

# Rabbit Software PC-to-Host and LAN Gateway Products

## In this report:

Analysis .....	-102
Characteristics.....	-105
Pricing.....	-108

## Product Summary

### Editor's Note

Since our last report five months ago, Rabbit Software continues to strengthen its UNIX line of connectivity products. In addition, the company's growing DOS-based product line now includes a workstation product that provides 3290 support plus numerous capabilities impossible with 3290 terminals. This report examines Rabbit PC-to-host and LAN gateway products' features, functionality, competitive position, and pricing.

### Description

Rabbit offers hardware/software combinations that allow users of DOS- and UNIX-based microcomputers—in either stand-alone or network environments—to perform terminal emulation and file transfers to access IBM host systems.

### Strengths

Rabbit has a strong reputation in the UNIX connectivity market and offers a comprehensive product line for UNIX users who require access to IBM host systems. The company's

DOS SNA gateway product line provides unmatched experience in SNA technology; its RabbitGate II SNA is the most comprehensive SNA gateway product in the industry.

### Limitations

Despite its extensive offerings in UNIX connectivity and excellent SNA gateway product line, financially troubled Rabbit Software lacks the prestige of more established companies in the end-user market.

### Competition

Novell, Digital Communications Associates (DCA), and Attachmate.

### Vendor

Rabbit Software Corp.  
Great Valley Corporate Center  
7 Great Valley Parkway East  
Malvern, PA 19355  
(215) 647-0440

### Price

Prices range from \$395 for the basic RabbitSTATION token-ring products to \$8,995 for the fully configured RabbitGATE II SNA.

### GSA Schedule

Yes.

—By *Donna Horsley*  
*Staff Writer*

# Analysis

## Product Strategy

Rabbit Software entered the commercial end-user market in 1987 after five years of modest success as a research and development firm of connectivity products (particularly for the UNIX environment). In its move to compete in a market already dominated by DCA, Novell, and Attachmate, Rabbit introduced a full line of DOS products to supplement its already established UNIX line.

Today, the company declares steadily increased sales of its popular DOS and UNIX product line as it struggles to turn profitable in 1991. (Rabbit has incurred significant financial losses over the past four years.) Rabbit earned about \$8.5 million in 1990 from its products, specifically its top-notch gateway product line.

Rabbit's PC-to-host product line includes links for individual workstations, gateways, tokenring, and X.25 connectivity devices. The products are hardware/software combinations that support coaxial, direct, and remote connections via modems. The company offers standard application program interfaces and graphics options.

Rabbit's 1991 plans for its product line include product enhancements, the introduction of a 3270 emulation package for Microsoft Windows 3.0, and an advanced gateway with NetView support.

## DOS Products

Rabbit Software's DOS-based products allow PCs to connect to IBM mainframes by emulating IBM 3278 and 3279 terminals. Its 3270 line comprises local, remote, standalone, and gateway connectivity products. The devices are interfaced to the host directly through coaxial cable or twisted-pair wire, or remotely through an RS-232-C connection. Graphics offerings are optional for additional applications.

The DOS-based line of products can be divided into standalone (RabbitSTATION) and gateway (RabbitGATE) offerings. Within these two categories, products are available for both local and remote connections, including products supporting either the BSC or SNA protocols.

The Visible Advantage is Rabbit's most recent introduction in the DOS environment. An IBM 3290 replacement product, it provides simultaneous, full-screen display of four Model 2 host sessions on an 8514/A-compatible monitor, without the need for MS-Windows.

Rabbit is also beta testing a 3270 emulation package for Microsoft's Windows 3.0 operating system and an advanced gateway with NetView support.

## UNIX Products

Rabbit's strength lies with its UNIX product family—Open Advantage (formerly RabbitPLUS). The products allow a 386-based computer running under the UNIX, Xenix, or AIX operating system to communicate with a mainframe over dial-up or leased lines, as well as over X.25 packet switched networks. Like the DOS product line, Open Advantage products offer BSC and SNA protocol compatibility. In addition, Open Advantage products support standard Remote Job Entry (RJE) features, such as compression/decompression, point-to-point and multipoint communications, and unattended operation. (For a detailed breakdown of the available UNIX- and DOS-based products, see Figure 1.)

## Competitive Position

Despite Rabbit Software's financial failings, its DOS and UNIX products are fairly popular and well known. In one-on-one product comparisons, Rabbit products compete effectively with products from the competition—DCA, Attachmate, and Novell.

In the PC-to-host market, Rabbit claims most of its success in the gateway and UNIX markets. Rabbit holds a generous percentage of the market share for LAN gateways.

In the UNIX environment, Rabbit offers both BSC and SNA solutions. Such products show promise for Rabbit software revenue, as usage of UNIX and local area networks continues to increase in the corporate environment.

## Company Profile

### Rabbit Software Corp.

#### Corporate Headquarters

Great Valley Corporate Center  
7 Great Valley Parkway East  
Malvern, PA 19355  
(215) 647-0440

#### Officers

*Chairman & CEO:* Alfred Berkley III  
*President & COO:* Harry Beisswenger  
*CFO:* Robert Hunter  
*Vice Presidents:* Richard Thunen, Thomas Warrick, Douglas Patterson

#### Company Background

*Year Founded:* 1982  
*No. Employees:* 82

Rabbit Software debuted in 1982, at a time when many software and hardware manufacturers were entering the PC connectivity market. Rabbit functioned as a research and development company whose main business was developing technologies.

It would develop a product, such as any one in its successful UNIX line, and then sell it to another company, such as IBM. That company, in turn, would sell the product as part of its own product line.

With its OEM focus, Rabbit developed a star-studded clientele in the micro-to-mainframe communications market. Besides IBM, companies OEM'ing Rabbit's products included Unisys, 3Com, NEC, Siemens, Oki Electric, and Ericsson. During this period Rabbit also developed valuable skills with UNIX.

In 1987, Rabbit underwent changes, the most significant of which was the company's decision to put its stock on the NASDAQ market. Shortly after going public, Rabbit linked up with MicroPlus

	Fiscal Year (millions of dollars)			
	1987	1988	1989	1990
Total Revenue	5.6	10.3	5.5	8.5
Total Expenses	9.7	14.9	17.5	11.7
Net Income	-3.9	-4.9	-12.7	-3.2

and CTi Data—two companies that specialize in linking PCs that use the DOS operating system to IBM mainframes. Rabbit acquired CTi Data—a manufacturer of communications controllers—and merged with MicroPlus to expand its 3270 DOS product line, which mirrors Novell. Both companies eventually acquired the Rabbit Software name.

As a result of the mergers, Rabbit doubled its sales offices and started a sales and marketing campaign at the end of 1987. The company also opened an international office in Europe.

Rabbit entered the end-user market in 1987 with a comprehensive product

line that has since become a successful contender in the competitive PC-to-host market. Its SNA MS-DOS-based gateway products compete effectively with DCA IRMALAN, Attachmate Extra, and Data Interface Systems Corp. for highest user ratings. Rabbit's UNIX product offerings are unmatched by the competition.

Rabbit Software expects first-time company profits for 1991 as a result of refocusing efforts. To combat poor investments in recent years and subsequent financial woes, Rabbit has eliminated its controller and CUT product lines, has consolidated its sales regions, and has closed its Paris office.

Rabbit has also chosen to sell direct and through VARs instead of large-volume distributors. Twenty-eight percent of Rabbit sales are direct to the end user, whereas 72 percent are distributed through VARs.

“The marketplace is looking for more than a Band-Aid fix of just a few gateways or coax connections. We believe that people who are trying to put together a whole network are looking more towards services and we believe that VARs are going to provide that,” a company spokesperson said.

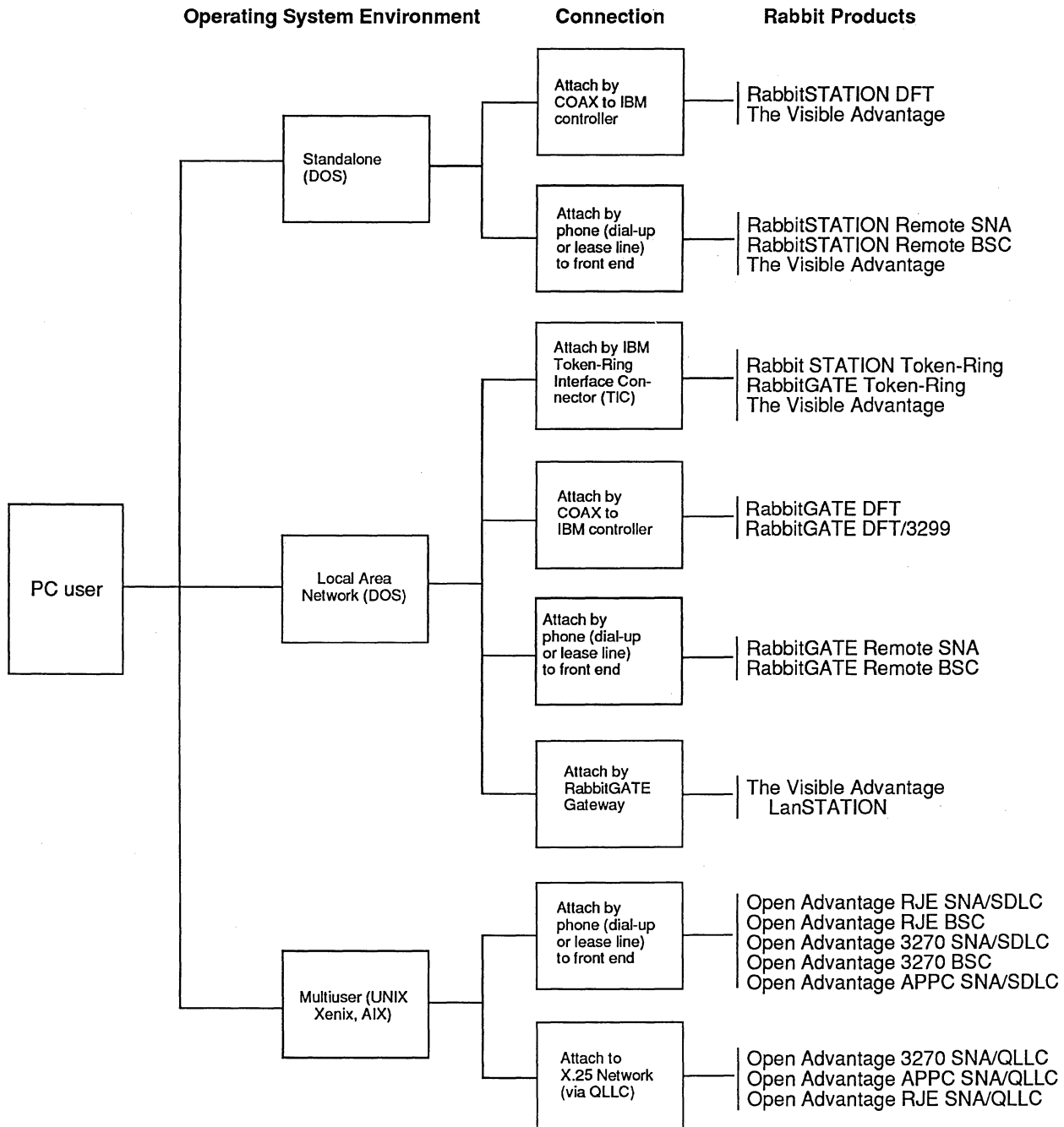
He asserts that Rabbit has the edge since competitors “sell primarily through distributors rather than VARs.”

