. Box 657, Kirkland, WA 98033 • 206-827-9626.

□ DCS-2 & DCS-2S PBX Data Carrier System

Type • baseband local area network using existing PBX or local centrex telephone loops connected to centralized data switch, CPU, or multiplexers • supports concurrent data and voice transmission.

Transmission Speed • composite high-speed channel data rates at 1.544M bps; up to 9600 bps asynchronous with DCS-2 version • DCS-2S handles both synchronous and asynchronous communication at data rates up to 9600 bps.

Cable Length • up to 6,400 feet; can add a repeater for every 1,000 feet beyond 6,400 feet.

Application • data and voice transmission simultaneously over telephone lines in PBX/Centrex-based campus environments.

Configuration • system is available in 3 versions: DCS-2B, DCS-2A, and DCS-2S • DCS-2B is used for applications in which central data equipment is within 500 feet of the telephone main

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distribution frame; it includes no multiplexing systems • the DCS-2A is used for applications in which central data equipment is remote from the telephone main distribution frame; it includes 2 T1 Digital Carrier-compatible TDM multiplexers that compress 32 asynchronous data channel transmissions over a single circuit • DCS-2S can operate in either synchronous or asynchronous mode; mode is switch controlled; synchronous communication can be clocked using internal, external, master, or slave clocks • a minimum configuration requires a Channel Termination Card that supports 2 data channels, 1 to each of 2 station units in point-to-point communication; a standard card file houses up to 16 dual-Channel Termination Cards (32 channels); a mini 8-card file is also available • a maximum configuration for 1 power supply supports 8 card files, each can connect 16 dual-channel Termination cards, for 256-channel capacity; such a large configuration requires the M-830-200 Large Redundant Power Supply unit; additional power supplies can be added for unlimited 256-channel group support.

Interfacing • RS-232C data-compatible channels.

Gateways • none.

First Announced • August 1980 (DCS-2); March 1984 (DCS-2S).

Systems Installed • 30,000 carrier channels for DCS-2A and 2B; DCS-2S still in Beta test.

Price • purchase price of a DCS-2B 8-data channel system is \$474 per channel, a 32-data channel system with wall mounts is \$450 per channel, a 160-data channel system is \$440 per channel, a 224-data channel system with factory rack assembly is \$434 per channel • phone jack installed by phone company is \$75 per extension • price per channel is less than \$600 for DCS-2A and DCS-2S, and \$500 for DCS-2B for 32-channel configuration.

■ **THREE RIVERS COMPUTER CORPORATION—See PERQ SYSTEMS, INC**

■ 3COM CORPORATION

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

□ **Ethernet/UNET**

Type • network software product and Ethernet controller to link multiple interactive computers running under UNIX version 7 and XENIX operating systems by baseband coaxial cable; uses CSMA/CD access protocol and meets Ethernet specifications • implements Internet Protocol (IP) and Transmission Control Protocol (TCP) standardized by U.S. Department of Defense; in terms of International Organization on Standards, Open System Interconnection (OSI) Reference Model UNET implements 5 of the 7 layers of the model: Link, Network, Transport, Presentation, Application • Ethernet/UNET extends communication through all 7 layers with the addition of Session and Physical levels • will not continue UNET Protocol under UNIX beyond V.7.

Transmission Speed • 10M bps.

Cable Length • 1,000-meter cable segment • up to 2.5 kilometers between hosts on Ethernet using repeaters.

Application • remote file transfers, process-to-process communication, electronic mail transfers, datagram service.

Configuration • network supports up to 1,000 computers • 3COM provides 2 Ethernet Controllers to connect DEC computers to Ethernet transceivers: UNIBUS Controller for PDP-11 and VAX-11 computers • software drivers for RSX-11, RT-11, and VMS • the 3C300 UNIBUS Ethernet Controller connects UNIBUS PDP-11 or VAX computers to Ethernet; consists of single plug-in hex module; controller is built around 32K-byte dual-ported memory; 1 port is used for packet transfers between buffer memory and Ethernet without consuming UNIBUS or CPU cycle; the other port allows PDP-11 or VAX to access the full 32K bytes to process packets; a portion of this memory is reserved for transmit/receive buffers of 2K bytes each; Ethernet-specified transceivers and cable coupled with any 3COM software driven implement physical and data link layer of OSI model; so equipped, any PDP-11 or VAX family computer becomes compatible with any other Ethernet-based system at these levels •