#### Decision Points

##### User Interface

Rabbit's entire product line shares the same user interface—a vital feature in today's connectivity environment. The feature saves a user who is working on a system using SNA from learning a new

*Figure 1.*  
**Rabbit Software Product Breakdown**



*This chart provides a detailed breakdown of Rabbit's wide array of PC-connectivity options.*

user interface when switching to a Rabbit product for the BSC environment.

Rabbit's product installation and configuration is completely menu driven. Users access a context-sensitive help facility while on-line.

All Rabbit products support IBM IND\$FILE transfer method, and any Rabbit product supporting sessions can also support multiple windowing.

It enables DOS, host, and notepad sessions to run concurrently, and users can configure the windowing function to see each of these sessions in progress.

Rabbit's UNIX products allow a single workstation to establish up to eight concurrent host sessions, depending on the model. A browse feature

allows the user to page through previously transmitted host screens. The user can also request the next screen from the host while reading the current one. User-defined keyboard mapping is also supported via an on-line keyboard template.

Rabbit's products support standard APIs, allowing users to perform tasks such as updating a local or remote database transparently and automatically. The APIs allow the user to directly interface with the host applications.

### **UNIX Connectivity**

With its difficulty in gaining a larger share of the DOS-based connectivity market, Rabbit has benefitted from its proficiency in the UNIX marketplace. In September 1989, the company introduced its revamped line of RabbitPLUS products (now named Open Advantage) for use in UNIX, Xenix, and AIX operating environments. As acceptance of these multiuser, multitasking operating systems continues to increase, Rabbit stands to benefit substantially.

### **System Growth**

Rabbit's connectivity products are mostly hardware/software combinations. The company's standalone RabbitSTATION products can be upgraded to gateway products by changing the software. The boards themselves are the same for the BSC, SNA, and X.25 versions of the products, whether standalone or gateway, which lays a clean path for system growth and reduces the cost often associated with upgrading to network gateways.

## Characteristics

**Models:** DOS-based products—RabbitSTATION DFT, RabbitSTATION Remote SNA, RabbitSTATION Remote BSC, RabbitGATE DFT, RabbitGATE SNA, RabbitGATE BSC, RabbitGATE Token-Ring, The Visible Advantage. UNIX products—Open Advantage SNA 3270, Open Advantage BSC 3270, Open Advantage SNA RJE, Open Advantage BSC RJE, Open Advantage X.25, Open Advantage APPC/SNA, Open Advantage 3270 SNA/QLLC.

**Date Announced:** Information not available.

**Date First Installed:** DOS-based products—RabbitSTATION DFT (1988), RabbitSTATION Remote SNA (1987), RabbitSTATION Remote BSC (1987), RabbitGATE DFT (1988), RabbitGATE SNA (1987), RabbitGATE BSC (1987), RabbitGATE Token-Ring (1989), The Visible Advantage (1990). UNIX-based products—1987.

**Number Installed:** Approximately 10,000.

**Distribution:** Rabbit Software sells its products to end users through VARs, sales and service offices, and authorized distributors. The company also OEMs its products.

### **Models**

Rabbit Software sells products for DOS and UNIX environments. Such products let PCs communicate with minicomputers and mainframes, supporting SNA and bisync protocols and the SNA and OSI connectivity architectures. A Rabbit product allows a single user at a PC—or many users in a workgroup—communication with one or more mainframes or minicomputers.

Most Rabbit products consist of an adapter board and software diskettes and documentation, and provide both file transfer and 3270 emulation. All installation, configuration, and file transfer are menu driven. Rabbit's DOS and UNIX models allow user access to context-sensitive help and print from screen to disk. Other features common to all models are flexible keyboard mapping, keyboard macros, and a built-in line monitor. Keyboard macros are used to execute strings of repetitive tasks in a single keystroke. The products support monochrome, color, or enhanced color displays, and colors and keyboard remappings can be modified while on-line.

### **DOS Products**

Rabbit's DOS products run on IBM PC/XT/AT and PS/2 computers and compatibles, and require a diskette drive or hard disk. Users can dynamically change the keyboard and start the software via a single command. Bisync products operate at an aggregate rate of 19.2K bps. SNA products support communications up to 64K bps. The DFT coax products run at the speed of the controllers to which they are connected. Token-ring products run at 4M or 16M bps.

Each workstation supports multiple windows, including concurrent use of DOS and notepad windows with up to eight host sessions. The software's built-in windowing capability allows any combination of sessions to be viewed at the same time. The entire DOS product line shares a common user interface, so that windows are the same for SNA and bisync configurations. Users can upgrade RabbitSTATION products into RabbitGATE products.

**Table 1. Rabbit Software DOS Product Comparison**

Model	RabbitSTATION DFT	RabbitSTATION Remote SNA & Remote BSC	RabbitSTATION Token-Ring	RabbitGATE DFT	RabbitGATE Remote SNA & Remote BSC	RabbitGATE Token-Ring	RabbitGATE 3299/DFT
Minimum Memory (bytes)	119K	64K	162K	84K per workstation	84K per workstation	84K per workstation	84K per workstation
Terminals Emulated	IBM 3278/79	IBM 3278/79	IBM 3278/79	IBM 3278/79	IBM 3278/79	IBM 3278/79	IBM 3278/79
Controllers Emulated	None	IBM 3174, 3274	None	None	IBM 3174, 3274	IBM 3174	3174, 3274
Printers Emulated	IBM 3286-2, 3287-1/-2	IBM 3286-2, 3287-1/-2	IBM 3286-2, 3287-1/-2	IBM 3286-2, 3287-1/-2	IBM 3286-2, 3287-1/-2	IBM 3286-2, 3287-1/-2	IBM 3286-2, 3287-1/-2
Type of Connection	Type A coaxial	RS-232-C	Token-Ring	Type A coaxial	RS-232-C	Token-Ring	Coaxial
Maximum Number of Host Sessions	5	8	8	5 per gateway	8	128	40

Rabbit gateway products support pooling, which allows workstations to be placed in queue for establishing a host session. Otherwise, sessions can be dedicated to particular workstations.

**RabbitSTATION DFT:** This product allows an IBM PC or PS/2 to connect with an IBM 3X74 controller running the SNA protocol, thereby allowing the PC to access a mainframe. The RabbitSTATION DFT board or any IBM-compatible coax adapter can be connected to a local or remote controller via coaxial cable. Five mainframe sessions, a DOS session, and two notepad sessions can run simultaneously. Sessions can be divided between printers and terminals devices. A utility called DFT-DUMP.COM is used to capture on disk or display any link-level data communications between the host and the gateway.

**RabbitSTATION Remote SNA:** This product combines the functions of a RabbitSTATION DFT with those of a 3270 cluster controller. It allows a single PC workstation to communicate with an IBM 37X5 host front-end processor, using the A and SDLC communications protocols. Unlike RabbitSTATION DFT, this product can access a mainframe without connection to a controller.

RabbitSTATION Remote SNA consists of hardware and software. Up to eight host sessions, a DOS session, and two sessions can run concurrently. The sessions can include any combination of 3270 displays and printers, and all communicating on the same line to the mainframe. The sessions operate at an aggregate rate of 64K bps. A standard RS-232-C cable connects the PC to the host. RabbitSTATION Remote SNA uses an onboard 80186 co-processor board with 512K bytes of RAM to off-load use of the workstation's memory.

**RabbitSTATION Remote BSC:** This product operates like the RabbitSTATION Remote SNA except the line speed is 19.2K bps.

**RabbitGATE DFT:** This product is similar to RabbitSTATION DFT, which can be upgraded to a RabbitGATE DFT. It allows a single PC workstation on a NETBIOS-compatible LAN to connect to an IBM 3X74 controller, using the SNA protocol. Standard Type A coaxial cable connects the board to the controller. Up to eight host sessions, one DOS session, and two notepad sessions can operate concurrently on each PC. Multiple gateways can be installed on a LAN, with a maximum of five host sessions per gateway, allowing any number of concurrent host sessions to operate simultaneously in a local area network. A gateway monitor displays information on all the LUs attached to it. Like its STATION counterpart, RabbitGATE DFT also supports DFT-DUMP.COM.

**RabbitGATE Remote SNA:** This gateway product allows a workstation on a NETBIOS-compatible PC LAN to connect to an IBM 37X5 front-end processor using the SNA and SDLC protocols. A synchronous, serial communications board installed in the PC connects to the host via an RS-232-C or V.35 connection. With RabbitGATE Remote SNA, each workstation supports up to 128 host sessions, a single DOS session, and a notepad session. A gateway monitor displays information on all attached LUs.

**RabbitGATE Remote BSC:** This gateway product allows a workstation on a NETBIOS-compatible PC LAN to connect to an IBM 37X5 front-end processor using the bisync protocol. A synchronous, serial communications board installed in the PC is connected to the host via an RS-232-C or V.35 connection. Each workstation supports up to eight sessions with the host, one DOS session, and two notepad sessions. Each gateway supports 8, 16, or 32 sessions, distributed to PC workstations on the LAN. A gateway monitor displays information on all the sessions (LUs) attached to it.

**RabbitSTATION Token-Ring:** This software-only product allows a PC on a token-ring LAN to communicate with a TIC-connected IBM mainframe. The program provides access to mainframes at the 802.2 token-ring data link-level protocol. The PC running the software is defined as an SNA physical unit by the mainframe and manages its own LUs. This access method is recommended by IBM, since each physical unit can provide separate NetView input. RabbitSTATION Token-Ring supports IBM 4M bps and 4M/16M bps token-ring adapters. The product requires a minimum of 162K bytes of RAM and offers up to eight mainframe sessions.

**RabbitGATE Token-Ring:** This product is similar to RabbitSTATION Token-Ring because it provides access to TIC-connected mainframes. It comprises gateway and workstation software. The gateway PC acts as an SNA resource manager, performing as an IBM 3174 controller. PCs running the workstation software communicate with the mainframe through the gateway PC. The workstations communicate with the gateway through the NETBIOS or Novell SPX/IPX protocol. The gateway PC assigns and manages mainframe sessions for the workstations. The program supports the same Token-Ring adapters as RabbitSTATION Token-Ring and provides up to 128 mainframe sessions.

**The Visible Advantage:** A replacement for the IBM 3290 terminal, this new DOS-based workstation software product provides simultaneous, full-screen display of four Model 2 host sessions on an 8514/A-compatible color monitor or high-resolutions monochrome monitor, without the need for MS-Windows. Running on either MCA or AT-bus personal computers, The Visible Advantage provides many capabilities impossible with 3290 terminals, such as scripting, APIs, file transfers, and a concurrent DOS session. It can operate as a standalone DFT, token-ring, SNA/SDLC or BSC product, or as a LAN station connected to any of Rabbit's gateways.

### **UNIX Products**

The Open Advantage series of connectivity products (formerly RabbitPLUS) allows a 386-based PC running the UNIX, Xenix, or AIX operating system to communicate with an IBM mainframe over dial-up or leased lines. The product line has also been extended to the new RISC System/6000. All of the products support on-line, context-sensitive help; a browse feature; and a menu-driven user interface. Data is captured to a local disk file, a spooler, or a printer. By using systems and user profiles, users can define an individual host configuration. UNIX supports other features such as cursor select, printer management through a Printer Status facility, local copy, and a selector light pen.

**Open Advantage SNA 3270:** This product provides remote 3270 (PU Type 2.0) communications using the SNA/SDLC protocol. As many as 432 asynchronous

terminals can be attached via asynchronous communications boards to the 386 PC. Up to 6 concurrent LU sessions can run on a single terminal, and a total of 32 host printer and terminal sessions can be configured and active with the host on a single PC. A user on a terminal can switch between the six host sessions and the Xenix 386 sessions while the host sessions are active.

**Open Advantage BSC 3270:** This product allows a 386-based PC to communicate with an IBM host using the bisync protocol. The product operates as a standalone workstation or in a multiuser environment with asynchronous terminals attached. As many as 432 asynchronous terminals can be attached via asynchronous communications boards to the 386 PC. Up to 6 concurrent LU sessions can run on a single terminal, and a total of 32 host printer and terminal sessions can be configured and active with the host on a single PC. A user on a terminal can switch between the six host sessions and the Xenix 386 sessions while the host sessions are active.

**Open Advantage SNA RJE:** This product allows a UNIX-, Xenix-, or AIX-based workstation to function as an intelligent Remote Job Entry (RJE) workstation in accessing an IBM mainframe. Connections are made through a remote RS-232-C connection over leased or dial-up lines. Open Advantage SNA RJE provides IBM 3770, 2780, 3780, and HASP workstation emulation using the SNA/SDLC protocol. The product provides support for all standard and operational RJE functions, including point-to-point and multipoint communication, data compression/decompression, and unattended execution.

**Open Advantage BSC RJE:** This product allows a UNIX-, Xenix-, or AIX-based workstation to function as an intelligent Remote Job Entry (RJE) workstation in accessing an IBM mainframe. Connections are made through a remote RS-232-C connection over leased or dial-up lines. Open Advantage BSC RJE provides IBM 2780, 3780, and HASP workstation emulation. The product provides support for all standard and operational RJE functions, including point-to-point and multipoint communication, data compression/decompression, and unattended execution.

**Open Advantage X.25:** This product allows a 386 PC to connect to domestic and international public packet switched networks. Users can access generic Xenix facilities for transferring files and distributing electronic mail across the X.25 network service. The product's PAD services allow terminal users to establish a virtual circuit connection across an X.25 network. Asynchronous terminals can call remote hosts and transfer files back and forth, with communications established by an asynchronous modem.

The product consists of an intelligent, synchronous communications adapter board and X.25 software. The board off-loads gateway processing from the 386 PC, reducing memory and processing overhead on the

gateway PC. Up to four boards can be installed on one PC, and each board provides two X.25 links, providing a total of eight X.25 links per PC; each link supports 32 virtual X.25 circuits. Like the previous 386 products, this one also operates on an Intel 80386-based computer with an IBM PC AT-compatible I/O bus or PS/2-compatible Micro Channel bus.

**Open Advantage APPC/SNA:** This product allows a UNIX-, Xenix-, or AIX-based workstation to communicate with IBM mainframes, System 36s, and other machines running Open Advantage APPC or standard APPC implementations. Using the SNA/SDLC Physical Unit Types 2.0 and 2.1, LU-type 6.2 protocols over dial-up or leased line, it provides a C library of LU6.2 conversational verbs that can be linked into application programs. It provides unlimited host communications and requires no special knowledge of 3270 screen formats and protocols. Open Advantage APPC allows the user to write SAA LU6.2-based applications—which lets the concurrent transmission, receipt, and utilization of data by cooperative processing programs travel across an SNA network with or without an IBM host.

**Open Advantage 3270 SNA/QLLC:** This product provides remote 3270 (PU Type 2.0) communications for UNIX and Xenix operating systems using SNA/QLLC protocols across an X.25 packet switched network. Open Advantage 3270 SNA/QLLC allows up to 32 host printer and terminal sessions on a single PC. It provides up to six concurrent 3270 sessions per user, including extended color support, suspend/resume function, and Model 2/3/4/5 display station emulation.

## Support

**Phone Support:** Customer support is available from 9 a.m. to 6 p.m. EST at (800) 445-HELP.

**Warranty:** Hardware is warranted for 1 year and software is warranted for 90 days. Parts are replaced or repaired during that warranty period.

**Maintenance:** Rabbit has a Return Merchandise Authorization (RMA) program for Rabbit products once their warranty runs out. Customers can send the products for repair at a fixed fee. Products are returned to the customer via UPS within 10 working days after Rabbit receives them. Faster shipping methods can also be purchased.

## Product Prices

	Price (\$)
RabbitSTATION DFT	995
RabbitSTATION Remote SNA	1,395
RabbitSTATION Remote BSC	1,395
RabbitSTATION Token-Ring	395
RabbitGATE DFT	1,695
RabbitGATE 3299/DFT	5,995
RabbitGATE Remote SNA	2,395-8,995
RabbitGATE Remote BSC	2,395-5,995
RabbitGATE Token-Ring	4,995-6,995
Open Advantage SNA 3270	1,395-3,195
Open Advantage BSC 3270	3,195
Open Advantage X.25	1,950
Open Advantage RJE SNA	695-1,295
Open Advantage APPC SNA	2,595-3,195
Open Advantage 3270 SNA/QLLC	3,090-4,290
The Visible Advantage	295-495
APA Graphics	495



# Racal InterLan Networking Solutions



**In this report:**

Analysis ..... -102  
 Characteristics..... -104  
 Pricing and  
 Support..... -107

**Product Summary**

**Editor's Note**

Since our last report, Racal InterLan has refocused its product line, concentrating mainly on two major areas—the INTERNExT Series and Ethernet Network Interface Cards. The company also offers network management solutions.

**Description**

The INTERNExT Series consists of the INX5000, an integrated LAN communications system; the INX400/R, a high-performance remote LAN bridge; the INX400/L, a local bridge; the LANcentral Express, an SNMP-based LAN management system which runs on a Sun SPARCstation IPC; and the Network Management Module, also an SNMP-based system that sends information to management stations, such as LANcentral Express.

Racal InterLan's Ethernet adapter cards support the following buses: 8-bit PC XT, 16-bit ISA (AT), NuBus, MCA, and EISA. The cards are also compatible with the INX5000 system, enabling users to manage a mixture of PC and terminal connections at the facility, closet, and work-group levels.

—By *Barbara Callahan*  
Associate Editor

**Strengths**

An innovative company, Racal InterLan has introduced the industry's first 10BASE-T adapter cards and the first miniature 10BASE-T Media Access Units. The company offers a lifetime warranty on all Ethernet adapter cards.

**Limitations**

Racal InterLan does not produce products for token-ring configurations.

**Competition**

BICC, Cabletron, Chipcom, SynOptics, 3Com, Tiara, Ungermann-Bass, Western Digital, and XyPlex.

**Vendor**

Racal InterLan  
155 Swanson Road  
Boxborough, MA 01719  
(508) 263-9929

**Price**

INX5000 (12-slot base unit, 110 V)—\$4,250; Ethernet adapter cards—\$350 to \$595.

**GSA Schedule**

Yes.

# Analysis

---

## Product Strategy

Racal InterLan has concentrated on Ethernet and in so doing has covered all bases for the implementation of that approach to local area networking. In addition to Ethernet, the transmission media supported by Racal InterLan products includes Thin Ethernet, 10M bps shielded and unshielded twisted-pair wire, 10BASE-T, and LattisNet unshielded twisted pair (SynOptics proprietary). Bus architectures supported include PC/XT, PC/AT (ISA), EISA, MacBus, Micro Channel, and NuBus.

The company's products support Novell NetWare, IBM LAN Manager, Banyan VINES, Digital Equipment DECnet, Microsoft Windows 3.0, AppleTalk, 3Com 3+ and 3+ Open, SCO UNIX, SCO XENIX 286/386, Interactive Systems 386/ix, AT&T UNIX System V.3.2, and Sun NFS.

Transport protocols include:

- TCP/IP
- LAT
- DECnet
- AppleTalk
- IPX

In its short history, Racal InterLan has come up with several significant "firsts." By developing a TCP Gateway for Novell NetWare, the company opened the door for PCs in a NetWare/DOS workgroup to share data with TCP/IP hosts on a departmental network. The Gateway allows workstations on a NetWare LAN to access the services of workstations, servers, minis, and mainframes that are running TCP/IP on Ethernet.

To advance multihost and multioperating system interoperability, the company came up with LAT/TCP Terminal, a high-performance server that supports simultaneous sessions to Digital

Equipment's proprietary local area transport (LAT) protocol and TCP/IP.

Because of bridges' capability to isolate nodes that communicate mainly with one another, Racal InterLan incorporated these devices into its network management strategy via the IB Series/Bridge 802.1 Network Management product. Turning toward the vast base of UNIX users, the company created TCP/IP utilities for PC-based UNIX systems and UNIX derivatives.

Recently, Racal InterLan introduced the first adapter cards that feature on-board SynOptics' LattisNet unshielded twisted pair. Having released the industry's first 10BASE-T adapter cards, Racal InterLan has scored another technological first by bringing to market the first miniature 10BASE-T Media Access Units (MAUs).

---

## Competitive Position

In a field that has become increasingly more crowded, filled with vendors that are moving out of flat markets, Racal InterLan appears to be holding its own and making the right moves. The company spots trends in Ethernet networking and quickly acts to produce the kinds of products that users will need, even before they are clamoring for them. This technique has served the company well, resulting in a 43 percent growth over the past three years.

At present, the company has entered into a streamlining mode, paring down its product line, which at one point numbered over 1,000 offerings, and concentrating on the INTERNExT Series and Network Interface Cards. This product shakeout will undoubtedly advance the company's interests, freeing it up to pursue the hottest issues and items.

As part of the paring process, the company signed an agreement with National Computer Marketing (NCM) that gives NCM exclusive marketing rights to Racal InterLan's NP100 and NP200 Series of protocol processors for Digital Equipment's VAX machines.

Although Racal InterLan competes against some of the industry's heaviest hitters, the company has made sure its cards can coexist with products from its opponents. Racal InterLan's cards are compatible with products from hub and media vendors such as SynOptics, Cabletron, David Systems, Networth, Chipcom, and AT&T. This "vendor friendliness" appears to be working—the

## Company Profile Racal InterLan

### Corporate Headquarters

155 Swanson Road  
Boxborough, MA 01719  
(508) 263-9929

### Officers

*President and CEO:* Randy  
N. Phillips

*Vice President of Finance:*  
Thomas O'Brien

*Vice President of Market-  
ing:* David Tolwinski

*Vice President of Sales  
and Service:* Gerald W.  
Wesel

*Vice President of Finance:*  
Maureen Mulroy

### Company Background

Racal InterLan is a subsidiary of The Racal Corp., which is a part of the \$750 million Data Communication Group within Racal plc, the \$2.8

million U.K. parent corporation. In 1989, The Racal Corp. acquired InterLan Inc., formerly owned by Micom Systems Inc., and made the company an essential part of its data communications operations. Racal's Data Communication Group produces revenues of approximately \$750 million. Before the acquisition, a Racal subsidiary in the U.K. sold the InterLan product line.

Racal InterLan designs and manufactures software and hardware products for local area networking. The products support distributed and cooperative applications processing among PCs,

workstations, and mini-computers in multivendor environments. In addition to developing its own products, Racal InterLan integrates technical building blocks into value-added products.

Over the past three years, Racal InterLan has experienced nearly 43 percent growth. The company invests 14 percent of its sales in R&D. Regional sales offices are located throughout the United States. In Europe, Racal InterLan maintains a sales office in Surrey, England. The company employs approximately 275 people.