3COM also makes the 3C400 MULTIBUS Ethernet (ME) Controller, single board plug-in, connects MULTIBUS (IEEE-796) computers to Ethernet, with each other, with Digital's minicomputers, and with Ethernet-compatible equipment from Xerox, Intel, Three Rivers, and others; uses dual-ported memory; 1 port carries 10M-bps Ethernet packets to/from memory; the other port allows concurrent packet assembly/processing by protocol software in host; the ME's 8K-byte memory contains 1 transmit/2 receive buffers to support back-to-back packet reception; includes CSMA/CD and Manchester encoding on MULTIBUS; ME functions as 16-bit memory slave and is compatible with both 8- and 16-bit MULTIBUS masters.

Interfacing • Ethernet Transceivers used with UNIBUS and MULTIBUS controllers to connect computers to Ethernet Networks; transceiver transmits and receives 10M-bps serial bit streams and detects collision; 15-meter cable connects the station to the transceiver.

Gateways • to all Ethernet-based networking systems.

First Announced • end of 1981.

Systems Installed • 1,500 individual Ethernet nodes; 200 nodes with UNET software.

Pricing • purchase prices are from \$1,800 to \$2,100 per computer connection • single Multibus Ethernet (ME) is \$1,250; the UNIBUS controller is \$1,450 in single-unit quantity.

□ **Etherlink**

Type • baseband Ethernet-compatible local area network; interconnects IBM Personal Computers and most IBM PC compatibles; designed for resource sharing; uses CSMA/CD access method.

Transmission Speed • 10M bps.

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

Application • supports IBM DOS applications; office/business environment; local and remote electronic mail, printer sharing, and disk sharing.

Configuration • supports up to 100 IBM Personal Computers (PCs) or IBM PC compatibles per cable segment; 1,000 per network using repeaters • 3COM AP Network Server implemented using an Intel 8086 with 512K-byte memory; it offers shared access to hard disk with 30M-byte capacity expandable to 60M bytes; provides 1M-byte diskette for backup; optional cartridge tape drive also available; features password control; EtherShare software divides Winchester disk into volumes accessible (read or write) by any PC on network; each PC can access up to 4 volumes at one time; network supports multiple servers; with add-on EtherPrint software, EtherShare becomes print server • EtherMail is optionally available for electronic mail to all PCs on network (compatible with IBM PC-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 • AP Network Server unit includes Ethernet transceiver.

Gateway • none currently.

First Announced • October 1982.

Systems Installed • 1,500 networks (8,000 interconnected PCs).

Pricing • purchase price is \$795 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

Local Area Networks (LANs)

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 OSI reference model using CSMA/CD access protocol • supports any vendor's text/data processing equipment • Personal Connection, baseband version, is both PC LAN and extension of Net/One • also available as hybrid using fiber optic cable extension or fiber optic backbone network.

Transmission Speed • up to 10M bps.

Cable Length • 500 meters (1,500 feet) per cable segment; 1,500 meters (4,500 feet) with repeaters • up to 2,500 meters (7,500 feet) with fiber optic cable extension • also expandable with bridges.

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 1,024 NIUs per network (24,576 user devices).

Interfacing • RS-232C asynchronous and synchronous; CCITT V.35, IEEE-488; DEC DR11-W/B; RS-449, 8-bit, 16-bit, 32-bit parallel • requires NIU between user device and network.

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 • X.25 available second quarter 1984.

First Announced • shipped July 1980.

Systems Installed • 400 networks.

Pricing • purchase price is \$2,300 for NIU-150A base unit, \$500 for 6-port I/O module for NIU-150A, \$4,390 for NIU-2A base unit, \$1,800 for 6-port Application Processor NIU-2A, \$4,110 for Local Bridge Option, \$5,255 for Network Storage Module, and \$395 for Network Transceiver.