The company has achieved many "firsts," notably producing the first Unshielded Twisted Pair (UTP) Ethernet cards, delivering 10BASE-T adapter cards, marketing miniature 10BASE-T MAUs, developing the

first integrated 10BASE-T concentrator and terminal server, and introducing the first NetWare-to-TCP/IP gateway.

### Recent Agreements

*August 1990*—concluded an agreement with National Computer Marketing, Inc. (NCM), under which NCM develops, markets, and maintains the Racal InterLan NP100 and NP200 Series of products for Digital Equipment's VAX computers. NCM gains exclusive marketing rights.

*October 1, 1990*—announced at the Interop show that it had entered into joint partnerships with Sun Microsystems, Retix, and MOD-TAP Systems to provide integrated technologies and services for Racal InterLan's INTERNExT integrated LAN communications system.

company boasts an installed base for its 10BASE-T and LattisNet UTP cards of over 180,000.

During 1990, Racal InterLan entered into an agreement with Tech Data to resell its products. To enhance the INTERNExT Series, Racal InterLan entered into joint partnerships with Sun Microsystems, Retix, and MOD-TAP Systems.

### Decision Points

From a user's perspective, Racal InterLan has to look very appealing. The company offers a lifetime warranty on all its Ethernet adapter cards, which include cards for 10BASE-T, LattisNet UTP, Macintosh SE and Macintosh SE/30, PC XT, EISA, PC AT (ISA), and Micro Channel. In addition, with each MacConnect card, Racal InterLan provides, at no charge, Etherscope, a protocol analyzer and

packet monitor that offers full packet disassembly and analysis for AppleTalk Phase I, AppleTalk Phase II, TCP/IP, and NetWare IPX. Equipped with a Macintosh graphics interface, Etherscope assists with network monitoring by providing traffic "skylines" and network utilization estimates.

The company also offers free training from its staff to users who purchase their first INX5000 Communication System, which is basically a terminal server and 10BASE-T concentrator packaged in one system. Features of the INX5000 that will attract network managers are its modularity and fault-tolerant construction, modular components, and network management software.

The INX5000 supports LANcentral Express, a UNIX-based application that interfaces to SNMP agents from various vendors and runs on a Sun SPARCstation. The Network Management

Module of the INX5000 relieves some of the problems of network management by providing users with realtime access to more than 500 SNMP statistics.

Roll Call supplies SNMP-based network card management, not only to Racal InterLan's cards but to those from other vendors that are positioned throughout a network. Roll Call makes use of graphics to display a network profile that includes numerous statistics and counters. The system automatically queries the network and compiles statistics about Ethernet packet capture and analysis, card/connection, and network utilization. An event log that features filters and alarms notifies network managers about failures and problems.

Shoppers for STREAMS drivers can do it all in one stop. Racal InterLan offers STREAMS that support INTERACTIVE UNIX, SCO UNIX and SCO XENIX 386, 32-bit EISA, 8-bit PC XT, 16-bit PC AT (ISA), and 16-bit MCA. NetWare TCP/IP Gateway from Racal InterLan, a bundled hardware/software product, integrates NetWare 2.1, 2.12, and 2.15 clients into TCP/IP networks. The product enables up to 31 Novell NetWare clients to conduct simultaneous sessions.

## Characteristics

### Overview

Racal InterLan is currently focusing on two major product lines: the INTERNEXt Series and Ethernet adapter cards.

The INTERNEXt Series includes the INX5000 Series, an integrated LAN communications system; the INX400/R, a high-performance, remote LAN bridge; the INX400/L, a local bridge; the LANcentral Express (LCX), an SNMP-based LAN management system running on a Sun SPARCstation; and the INTERNEXt Network Management Module (INX-NMM), a network management solution for the INTERNEXt family.

Racal InterLan's Ethernet adapter cards include 10BASE-T and LattisNet UTP, MacConnect, NI5210 PC

XT, ES3210 EISA, NI6510 PC AT (ISA), and NI9210 Micro Channel. For SNMP-based network card management, the company offers Roll Call.

### INTERNEXt Series

#### INX5000 Series

The INX5000 Series is an integrated LAN communications system that supports mixed network configurations via expansion modules. The INX5000 serves as a platform for high-density connections because of its fault-tolerant architecture, modular components, and network management software. The series delivers the full range of desktop-to-desktop connectivity for workgroup, departmental, and facility-level networks. When functioning as an integrated wire-closet system, the INX5000 serves as the basis for a complementary family of LAN products that includes workstation adapters, media products, departmental systems, and interoperability software.

To maximize connectivity, the INX5000 features high port densities for attaching terminals, PCs, workstations, host systems, and other devices to the LAN. The INX5000 accomplishes this range of connectivity through the integration of a 10BASE-T Ethernet concentrator and a LAT/TCP terminal server in the same chassis. By moving a patch cord, the administrator of large networks can support user devices with an integral LAN connection or an RS-232-C interface.

Racal InterLan offers the INX5000 in a 12-slot communications chassis or in a 3-slot enclosure. These systems provide a progression of connection densities, ranging from 12 to 208 ports of 10BASE-T or LAT/TCP terminal service. Both systems can be table or rack mounted. Users can wall mount the three-slot system for installation in shallow wire closets.

Modularly constructed, the INX5000 circuit boards and subassemblies join internally via connectors and do not require internal cable assemblies. All expansion boards are interchangeable between the 21-slot and 3-slot chassis. For repairs and reconfigurations, users can access INX5000 modules from the exterior of the chassis.

Since the series includes a module that implements the IEEE Fiber Optic Inter-Repeater (FOIRL) specification, the INX5000 supports a fiber optic backbone capability, extending to distances up to one km. A central system serves as the fiber optic hub for other chassis when it is configured in star topology. At the end points of the star, a single-port fiber optic interface replaces the AUI Ethernet interface normally used for coaxial backbone networks.

All subassemblies in the INX5000 chassis are easily removable, facilitating in-service repairs. The INX5000 also offers a redundant power system and heat-sensing modules.

### **Network Management**

*LANcentral Express* is a network management station that operates in conjunction with an SNMP agent resident in the Network Management Module (NMM) and with other intelligent INX modules, such as the LAT/TCP terminal server. These modules also contain agents that enable X Windows and Telnet-compatible devices to display and modify variables in the management information base (MIB) maintained by the system.

LANcentral Express runs on a Sun SPARCstation, which incorporates a 16-MIP RISC processor and 12M bytes of RAM. Racal InterLan has enhanced the software to support LAN-specific applications. A high-resolution, bit-mapped graphical display simplifies the manipulation of management information gathered from network devices. The INX Macro Facility enables activities of the INX5000 modules to be automated and customized.

### **Expansion Card Options**

Users can expand their systems' capabilities with the 10BASE-T Concentrator, LAT/TCP Terminal Server, FOIRL Concentrator, or Network Management Module (NMM).

**10BASE-T Concentrator:** Each 12-port 10BASE-T module set installed in a 12-slot or 3-slot chassis performs IEEE 802.3 repeater functions, such as retiming, preamble restoration, fragment extension, jabber protection, auto partitioning, and link integrity tests. When an NMM is added to an INX5000 system, each concentrator module reports port-level activity and status information.

**LAT/TCP Terminal Server:** The 16-port terminal server module set supplies connectivity to LAT hosts (Digital Equipment's VMS systems) or TCP hosts from any asynchronous device on the network. Users activate LAT or Reverse LAT sessions by a simple command sequence, initiated by the host system or automated by the INX Macro Facility. Users can also establish TCP (Telnet) sessions to any host that supports the TCP/IP standard.

Users can "hot switch" between the two protocol types via the Multiple Virtual Circuit. An Integrated Print Server Facility manages print jobs for print devices attached to the server. Users can manage LAT and TCP connections separately by invoking either the Digital Terminal Server Manager (TSM) agent or the SNMP agent. This feature enables a network administrator to manage the LAT environment from a VAX system and the TCP sessions from an SNMP management system. Alternatively, both protocol environments can be managed by an SNMP management station.

**FOIRL Concentrator:** Racal InterLan's implementation of FOIRL makes use of port-level management techniques via SNMP, which allow the network manager to monitor and control devices on the fiber optic backbone or on the twisted-pair subnet from the same central management station.

**Network Management:** The Network Management Module (NMM) supports over 500 MIB variables that measure traffic levels and packet errors with rate

and value statistics. The NMM is located in a 386SX-based environment for the INX5000 12-slot and 3-slot systems. The NMM contains SNMP, Telnet, and the INX chassis management protocol (INX-CMP) software to communicate with various console devices. For local management, the system can be optionally configured with an LCD control panel. For remote management, the NMM supports X Windows and Telnet to allow an X-Terminal or a Telnet device to log on to the NMM system software and perform management activities.

### **INX400/R**

The INX400/R high-performance, remote LAN bridge is an Ethernet Media Access Control bridge, suitable for T1 (1.544M bps) and M1 (2.048M bps) networks. By saturating two T1 or two M1 links simultaneously, the INX400/R ensures the efficiency of link bandwidth. Transparent to higher level protocols, the bridge can operate with standard and thin Ethernet networks. With a single LAN port and either one or two wide area network (WAN) interfaces, the INX400/R makes remote networks function as a single LAN.

The principal features of INX400/R are self-configuration; forward-if-remote mode; load balancing; adaptive routing; triangulation; end-to-end data integrity; spanning tree protocol; T1 day/night service; network management; traffic management; remote network management; and optional second WAN port.

For additional features, see Table 1.

### **INX400/L**

A local bridge, the INX400/L examines 23,000 packets per second and transmits 12,000 packets per second. The bridge monitors activity on both networks to which it is connected. From a console attached to an RS-232-C connector, the network administrator can obtain statistics on the bridge, monitor an extended network, or configure the bridge. A simple command activates comprehensive network statistics. The INX400/L can produce statistics for each network connected or for both networks combined.

Some network statistics include packets received, collisions/deferrals, misaligned packets, bytes received, small packets, and large packets. A network management agent based on SNMP, operating with LANcentral Express or other SNMP-based management systems, provides a centralized monitoring and control point for INX400/L local bridge operators.

The INX400/L uses a spanning tree algorithm that detects loops in the network topology and automatically shuts off redundant bridges. Users can configure the device to forward packets, based on size, thereby allowing a network to balance traffic and increase throughput. In addition to source and destination addresses, the INX400/L's table can be set so that any frame of a specific Ethernet protocol type is always filtered. The INX400/L can also perform filtering based on protocols such as broadcast, multicast, TCP/IP, ITP, DECnet, or ISO. The network administrator can define filters for up to six user-defined protocols.

**Table 1. INX400/R**

Processors	Dual Motorola 68020s and others
Display	16-character LCD for system messages
Removable Storage	3.5-in. diskette for system loading and software updates
Other	Nonvolatile memory for configuration and Ethernet address information
MTBF	25,000 hours
WAN Speeds	Support of 2 links simultaneously at up to 2.048M bps each
LAN Stations Supported	Up to 2,000
Filter Rate	14,880 frames per second
Transfer Rate	8,000 frames per second
Frame Size	64 bytes to 1,518 octets
LAN Compatibility	IEEE 802.3 10BASE5, ISO 8802-3 (Standard Ethernet) IEEE 802.3 10BASE2, ISO 8802-3/AD1 (Thin Ethernet)
WAN Compatibility	CCITT X.21, V.35, RS-449, G.703, T1 CSU
Number of WANs Supported	1 or 2
Additional Approval	Approved for connection to British Telecom Kilostream and Megastream

**LANcentral Express (LCX)**

LANcentral Express is an SNMP-based LAN management system, which runs on a Sun SPARCstation IPC. LCX serves as a centralized monitoring and control point for all INTERNEXt products as well as for other SNMP-compliant devices. The system operates in conjunction with an SNMP agent resident in the INTERNEXt network management module (INX-NMM) and the LAT/TCP terminal server module (INX-NTS). LCX enables users to:

- centralize configuration control over objects on the network, allowing all objects to be managed from one location,
- compile and display statistics about the operation of the network and devices on the network,
- detect and isolate failures and problems before they become critical, and
- analyze logged events to resolve soft or intermittent network problems.

LCX runs on a Sun Microsystems SPARCstation, Model IPC, with Sun OS 4.1.1 (UNIX) and SunNet Manager to perform management applications for a variety of network devices. LCX uses X Windows and Sun's OPEN LOOK windowing system. The workstation incorporates a 16-MIP RISC processor and 12M bytes of RAM. LCX

features SNMP-based management software and issues SNMP commands by defining the MIB for a network device as a schema file.

Racal InterLan has equipped LCX with a high-resolution, bit-mapped graphical user interface (GUI) for displaying a network topology map, presenting management data, and issuing SNMP commands. All numerical data retrieved from supported devices can be displayed as bar or line charts.

**INTERNEXt Network Management Module (INX-NMM)**

The INX-NMM serves as a central point of management for the INX5000 series. An intelligent device, INX-NMM features the Intel 80386-SX microprocessor, running an SNMP agent for controlling over 5,000 management information base (MIB) variables. The module executes a software image that contains the current MIB attribute list for a variety of INTERNEXt modules.

To allow the user to determine the quality of service on a per-port basis, INX-NMM maintains statistical counters for an extensive set of traffic and error statistics. The speed and memory capacity of the 386-based module enable realtime values to be collected for frame-level to bit-level statistics.

On-board protocols allow the INX-NMM to support X-Terminals and ASCII terminals. The TCP/IP and X Window software on the INX-NMM support remote access by an X-Terminal. Users can connect VT100 devices to the console port locally or remotely through Telnet. Redundancy features include dual-bus support and multiple management modules, in which the second module can back up the first if they are both assigned to the same bus.

Hardware specifications include 80386-SX 20MHz CPU, 1M byte of DRAM, 16K bytes of cache memory, 256 bytes of EPROM, and 16K bytes of EEPROM. Green LEDs indicate status, and amber LEDs indicate faults.

**Ethernet Adapter Cards**

For specifications on 10BASE-T and LattisNet UTP, MacConnect, NI5210 PC XT, ES3210 EISA, NI6510 PC AT (ISA), and NI9210 Micro Channel, see Table 2.

**Roll Call**

Roll Call is an SNMP/Ethernet card management system that manages all cards on the network, including non-InterLan cards. Roll Call features the vendor's NP600 intelligent Ethernet processor, which captures and disassembles all packet traffic on a network segment of up to 100 PCs. The NP600 includes an 80186 processor with 512K bytes of memory to enhance network performance in high-packet traffic environments. Roll Call features a standards-based design that includes 802.3 Ethernet packet drivers, SNMP management information base (MIB), and Windows 3.0 desktop

**Table 2. Ethernet Adapter Cards**

Product	Description	Support
10BASE-T and LattisNet UTP	On-board LattisNet UTP, 10BASE-T buses for PC XT, PC AT, MCA; function with Novell NetWare, IBM LAN Manager, Banyan VINES, Digital Equipment DECnet, Apple AppleTalk, 3Com 3+ and 3+ Open	Compatible with products from Syn-Optics, Cabletron, David Systems, Networth, Chipcom, AT&T
MacConnect	Consists of NIA310 (Macintosh II Nu-Bus), NISE (16-bit Macintosh SE), NISE/30 (32-bit Macintosh SE/30)	NIA310 supports Ethernet/Thin Ethernet, 10BASE-T UTP Ethernet applications
NI5210 PC XT	8-bit data link Ethernet controller operating in low to midrange networks	Supports Ethernet/Thin Ethernet, LattisNet UTP, and 10BASE-T
ES3210 EISA	32-bit data link Ethernet controller with 16K bytes on-board RAM, suitable for systems conforming to EISA	Multiple processor file servers, multiuser UNIX-based systems, single-user workstations running network applications
NI6510 PC AT (ISA)	16-bit bus master, data link Ethernet controller	Connects PC AT (ISA) and IBM-compatibles to 802.3 Ethernet networks
NI9210 Micro Channel	16-bit MCA 803.2-compliant Ethernet data link controller with 16K bytes of RAM for IBM PS/2s	Ethernet/Thin Ethernet, LattisNet UTP, and 10BASE-T

management applications. The DOS Windows 3.0 Graphical User Interface (GUI) provides network monitoring and diagnostics.

## Software Products

### UNIX STREAMS Drivers for Ethernet Adapter Cards:

These products support interactive UNIX, SCO UNIX and SCO XENIX 386, ES3210 (32-bit EISA), NI5210 (8-bit PC XT), NI6510 (16-bit PC AT—ISA), and NI9210 (16-bit MCA).

**Board-Based TCP/IP for DOS:** The NP627 for DOS protocol processor is a hardware/software product that provides the DOS user with full TCP/IP services, such as Telnet, FTP, SMTP, and the Berkeley R-utilities. It also supports concurrent NetWare and TCP/IP connections.

**PC/TCP-Host-Based TCP/IP for DOS:** This product, which supports concurrent TCP/IP and NetWare connections, is compatible with Racal InterLan's NI5210

PC XT, NI6510 PC AT (ISA), and NI9210 MCA Ethernet cards. The company offers the INTERDRIVE option for users who require NFS services.

**TCP Server:** TCP Server is a standalone gateway server that integrates NetWare 286/386 and TCP/IP. The product provides users with bidirectional TCP/IP services, such as FTP and SMTP, as well as Telnet and R-utilities between NetWare DOS or OS/2 clients and TCP/IP hosts. TCP Server supports any NetWare subnet, including Token-Ring, Arcnet, PC LAN, and thick/thin Ethernet. The TCP Server package includes the vendor's NP600/XL intelligent Ethernet controller and TCP Server software. It runs on a NetWare OS/2 workstation that supports NetWare 286 V.2.15 or NetWare 386 V.3x. Users do not have to modify existing client NetWare workstations.

**NetWare TCP/IP Gateway for Novell NetWare:** A bundled hardware/software offering, this product integrates NetWare 2.1, 2.12, and 2.15 clients into TCP/IP networks. Users can install the gateway adapter and software in an IBM PC, AT, or compatible server without modifying the existing server configuration. The TCP/IP Gateway provides NetWare clients with a variety of TCP/IP services, including Telnet, FTP, SMTP, Berkeley, R-utilities, ARPA protocols, and Oracle SQL\*NET database support. The Gateway software license supports up to 16 simultaneous Softronics VT220 Telnet sessions. A license upgrade extends the simultaneous sessions to 31.

## Pricing and Support

Racal InterLan offers a lifetime warranty for its Ethernet adapter cards. The warranty covers any defect in materials or workmanship for all Ethernet adapter cards purchased after July 30, 1990. Under the warranty, the company guarantees repair or replacement of any defective card at no repair cost to the customer.

## Equipment Prices

	Purchase Price (\$)
<b>INTERNETX INX5000</b>	
INX5000 12-slot base unit, 110 V	4,250
INX5000 12-slot base unit, 220 V	4,250
INX5000 3-slot base unit, 110 V	2,550
INX5000 3-slot base unit, 220 V	2,550
NTS Module Set with Telco Connectors	2,995
INX-NTS Software Featurecard	595
10BASE-T Module Set	2,125
LCX Management Station (hardware and software)	22,000
LCX Management Software (software only)	8,000
Network Management Module with AUI/BNC Connectors	3,195
INX-NMM Software Featurecard	595
LCD Control Panel	1,250
LCD Control Panel	1,250
<b>INX400/R Remote LAN Bridge</b>	
INX400/R with RS-449 interface, 110 V	10,400
INX400/R with RS-449 interface, 220 V	12,900
INX400/R with V.35 interface, 110 V	10,400
INX400/R with V.35 interface, 220 V	12,900
INX400/R with T1 interface, 110 V	10,900
INX400/R with T1 interface, 220 V	12,900
<b>INX400/L Local Bridge</b>	
INX400/L Ethernet-to-Ethernet Bridge, 110V	3,195
INX400/L Ethernet-to-Ethernet Bridge, 220V	3,195
<b>NTS200—8-port LAT and TCP/IP Terminal Server</b>	
NTS200 and DK-LAT/TCP-PAK Package (bootserver)	2,690
NTS200 and DK-LAT/TCP-Key Package (package bootable from above package)	2,390
NTS200 and DK-LAT/TCP-Key Package (package bootable from above package)	2,390
<b>Ethernet Adapter Cards</b>	
SynOptics LattisNet Networks 8-bit PC XT	395
SynOptics LattisNet Networks 16-bit PC AT (ISA)	450
SynOptics LattisNet Networks 16-bit PC AT (ISA)	450
SynOptics LattisNet Networks MCA (PS/2)	595
10BASE-T Networks 8-bit PC XT	350
10BASE-T Networks 16-bit PC AT (ISA)	395
10BASE-T Networks MCA (PS/2)	395
10BASE-T Networks NuBus	550

**Purchase  
Price  
(\$)**

<b>MacConnect Cards</b>	
NuBus Thick/Thin	450
NuBus 10BASE-T	495
MAC SE Thick/Thin	395
MAC SE/30 Thick/Thin	495
MAC SE/30 10BASE-T	550
<b>NI5210 PC XT Cards</b>	
Thick/Thin	295
10BASE-T	350
LattisNet	395
<b>NI6510 PC AT (ISA) Cards</b>	
Thick/Thin	375
10BASE-T	395
LattisNet	450
<b>NI9210 Micro Channel Cards</b>	
Thick/Thin	495
10BASE-T	495
LattisNet	595
<b>Network Management</b>	
Roll Call Network Card Management Package	995
<b>Software</b>	
ES3210 with STREAMS	995
NI5210 with STREAMS	295
NI6510 with STREAMS	375
NI9210 with STREAMS	495
ES3210 STREAMS driver	75
NI5210 STREAMS driver	75
NI6510 STREAMS driver	75
NI9210 STREAMS driver	75
TCP/IP for DOS Protocol Processor	750
INTERDRIVE NFS Software	90
NETBIOS software	80
NETBIOS software	80
NI5210/8 PC XT card with PC/TCP	690
NI6510 PC AT (ISA) card with PC/TCP	770
NI9210 MCA card with PC/TCP	890
TCP Server	5,995
BSD Sockets Library	995
NetWare TCP/IP Gateway	3,995
Telnet License upgrade	750



# Sitka TOPS Local Area Network Products

## In this report:

Product Analysis.....	-102
Vendor Analysis.....	-104
Support.....	-105
Specifications.....	-106
Pricing.....	-107

**Note:** Sitka is in the midst of a back-to-basics campaign, focusing its interests on cross-platform networking and is no longer aggressively marketing its electronic mail product. In the Fall of 1992, Sitka will introduce OpenTOPS, an enhanced version of the present SitkaTOPS architecture that will increase support for hardware platforms, operating systems, and transport protocol standards. Much of the strength of OpenTOPS is attributed to Sitka's implementation of Tiara Computer's 10NET 5.0 peer-to-peer technology. Sitka gained immediate access to 10NET capabilities when it formed a technology agreement with Tiara last year.