Net/One Broadband

Type • CATV-compatible broadband coaxial mid-split or high-split on single cable, or dual-cable system; uses CSMA 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 • Personal Connection, broadband version, is both PC LAN and extension of Net/One.

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 • up to 300 NIUs per channel pair (network) for 7,200 user devices.

Interfacing • RS-232C asynchronous and synchronous; CCITT V.35; IEEE-488; DEC DR11-W/B; RS-449; 8-bit, 16-bit, 32-bit parallel • requires NIU between user device and network.

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 • X.25 second quarter 1984.

First Announced • February 1982.

Systems Installed • over 150.

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 \$650 to \$950.

Fiber Optic Net/One

Type • baseband, bus topology with star clusters, Ethernet-compatible network using fiber optic components from Siecor Corporation.

Transmission Speed • 10M bps.

Cable Length • depends on Star Node model used: for Star Node-6, maximum distance from Star Node to optical transceiver is 800 meters (2,600 feet); for Star Node-14 maximum distance from Star Node optical transceiver is 550 meters (1,760 feet) • using multiple Star Nodes (up to 3), maximum end-to-end distance is 4,800 meters (about 2.8 miles) for total fiber optic Net/One.

Application • primary use is backbone network to interconnect buildings wired with coaxial cable Net/One LANs; can also be used for standalone fiber optic local area network.

Configuration • network built around one or more Star Nodes, which include a cabling center (splices indoor wiring to fiber optic cable), star coupler, collision determination circuitry (CDC) for 100% collision detection, optical taps, and elastomeric splices • Star Node-6 is a 6-port unit with 16-slot cabling center, 8x8 star coupler, and CDC • Star Node-14 is a 14-port unit, 56-slot cabling center, 16x16 star coupler, and CDC • when Fiber Optic Net/One is operating as a backbone network, Star Node ports are used to interconnect Ethernet-compatible cable segments usually located in separate buildings; 100 NIUs (2,400 user devices) can connect to a cable segment in each building for a total of 600 NIUs (14,400 user devices) for a network based on Star Node-6 and 1,400 NIUs (33,600 user devices) for a network based on Star Node-14 • multiple Star Nodes can be configured to interconnect Ethernet-compatible LANs in more than 14 buildings • uses same repeaters, NIUs, and software as Baseband Net/One • when operating as standalone fiber optic LAN, each Star Node can connect up to 6/14 NIUs to the network; using multiple (up to 3) Star Nodes, from 18 to 39 NIUs (432 to 936 user devices) can be connected to the network.

Interfacing • through optical transceiver which connects to the fiber optic cable • user device interfaces to standard Net/One Network Interface Unit (NIU) • NIU interfaces include RS-232C asynchronous and synchronous, CCITT V.35, IEEE-488; DEC DR11-W/B, RS-449, 8-bit, and 32-bit parallel • coaxial cable Baseband Net/One cable segments interface to a Star Node through an Ethernet transceiver, local repeater, and optical transceiver.

Gateways • to Baseband Net/One through port on Star Node • X.25 second quarter 1984.

First Announced • January 1984 as standard product; some networks were installed in 1983.

Systems Installed • 10 networks (50 nodes where node is equivalent to an optical transceiver).

Pricing • purchase price is \$2,100 for optical transceiver, \$12,000 for Star Node-6, and \$20,000 for Star Node-14 • purchase price of fiber optic cable varies according to number of fibers in cable: \$5 per meter (3 feet) for dual fiber and \$21 per meter for 12-fiber armored cable; 40-fiber cable is available through special order • uses same repeaters as Baseband Net/One; purchase price is \$3,850 for remote repeater and \$2,500 for local repeater.

Thin Coaxial Baseband Net/One

Type • same as Net/One Baseband.

Transmission Speed • 10M bps.

Cable Length • 200 meters (600 feet) per cable segment; with maximum of 2 repeaters, 600 meters (1,600 meters using fiber optic repeater).

Application • same as for Net/One Baseband; thin coaxial cable

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(RG58 A/U) is less expensive than other coaxial cable, thus it is especially appropriate for interconnecting personal computers.

Configuration • up to 30 transceivers (NIUs) can connect to a cable segment for a maximum of 90 transceivers (NIUs) with 2 repeaters; up to 24 user devices can connect to an NIU for a network maximum of 2,160 user devices on the network.

Interfacing • through baseband transceiver in a network interface unit (NIU); user devices connect to cable through NIU • same NIU interface as for Net/One Baseband.

Gateways • same as for Net/One Baseband.

First Announced • October 1983.

Systems Installed • most are installed as PC connection extension of Net/One Baseband.

Pricing • units same as Net/One Baseband except for price of the cable.

■ VALMET, INCORPORATED

7 Westchester Plaza, Elmsford, NY 10523 • 914-347-4440.

□ Millway

Type • baseband network using coaxial cable and a polling access scheme; provides microprocessor-based I/O nodes to interconnect computers and peripherals from various vendors in a paper mill environment • internal data transfer protocol conforms to HDLC.

Transmission Speed • from 250K to 1M bps.

Cable Length • up to 6,500 feet per network link; with 5 repeaters up to 30,000 feet maximum.

Application • plant-wide and multipoint production control in paper mill environment; available software packages support order entry, production planning, laboratory and paper machine finishing line automation, process control, inventory, and maintenance applications.

Configuration • the Millway network is built around microprocessor nodes on a network cable; each node is configured to support 1 host computer with peripherals; provides input/output (I/O) functions that include code translation/protocol conversion for computer input to the network and for output communication with other computers on the network; supports simultaneous communications between computers • Millway is offered in 2 versions: Millway I provides 250K-bps network transmission for up to 32 1-host nodes on a 6,000-foot segment and up to 160 nodes in a maximum 30,000-foot network with channel transmission rates up to 9600 bps; the Millway II provides up to 1M-bps network transmissions for up to 100 1-host nodes on a 6,000-foot segment and up to 500 nodes on a 30,000-foot maximum network with channel data rates up to 56K bps • 1 node on each network is configured as a network traffic controller and provides access to the network through the polling scheme.

Interfacing • each host computer interfaces workstations to network.

Gateways • a node can be configured as a gateway node to another network.

First Announced • as DATAWAY in Finland 1980; as Millway in United States in Spring 1982.

Systems Installed • 12 in Finland; 4 in North America.

Pricing • purchase price of each 1-host network node interface is approximately \$15,000; includes all hardware/software interface requirements; purchase price of traffic controller node is \$10,000.

■ 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.

Transmission Speed • 750K bps.

Cable Length • 1,000 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.

First Announced • November 1982.

Systems Installed • about 60 networks (360 nodes).

Pricing • purchase price of each computer/terminal workstation ranges from \$2,500 to \$4,495 plus \$750 for each hardware interface; purchase price is \$10,490 for a minimum 2-workstation configuration and about \$60,000 for a maximum 16-workstation configuration.

■ WANG LABORATORIES, INC

One Industrial Avenue, Lowell, MA 01851 • 617-459-5000.

□ Wangnet

Type • 340-MHz broadband coaxial cable-bus, allocated to 5 separate frequency bands: Wang Band (217M to 251 MHz), Peripheral (97.5 MHz to 145.5 MHz), Interconnect (10M to 12 MHz, 12M to 22 MHz, and 48M to 82 MHz), Utility (174M to 216 MHz), and PC Service (29.1 MHz to 44.1 MHz) • the Wang Band shared-access channel using CSMA/CD protocol is for networking Wang systems • Peripheral Band implements 6 channels using a polled access protocol with a Wang computer acting as controller; provides for connecting multiple workstations to single host processor • the Interconnect Band has 48 dedicated channels for multipoint or point-to-point communication and 256 switched frequency channels for multipoint or point-to-point communications • the Utility Band has 7 video channels • PC Service Band interconnects PCs over 5 independent channels; uses ARCnet token-passing protocol for access within each channel.

Transmission Speed • Wang shared-access channel up to 10M bps; dedicated channels up to 9.6K and 64K bps; switched channels up to 9.6K bps; Peripheral Band channels transmit at 4.27M bps; PC Service Band channels transmit data at 2.5M bps; and video channels operate at 6 MHz.