Sitka, an independent subsidiary of Sun Microsystems, manufactures and markets TOPS local area network software and hardware for linking PC, Macintosh, Sun Workstation, and pen-based computers into a single network.

## Strengths

- SitkaTOPS products provide strong cross-platform communications.
- SitkaTOPS products are economical, easy to install, and easy to use.
- SitkaTOPS enables users to function as clients, servers, or client/servers in a LAN environment.

## Limitations

- SitkaTOPS products are not ideally suited for network users demanding the benefits of a client-server architecture.
- DosTOPS lacks Windows capabilities, uses a lot of RAM, and is dependent on the AppleTalk protocol.
- SitkaTOPS products lack support for TCP/IP and NFS (Network File System).

## Competition

Novell NetWare and Apple Computer AppleShare provide Macintosh/IBM PC-based LAN competition. Artisoft's LANtastic provides PC-based competition

## Vendor

Sitka Corp.  
950 Marina Village Parkway  
P.O. Box 4016  
Alameda, CA 94501  
(415) 769-9669  
Fax: (510) 769-8771

## In Canada:

Contact Sitka U.S. Headquarters  
(415) 769-8700, ext. 900  
Fax: (510) 769-8771

## Price

TOPS network software and hardware products range from \$249 for DosTOPS to \$1,310 for PenTOPS. **GSA Schedule:** Yes.

—By Donna Gasiewski  
Staff Writer

## Product Analysis

SitkaTOPS products link PC, Macintosh, Sun Workstation, and pen-based computers together into a single local area network, providing transparent file and printer sharing and e-mail options. SitkaTOPS products include a quick and easy menu-driven installation procedure, and once installed, its features are accessed by easy-to-use menus. SitkaTOPS supports multiple network-cabling schemes, and can be run at Ethernet speeds over Ethernet cabling, or at FlashTalk or AppleTalk speeds over inexpensive twisted-pair cabling.

SitkaTOPS products are ideally suited for users who require cross-platform connectivity and who require workgroup-scale connectivity. SitkaTOPS is for users who may be contemplating purchasing a Novell network for cross-platform connectivity but who find the networking needs of a client/server architecture an overkill. Conversely, SitkaTOPS is not necessarily a recommended network connection for DOS-only workgroups or UNIX-only workgroups.

### Target Applications

SitkaTOPS products are targeted to the average PC user who wants to easily connect a workstation to a network, load software, and communicate with other workstations on a network through transparent file and printer sharing and e-mail features.

## Strengths

### Cross-Platform Connectivity

More than three-fourths of the nearly 700,000 SitkaTOPS workstations installed are on mixed-platform networks. With SitkaTOPS products, each network user accesses services and navigates the network through a familiar set of commands and an interface native to his or her own computing environment—regardless of whether they use a PC, Macintosh, Sun Workstation, or pen-based computer.

MacTOPS 3.1, for example, allows a Macintosh computer to directly access any other Macintosh, PC, UNIX, or pen-based computer on the network, and view or copy its files. It is the only product to provide two-way file sharing among Apple System 6.0 and System 7.0 machines, ensuring the co-existence of both operating systems on a single network.

According to Marcia Kadanoff, vice president of marketing, "Customers need to connect Macs to PCs and Sun Workstations, and System 7.0 does not solve that problem. There is also a large base of machines that will continue to run System 6.0. Sitka is the only one to bridge that System 6.0 to 7.0 connectivity gap."

Sitka's DosTOPS software allows a DOS-based computer to function as a networked file server, a client, or both, and allows for transparent file sharing between DOS, Macintosh, Sun Workstation, and pen-based computers. DosTOPS also allows PCs to act as fully functional file servers for Macintosh computers on the network by supporting the Hierarchical File System (HFS) and the Apple Filing Protocol (AFP). With HFS, multiuser Macintosh applications such as databases can be stored and used from a DOS-based server on the network even though the program is actually running on a Macintosh.

## Overview

Model	MacTOPS 3.1	DosTOPS 3.0	SunTOPS 3.0
Date Announced	May 1991	January 1990	December 1990
Date Released	August 1991	April 1990	February 1991
No. Installed (Including Earlier Versions)	350,000	245,000	105,000
Base Price	\$299	\$249	\$1,295
Operating Systems Supported	Compatible with all Apple-supported system software 6.0 through 7.0. Fully supports AppleTalk zones	DOS 3.1, 3.3, or 4.01	Sun O/S 4.0.3 and 4.1.0
Microcomputers Supported	Macintosh Plus, SE, SE/30, Macintosh II family	IBM or compatible PC/XT/AT, PS/2 Model 25 or higher, Compaq 386 and compatibles	Sparc, Sun-4, Sun 386i, and Sun-3 families

Model	PenTOPS 1.0	10Net 5.0
Date Announced	January 1991	October 1991
Date Released	March 1991	December 1991
No. Installed (Including Earlier Versions)	—	650,000
Base Price	—	\$129
Operating Systems Supported	PenPoint	DOS and Windows
Microcomputers Supported	NCR 3148 notebook computers	IBM PCs and compatibles

## Decision Points

	Requirements	Performance
SitkaTOPS Products	Cross-Platform Networking Support	With SitkaTOPS products, each network user accesses services and navigates the network through a familiar set of commands and an interface native to his or her own computing environment regardless of whether they use a PC, Macintosh, Sun-Workstation, or pen-based computer
	Ease of Use	Sitka products allow the average PC to easily connect a workstation to a network, load software, and communicate with other workstations on a network. Installing a new network node takes no more than 20 minutes, requires no administration, such as consulting services for installation, and is virtually independent from ongoing service and support
	Client-Server Architecture Support	DosTOPS allows a DOS-based computer to function as a networked file server, a client, or both, for transparent file sharing between DOS, Macintosh, Sun Workstation, and pen-based computers.

Sitka's SunTOPS is the one of only a few product that provides Sun Workstations—SparcStations included—a seamless link for file transfer and printer sharing with Macintosh and DOS personal computers. It supports AFP's shared environment extension (SEE), which ensures Macintosh network users, accessing a SunTOPS server, the full functionality of multi-user applications.

Sitka's PenTOPS provides users of the PenPoint operating system access to files from a Macintosh, PC, or Sun Workstation.

### Ease of Use and Installation

Individual SitkaTOPS products are optimized for native operating environments and familiar user interfaces, and support multiple-cabling schemes, including Ethernet, FlashTalk, and AppleTalk. Formal user product training is not necessary. Installing a new network node takes no more than 20 minutes and requires no administration. Sitka claims its TOPS products provide users independence from consulting services for installation and ongoing service and support.

### Low Cost

The average cost per node for a SitkaTOPS network is under \$300. Product upgrades are inexpensive and issued on a per site basis.

### Flexibility

SitkaTOPS network products can be created with either a dedicated server configuration or as a distributed peer-to-peer network—where each computer on the network acts as both client and server. Also, new nodes can be added or removed from the network quickly and without any computer down time.

### Limitations

Sitka provides strong workgroup networking—networking for the average PC user who wants to easily connect a workstation to a network, load software, and communicate

with other workstations on a network. However, SitkaTOPS products are not ideally suited for users demanding the benefits of a client/server architecture, such as heavy security and high performance. Such users would be better served by companies like Novell and Microsoft.

SitkaTOPS could benefit from increased protocol support, memory support, and operating environment support. MacTOPS is dependent on the AppleTalk protocol. DosTOPS uses a lot of RAM, thus leaving users scrambling for enough workstation RAM to run common business applications. SitkaTOPS products also lack support for TCP/IP and NFS, and do not provide token-ring connections. Sitka expects to deliver more choices for hardware platforms, operating systems, and transport protocols when it introduces the OpenTOPS architecture later in the near future.

### Competitive Analysis

Sitka is the leader in cross-platform networking. It is the only vendor to provide products linking PC, Macintosh, Sun Workstation, and pen-based computers together on a single local area network. There are several communications vendors offering cross-platform networking but none provide the breadth of hardware platform connectivity, nor as strong cross-platform connectivity or ease-of-use and installation features.

Novell, Microsoft, and Apple Computer are examples of vendors providing Sitka with competition in the dual Macintosh and PC-based LAN market; however, their entry-level configurations are not tailored for the casual network user who does not need or want to put up with the cost and hassles of a client/server architecture.

In the market for users demanding strong client/server architecture, Sitka cannot compete with peer-to-peer vendors such as Novell and Microsoft.

# Vendor Analysis

## Marketing Strategy

In the last year and a half, Sitka has adopted a back-to-basics approach to network communications. It has refocused its interests on its core strength—low-cost, easy-to-use, cross-platform network services—and is using that strength to expand into three new markets: Windows 3.0, DOS 5.0, and pen-based computing. Sitka has introduced only a few new products and no longer aggressively markets its e-mail products.

In the Fall, Sitka intends to introduce OpenTOPS, an enhanced version of the present SitkaTOPS architecture that emphasizes cross-platform connectivity. Sitka claims its SitkaTOPS products will support an unlimited number of hardware platforms, operating systems, and transport protocol standards, such as a new, full peer version of PenTOPS, support for NETBIOS, and support for TCP/IP, and IPX transport protocols.

With OpenTOPS, Sitka is changing its SoftTalk architecture layer, which is the equivalent of a Remote Procedure Call. The changes will allow SitkaTOPS network services to be independent of the transport layer, so as to enable drivers to be written for other transport protocols. OpenTOPS also represents changes to its TOPS filing protocol. Those changes allow Sitka, or a third-party developer, to port the OpenTOPS architecture to other operating systems, without having to go back and revise all the other versions of TOPS to accommodate the peculiarities of the new operating system.

To expand into the markets for Windows 3.0, DOS 5.0, and pen-based computing, Sitka formed joint technology agreements with Tiara Computer Systems and GO Corp, respectively. A technology agreement with Tiara has allowed Sitka to gain immediate access to the 10NET 5.0 peer-to-peer network for their Windows and DOS-only environments. The 10NET 5.0 technology will enable OpenTOPS to be based on both SMB (Server Message Blocks)—the filing protocol standard established by Microsoft and IBM—and NetBEUI, the API (Application Programming Interface) used by many electronic mail systems and workgroup applications. A joint technology agreement with GO Corp., the developer of the PenPoint operating system, has helped Sitka develop PenTOPS, which allows users of PenPoint access to files from a Macintosh, PC, or Sun Workstation.

Sitka, in its focus on core network services, has decided to look for a partner to sell and market InBox, its e-mail product. While Sitka recognizes the importance of e-mail to the local area network and wants to be able to continue to offer it to users, Sitka does not want to develop a direct sales force solely for the purpose of selling InBox.

## Target Markets

Sitka focuses its interests and energies on the workgroup communications market, specifically cross-platform connectivity. MacTOPS, DosTOPS, SunTOPS, and PenTOPS support true cross-platform, peer-to-peer networking. Seventy-five percent of the nearly 700,000 SitkaTOPS nodes installed are operating on mixed-platform networks.

Already a leader in the Macintosh cross-platform market and with strong connectivity for DOS and Sun Workstation environments, Sitka is now positioning itself in the market for pen-based computers. With the number of pen-based computers sold in the U.S. estimated to reach more than one million by the end of 1994, Sitka feels PenTOPS' easy-to-use, peer-to-peer, cross-platform features are ideally suited for the mobile network market.