Cable Length • in excess of 4 miles.

Application • automated office environment, including distributed data/word processing, electronic mail, and video applications.

Configuration • the 10M-bps Wang Band transmits packet-formatted data and supports up to 65,535 Wang devices, including the VS computers, Office Information Systems (OIS),

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and 2200 LVP/MVP/SVP systems • the Interconnect Band supports 64K bps on 16 channels dedicated to point-to-point or multipoint communications between Wang or non-Wang RS-449-compatible devices; 9.6K bps on 64 dedicated channels for communications between Wang or non-Wang RS-232C-compatible devices; 9.6K bps on 256 switched channels for communications between 512 Wang or non-Wang RS-232C-compatible devices • Peripheral Band can connect up to 32 serial devices to a single CPU or master unit on each channel; master unit can be a Wang VS, OIS, or Alliance system; peripherals must be serial devices such as printers and workstations; peripherals interface to a channel directly (by Ergo III workstations) or through a netmux interface unit, which can connect up to 8 devices to a channel; a Wangnet diplexer can physically isolate a portion of the network and add 6 channels to the peripheral band; multiple diplexers can be configured • up to 255 addressable nodes (Wang PCs) can attach to each of the PC Service channels; each PC attaches to the channel through a PCLIO (local interconnection option), which includes the LIO board, the RF modem to attach to the cable, and the software to support the token-passing access protocol; the LIO board includes facilities to select its address and the channel to which it is attached • Utility Band includes 7 channels; each channel will transmit 1 composite color-video-audio signal.

Interfacing • Wang Band cable requires Z80 microprocessor-based Cable Interface Unit (CIU) between network outlet and appropriate communications controller • Wang Interconnect Band requires the Wang crystal-controlled fixed-frequency modems with either RS-449 or RS-232C-compatible connector for dedicated channels and the Wang frequency agile modem for switched channels • Peripheral Band requires RF modem interface imbedded in "W" models of Wang Ergo II workstations in network multiplexer, and in a controlling master VS, OIS, or Alliance system • PC Service Band interface is PCLIO (Local Interconnect Option) board that plugs into slot of PC • Utility Band requires no interface for CATV devices.

Gateways • the 256 switched channels on Interconnect Band can interface to the Wang Data Switch to control sessions on Wangnet as well as sessions with remote sites; requiring only RS-232C compatibility • X.25 gateway through VS, OIS, and Alliance computers • a Wang computer can connect to all bands and provide a bridge between any 2 channels.

First Announced • 1982.

Systems Installed • 1,000 nodes on 55 networks.

Pricing • purchase price of a Cable Interface Unit (CIU) is \$3,800 • Wangnet cable kits are available for attachment of Wangnet interface devices: a kit with 4 60-foot drop cable assemblies is \$2,400 (\$15 monthly maintenance); a kit with mini-headend, 4 4-port TAP assemblies, 70-foot cables between components, and 60-foot drop assemblies is \$7,050 (\$20 monthly maintenance); a kit with mini-headend, 4 4-port TAP assembly, 35-foot cables between components, and 20 60-foot cable assemblies is \$10,000 (\$25 monthly maintenance) • an OIS 140 Model 1 master computer system with 26.8M-byte disk, single diskette, and Wangnet 2 Option Ergo is \$29,700 (\$242 monthly maintenance); an OIS 145 master with 275M-byte disk, 10M-byte disk, and single diskette, plus Ergo option is \$52,700 (\$489 monthly maintenance); a VS-50/50A/80 IOP for Wangnet attachment to drive 32 terminals is \$4,100 (\$50 monthly maintenance) • the WN2 Option Ergo is \$600 (\$5 monthly maintenance) when ordered separately • the NETMUX (8-port) for attaching peripherals is \$1,600 (\$10 monthly maintenance) • purchase price is \$600 for a PCLIO board and \$400 for an LIO Repeater card.

■ 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, baseband signaling • now conforms to IEEE-802.3 Committee standard.

Transmission Speed • 10M bps.

Cable Length • up to 500 meters (1,500 feet) per cable segment; multiple segments allowed per network; maximum distance between nodes is 2.5 kilometers (7,500 feet).