## Market Position

Sitka has one of the largest installed bases in the global LAN market. It has nearly 700,000 SitkaTOPS nodes installed, with 75% of its installed base representing mixed-platform networks.

"We are far and above the leader in cross-platform networking," Rebecca Fuller, Sitka spokesperson, said.

In the market for Macintosh connectivity, Sitka claims it has 98% of the Macintosh cross-platform market and 70% of the Macintosh-only market.

In the market for Sun Workstation peer-to-peer networking, Sitka reports a significant share of both the Sun cross-platform and Sun Workstation-only markets. In the market for DOS connectivity, Sitka claims a large share of the DOS cross-platform market. In the market for DOS-only networks, it reports a modest market share. Sitka expects its new access rights to Tiara's 10Net 5.0 peer-to-peer network for Windows and DOS-only environments will strengthen significantly its market share for DOS-only networks.

In the pen-based market, Sitka's market share is unknown because PenTOPS was only recently introduced. Nevertheless, Sitka considers itself a pioneering force in this rapidly emerging market and believes it is well positioned to become a market leader.

Sitka said it earned net profits for fiscal 1991, however it would not disclose a monetary figure. It claims increasing annual net sales, particularly in the international market where 40% of its networking products are sold.

## Company Activity Table

Date	Activity
1/90	Formed a joint technology agreement with GO Corp., the developer of the PenPoint operating system, to produce PenTOPS. PenTOPS allows file sharing and printer sharing among Macintosh, PC, SunWorkstation and pen-based computers
4/91	Appointed Deborah Triant company president; she replaces Rich Shapero
10/91	Signed cooperative technology agreement with Tiara Computer Systems to gaining access rights to 10Net 5.0 peer-to-peer networking for Windows and DOS-only environments

## Major Competitors

With SitkaTOPS, each network user accesses services and navigates the network through a familiar set of commands and an interface native to his or her own computing environments—regardless of whether they use a PC, Macintosh, Sun Workstation or pen-based computer. This unique strategy contrasts with all other network providers, whose solutions are based on centralized servers or tied technologically to a single computer platform. Novell, Microsoft, and Apple Computer provide competition in the dual Macintosh and PC-based LAN market; however their entry-level configurations are not tailored for the casual network user who does not need or want to put up with the cost and hassles of a client/server architecture. Artisoft's LANtastic, the market leader in peer-to-peer networking provides only DOS and Windows connectivity.

---

## Sales and Distribution Strategy

### Sales

Sitka markets its networking products through retail computer and software chain stores, national distributors, mail-order houses, and from more than 1,000 independent resellers.

Sitka claims success with its sales strategy and will maintain the tradition two-tier distribution model approach. Sitka has no plans to participate in direct sales.

Sitka international product sales have doubled in recent years to more than 40%.

### Distribution

Sitka TOPS products are sold throughout the U.S., Canada, Europe, and the Pacific Rim. Sitka markets its products through retail computer and software chain stores ComputerLand and Egghead Discount Software; national distributors MicroAmerica, Softsell, Tech Data, Merisel, Ingram/Micro-D, and Businessland; mail-order houses PC Connection and Mac Connection; and from more than 1,000 independent resellers.



## Support

Sitka provides strong support for its SitkaTOPS products. Its on-line technical support is excellent, although the support staff can often be overworked and thus not always immediately available to assist users. However, the support staff is prompt to return user telephone calls. Also, SitkaTOPS documentation is superlative. It is indexed and clearly written, with many helpful diagrams, and two chapters on troubleshooting and working on a network.

Sitka would benefit, however, to lengthen its technical support service hours, as well as its warranties on software and hardware to keep pace with its competition.

---

## Competitors' Programs

Apple Computer has a toll-free support line called the Technical Coordinator Answerline that registered users can subscribe to in order to obtain technical help over the

telephone. Apple provides Network Administrator's Course and LAN Literacy Course to teach users how to set up, configure, and maintain an AppleTalk network. The two-day course is offered by authorized Apple training providers. Also, Apple systems are warranted for one year, including parts and labor. Dealers provide carry-in maintenance during the warranty period. AppleCare extended service contracts are available for an annual fee.

Novell provides comprehensive educational course training. It offers six categories of courses, including Network User, Reseller, System Manager, Technical Support, Programming, and Computer-Based Training. Its courses are taught by Certified NetWare Instructors at Novell facilities located worldwide, or at the customer location.

---

## Policies & Programs

### Warranty

Software carries a 90-day warranty from the date of original retail purchase. If the software fails to perform in accordance with the documentation, Sitka will use reasonable commercial efforts to correct the problem at its own expense. If Sitka is unable to repair the software after a reasonable number of attempts, Sitka will either provide a replacement or a full refund of the license fee of the software. Sitka hardware carries a one-year warranty. If the hardware fails to perform in accordance with the documentation, Sitka will use reasonable commercial efforts to correct the problem at its own expense. If Sitka is unable to repair the hardware after a reasonable number of attempts, Sitka will either provide a replacement or a full refund.

### Support Services

TOPS offers free, unlimited technical support with a unique callback method. If a technician is not available, the user is assigned a specific time for which the technician will return the call, thereby eliminating telephone tag. In addition, TOPS operates a 24-hour bulletin board, which can be reached through several on-line services such as CompuServe and AppleLink.

### Service Locations

Sitka uses more than 3,000 authorized computer dealer locations throughout the U.S. and abroad.

### Service Hours

Sitka offers end-user technical support from 7 a.m. to 5 p.m. (PT) Monday through Friday, except for Wednesdays when its hours are 7 a.m. to 3 p.m. (PT).

### Training/Education

SitkaTOPS training is handled through Sitka's distributors and dealers. Reseller training options include a training center in Alameda, CA, on-site training at regional retail stores, a traveling seminar that visits major cities in the U.S., and a reseller training guide.

### Documentation

SitkaTOPS' documentation is indexed, with diagrams and two chapters on troubleshooting and working on a network.

### Upgrade Policies

Product provides inexpensive upgrades issued on a per-site basis.

# Specifications

## Enhancements

<b>Pen-Based Networking Access</b>	January 1991	PenTOPS 1.0 is the first of a series of pen-based networking products that Sitka developed. Available for the PenPoint operating system, it allows file sharing and printer sharing among Macintosh, PC, SunWorkstation and pen-based computers
<b>System 7.0-Compatible MacTOPS 3.1</b>	May 1991	MacTOPS 3.1 is the only networking product available that supports full, two-way, peer-to-peer file sharing among both System 6.0 and System 7.0 Apple Macintoshes, and Macintoshes and PCs
<b>10Net Peer-to-Peer Networking Access</b>	December 1991	Sitka has licensed the 10Net 5.0 peer-to-peer networking operating system for Windows and DOS computers from Tiara Computer Systems to combine with existing TOPS technology. 10Net is based on the SMB protocol standard, established by Microsoft and IBM, so PCs running 10Net can connect to LAN Manager servers and integrate new networking technology quickly and easily. 10Net also supports NetBIOS so applications like CC:Mail and dBase run smoothly over the network. Also, with 10Net's NDIS support, users can chose from any one of hundreds of network interface cards on the market, including Ethernet, 10Base-T, Token-Ring, and Arcnet

## Features/Functions

Model	MacTOPS 3.1	DosTOPS 3.0	SunTOPS3.0	PenTOPS 1.0
<b>Memory Required (bytes)</b>	200K	66K convent; 237 extended unlimited.	—	40K
<b>Number of Users</b>	Unlimited	Unlimited	Unlimited	Unlimited
<b>Transmission Speed</b>	LocalTalk, EtherTalk, Token-ring, and Arcnet speeds	LocalTalk, EtherTalk, Token-ring, and Arcnet	EtherTalk	LocalTalk, Serial, Parallel, Modem
<b>File Transfer/Conversion</b>	Text, binary	Text, binary	Text, binary	Text, binary
<b>Protocol Support</b>	All popular industry protocols	AppleTalk, EtherTalk	EtherTalk	AppleTalk
<b>Configuration</b>	Hardware and software for peer-to-peer or dedicated server	Hardware and software for peer-to-peer or dedicated server	Hardware and software for peer-to-peer or dedicated server	Software for peer-to-peer or dedicated server

Model	10Net 5.0
<b>Memory Required (bytes)</b>	29K client; 70K server
<b>Number of Users</b>	256
<b>Transmission Speed</b>	10M bps
<b>File Transfer</b>	Text, binary
<b>Protocol Support</b>	NetBEUI
<b>Configuration</b>	Software

---

# Pricing

<b>Products</b>	<b>Purchase Price (\$)</b>
<b>MacTOPS</b>	299.00
<b>DosTOPS</b>	249.00
<b>SunTOPS</b>	1,295.00
<b>PenTOPS</b>	1,310.00
<b>TOPS FlashCard (for PC/XT/AT Computers)</b>	239.00
<b>TOPS Flashcard (for PS/2 Computers)</b>	329.00
<b>TOPS Flashcard (for Toshiba Laptops)</b>	329.00
<b>TOPS Teleconnector (for Mac and PS/2 Computers)</b>	39.95
<b>TOPS Teleconnector (for PC/XT/AT Computers)</b>	39.95

---





# Spider Systems LAN Testers

## In this report:

Analysis.....	- 102
Competitive Position.....	- 103
Characteristics.....	-104
Pricing.....	-109

## Product Summary

### Editor's Note

Spider Systems, Inc., of Burlington, MA, is a subsidiary of Spider Systems Ltd., a Scottish company that began marketing its LAN products in the U.S. in 1988.

### Description

Spider offers a line of powerful test tools for Ethernet and IEEE 802.3 LANs and for token-ring and IEEE 802.5 LANs. Low-level decodes are standard with this equipment, but the company also offers a number of high-level software upgrades as options.

### Strengths

The Spider Systems test equipment prices are quite competitive. The equipment is lightweight and easy to learn. Users who already have a PC can acquire the Spider Systems capabilities by purchasing the various kit assemblies the company offers.

### Limitations

The number of high-level upgrades is still somewhat limited, but Spider intends to keep introducing new upgrades.

### Competition

AR Division of Telenex, Digilog, Novell, Hewlett-Packard, and Network General.

### Vendor

Spider Systems, Inc.  
12 New England Executive Park  
Burlington, MA 01803  
(617) 270-3510, (800) 447-7807

### Price

The SpiderMonitor K220 and P220 start at \$8,600. The SpiderAnalyzer K320 and P320 start at \$10,500. The SpiderProbe starts at \$3,450. For details, see the price list at the end of this report.

### GSA Schedule

No.

# Analysis

## Product Strategy

Spider Systems offers Ethernet, IEEE 802.3, token-ring, and IEEE 802.5 LAN testing products. This report discusses the following equipment:

- SpiderMonitor 220 Series
- SpiderAnalyzer 320 Series
- SpiderAnalyzer 320-R Series
- SpiderProbe
- SpiderMonitor 225 and SpiderAnalyzer 325

Spider Systems offers its SpiderMonitors and SpiderAnalyzers in two versions: a "P" model, in which the LAN tester is contained within a Compaq III personal computer; and a "K" version, a kit that comprises a printed circuit board (PCB), appropriate software, user documentation, and an Ethernet connection cable.