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 • Model 873 communications server provides 4 or 8 ports (with extension) for communication link connection to remote Xerox workstations, terminals, and host computer systems, as well as with other manufacturers' systems using AT&T 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 • 10,000 nodes.

Pricing • purchase price of the Ethernet transceiver is \$200; various cable packages: 75-foot Teflon insulated cable is \$480 and for 385-foot cable is \$2,080; 75-foot PVC insulated cable is \$35 and 385-foot cable is \$550; drop cables are from \$100 (15 feet) to \$300 (60 feet); connectors and terminators are \$5 and \$10, respectively • purchase price of the 8000 Network Systems processor is \$4,995 (\$80 annual maintenance); and the 873 Communication Interface is \$6,055 (\$120 annual maintenance); discounts are available for purchases of 5 or more systems; software is not included • 58M-byte disk file module is \$9,995 (\$130 annual maintenance).

■ XYPLEX, INC

100 Domino Drive, Concord, MA 01742 • 617-371-1400.

□ Xyplex System

Type • broadband network using CSMA/CA (Collision Avoidance) access protocol (not Ethernet compatible) using 3-MHz band.

Transmission Speed • 1M bps.

Cable Length • up to 6 miles without repeaters depending on type of coaxial cable used; can extend cable length by up to 1 kilometer (about 3,000 feet) through insertion of fiber optic cable section; Xyplex makes connectors to connect coaxial cable to fiber optic cable.

Application • general purpose; crosses all applications and industries where systems are I/O or terminal bound • especially strong in those areas where Digital's VAX-11 is strong; manufacturing, CAD/CAM, graphics processing, and hospital environments.

Configuration • consists of Host Interface Units and Cluster Controllers interconnected by single coaxial cable • Host Interface Units available in 32-/64-port UNIBUS units that can operate as front-end processors for Digital Equipment Corporation VAX-11 systems • terminal cluster controller available with RS-232C asynchronous connections for 8 terminals • connection of non-VAX and dial-out modems is provided by using cluster controller ports and using system as a statistical multiplexer • VAX/VMS-related software runs on the Host Interface Unit, and terminal-related software runs on the cluster controller.

Interfacing • from VAX systems through the 32-/64-port UNIBUS Host Interface Unit; from terminals, personal computers, or other systems, through an asynchronous RS-232C port on the 8-port XP-CC8-A Terminal Cluster Controller; XP-CC8 and Host Interface Unit connect to cable through a fixed-frequency RF modem.

Gateways • planned future products, include gateways to

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Ethernet and to remote networks over private or public carrier services.

First Announced • October 1982.

Systems Installed • 80 host interface units and 250 terminal cluster controllers.

Pricing • purchase price is \$9,500 for XP-UN64-A 64-port UNIBUS Host Interface Unit, \$5,700 for 32-port version, and \$5,600 for XP-CC8-A Terminal Cluster Controller for 8 terminals; quantity discounts are available • software license fee is \$800 for XP-VMSL VMS-related software and \$800 for XP-CC8-related software.

■ ZILOG, INC

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

□ Z-NET-II (Based on U-NET Protocol from 3COM)

(No longer marketed. Will begin marketing Ethernet-compatible LAN in 1984.)

■ ZTEL, INC

118 Ballardvale, Wiln, MA 01887 • 617-657-8730.

□ AXIS (Advanced Exchange Information System)

Type • integrated PBX and baseband network using twisted-pair wire or fiber optic cable for simultaneous voice/data transmission; effects proprietary ring using Ztel's protocol for call setup; follows ISO software structure.

Transmission Speed • 56K bps for twisted-pair wire; 10M bps for fiber optic cable.

Cable Length • 5,000 feet maximum for twisted-pair wire, longer with fiber optic cable.

Application • integrated office environment.

Configuration • 300 to 400 lines; 200 to 4,000 terminals.

Interfacing • through proprietary phone device or high-speed Ztel data service.

Gateways • to other local networks and to X.25 packet-switched networks.

First Announced • undisclosed.

Systems Installed • undisclosed.

Pricing • undisclosed.

• END