The SpiderMonitor and SpiderAnalyzer models enable a user to perform the following procedures:

- Identify the need for task scheduling or segmentation by analyzing traffic and error statistics

*The SpiderProbe B130 (left) is a multisegment remote monitoring and analysis tool that can operate with a SpiderAnalyzer (right) as its master unit.*

- Quickly identify faulty equipment through comprehensive error reporting
- Catch software problems by examining protocol structure and parameters with packet capture and decode capabilities
- Immediately recognize any unusual network activity by network and station alarms
- Measure loading, error levels and types, and response times

## Alarms

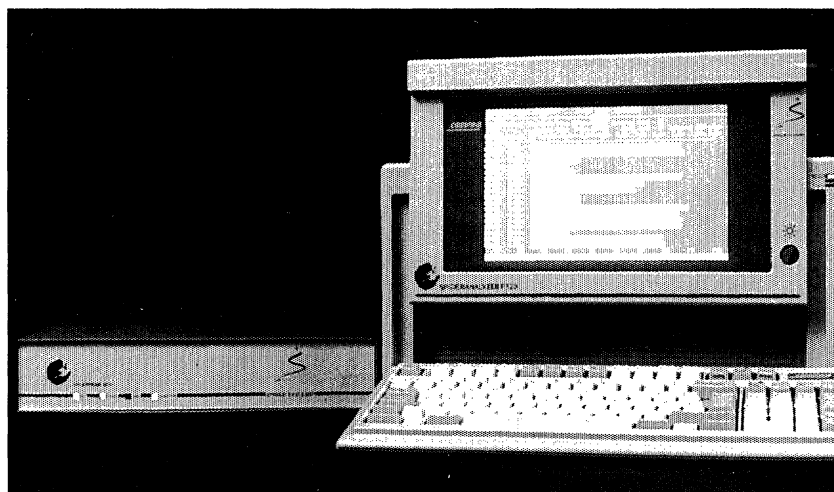
Network-level and station-level alarms notify the user when a predetermined condition is reached. Ethernet alarm criteria include:

- User-defined load level is exceeded
- User-defined error level is exceeded
- New station starts transmitting on network
- Evidence of a "dead" station on the network

Token-ring alarm criteria include:

- New station joins the ring or ring failing
- Active monitor alarm
- Beaconing ring alarm
- Neighbor notification incomplete

All information collected by the SpiderMonitor or SpiderAnalyzer can be logged to a printer or disk. Also, data can be loaded to Lotus 1-2-3 or a similar spreadsheet program.



## Company Profile Spider Systems

### **Parent Company**

Spider Systems Ltd.  
Edinburgh, Scotland

*President:* Burnham Baker  
*VP of Sales:* Marvin Reynolds

*Director of Marketing:* Jay Seaton

*Managing Director:* Peter Palmer

### **U.S. Headquarters**

Spider Systems, Inc.  
12 New England Executive Plaza  
Burlington, MA 01803  
(617) 270-3510, (800) 447-7807

### **Company Background**

*No. Employees:* 200

Spider Systems Ltd., the Scottish parent company, was founded in 1983 by computer specialists from ICL. The U.S. subsidiary, Spider Systems, Inc., was established in 1988 and

began marketing products in the U.S. that year.

Spider Systems designed its first SpiderMonitor in 1985 as a monitoring tool with powerful analysis capabilities. This, in essence, is how Spider Systems still defines a LAN tester.

Spider Systems Ltd. is one of Europe's leading networking companies with a broad range of connectivity products. In addition to its SpiderMonitor and SpiderAnalyzer products, the company markets the SpiderPort, a TCP/IP and LAT terminal server, SpiderBridge remote and local Ethernet bridges, and SpiderRouter. Spider Systems is also a leading supplier of X.25, Streams TCP/IP, and ISO software. "When we started," said Peter

Palmer, Spider's managing director, "networking was relatively unknown outside very large companies and academic institutions, but we were convinced that networking would become standard in industry and commerce."

The company's first product, the SpiderMonitor-D20, allowed users to monitor what was happening at any point in the network and to capture data from any part of the network. This product was much simpler to produce than many of its competitors' and therefore could be offered for much less than competing systems. Spider Systems points out that, for TCP/IP terminal servers and network monitors, it became the U.K. market leader within nine months and then became the market leader in Europe for the same products. The company has now established offices in London and Paris.

Based in Burlington, MA, the U.S. subsidiary, Spider Systems, Inc., sells its equipment nationwide through original equipment manufacturers, value-added resellers, and manufacturers' representatives. U.S. service and support are provided by technicians at the company's technical assistance center in Burlington, MA, and in Mountain View, CA.

Spider invests about 20 percent of its sales revenue in research and development. The company was recently awarded the prestigious and internationally recognized BS5750 manufacturing standard.

Spider Systems' goal is "to provide quality LAN management solutions, support and service for the North American market based on proven, reliable network monitoring and analysis technology."

### **Decoding**

The SpiderMonitor 220 Series provides three different filters for packet capture. After capture, packets are automatically decoded, in most cases, through Layer 4 (the Transport Layer) of the OSI model.

The SpiderAnalyzer 320 Series provides extensive packet filtering features and seven-layer protocol decoding of multiple protocols. This model can trigger packet capture on alarm, at a specific time of day, and on matching or not matching one or more filters. The 320 Series also

provides deeper filters and a second level of packet filtering. In addition, users can write their own decodes to analyze proprietary protocols.

### **Competitive Position**

The growing demand for LAN testers is based on the popularity of PCs and the increased level of cooperation among LAN vendors, especially the resolution of the disagreements between Ethernet and token-ring proponents. The LAN tester market is competitive and somewhat crowded, but Spider

Systems Ltd. believes it has products that address a need in the U.S. market.

Spider's strategy appears to be to offer equipment that is at least comparable (if not, in some respects, superior) to that of its competitors but at lower prices. Spider stresses that it offers a family of compatible products that can grow as the user's needs grow. Users need not purchase more capability than they actually need.

Many LAN vendors offer products that comprise equipment from other vendors. Spider is in step with this trend in that its "P" (for portable) products fit into a Compaq III PC. Spider is also keeping abreast of its competitors by offering kit ("K") versions, a LAN-adaptor PCB that fits into the user's PC.

---

### Decision Points

The SpiderMonitor and SpiderAnalyzer units are easy to learn and to use. The user is given a choice between portable models housed in a Compaq III PC and lower-priced kit versions that install in the user's own IBM or compatible PC. Spider offers a number of optional high-level decodes priced at \$750 each (the ISO high-level decode costs \$500); in addition, the company points out that upgrades are available. Another attractive (and unique) feature is that users can write their own decoding programs for proprietary protocols.

Among Spider's chief competitors in the U.S. market are Network General and Novell. Novell's LANalyzer supports Ethernet and IEEE 802.3 LANs, token-ring and IEEE 802.5 LANs, and Starlan LANs. It supports TCP/IP, XNS, ISO, and DECnet protocols and offers a memory capacity of 2 megabytes. Novell's LANalyzer is priced at \$9,980 for its kit versions. SpiderMonitor kits begin at \$8,600.

Network General has received much favorable attention for its Sniffer Network Analyzer. Like the Spider units, the Sniffer supports Ethernet and IEEE 802.3, and token-ring and 802.5 LANs, but it also tests ARCnet, Starlan, and IBM PCnet LANs. The Sniffer provides a memory capacity of up to 6 megabytes; the SpiderMonitor 220, SpiderAnalyzer 320, SpiderMonitor 225, and SpiderAnalyzer 325 provide 1.280 kilobytes, while the SpiderAnalyzer 320-R provides 896 kilobytes. The Sniffer's data transfer rate is 230K bps to 10M bps. The SpiderMonitor's data transfer rate is 9M bps.

Again, Spider offers a discernible price advantage. Sniffer prices start at \$12,500; the SpiderMonitor 220 units begin at \$8,600. Other advantages include the combined monitoring and analysis capability, a complete multitasking system that handles many functions at once, and the only combined system for simultaneous Ethernet and token-ring monitoring and analysis.

Spider Systems Ltd. of Edinburgh, Scotland is the leading vendor of network monitors and TCP/IP terminal servers in the United Kingdom and in Europe. In July 1988 the company set itself the rather daunting task of introducing an unknown product into an already competitive and growing U.S. test equipment market. Spider responded to this self-imposed challenge by offering a monitor that decodes up to OSI Layer 4 and an analyzer that decodes up to Layer 7. Spider's entry into the U.S. market presents an opportunity for test equipment buyers to evaluate some solid, versatile equipment offered at very competitive prices.

---

## Characteristics

**Product:** SpiderMonitor 220 and SpiderAnalyzer 320 Series.

**Number Installed to Date:** 2,000.

**Serviced by:** Spider Systems.

---

### System Description

Spider Systems' product line comprises the following:

- SpiderMonitor 220 Series
- SpiderAnalyzer 320 Series
- SpiderAnalyzer 320-R Series
- SpiderProbe
- SpiderMonitor 225 and SpiderAnalyzer 325
- Appropriate Software for each model
- Optional high-level decodes

The products included in these equipment lines are described below.

### **SpiderMonitor 220 Series**

Designed to be used with Ethernet and IEEE 802.3 LANs with up to 1,024 stations, the SpiderMonitor 220 is available in the two versions:

- SpiderMonitor P220, a complete portable test unit in a Compaq Portable III personal computer. It includes appropriate software, an Ethernet connection cable, user documentation, and tutorial instructions.
- SpiderMonitor K220, a kit consisting of an Ethernet controller/monitor board, appropriate software, an Ethernet connection cable, user documentation, and tutorial instructions. A Thin Ethernet transceiver, cable, and BNC T-piece are available as options.

The SpiderMonitor 220 incorporates seven operating modes:

**Alarms Mode:** Alarms can be visual or audible, and users can defeat them whenever desired. Alarms can be logged to disk or a printer and can be viewed in chronological order on the screen.

The SpiderMonitor 220 Series allows users to generate alarms for the following events:

- User-specified network load level exceeded
- User-specified error level exceeded
- New station on network
- No transmission from a station for a user-defined time period (up to 99 minutes)

**Development Mode:** Problems caused by incorrect protocols or bad packets are isolated, and the SpiderMonitor 220 time stamps all captured packets to 100 ms. The test unit traces packets by using programmable filters and triggers, using up to three types of trigger and filter conditions. Up to 1,500 packets can be filtered to buffer, or packets can be filtered to disk as ASCII for later analysis or as binary for refiltering. This mode automatically decodes TCP/IP, ISO, XNS, DECnet, IPX, and AppleTalk up to Layer 4 (Transport Layer). Spider expects to offer Banyan Vines decode capability this year.

**Performance Mode:** The SpiderMonitor 220 displays network activity in realtime by station. Network load can be shown as a percentage of available bandwidth or in packets per second.

**Statistics Mode:** The SpiderMonitor 220 tracks network operation by continuously acquiring statistics. It counts packets, bytes, and error packets per station. Statistics can be saved in ASCII format and loaded into a spreadsheet program for reporting.

**Summary Mode:** The SpiderMonitor 220 profiles network use over time. It displays average usage, peak

activity, and error rate and records at user-specified intervals (from 1 minute to 16 hours).

**Test Mode:** This mode identifies failing links. It employs Time Domain Reflectometry to locate media faults, open or short circuits, or transceiver faults. It transmits ISO, XNS, and Xerox link-level Echo packets to user-specified stations. Also, it performs loop-round tests.

**Traffic Generation Mode:** This mode lets the user measure the effect of new applications or stations. It generates packets of user-specified size, frequency, content (up to 216 bytes), and error type. Packet errors can also be generated.

The SpiderMonitor 220's Development Mode and Traffic Generation Mode are password protected.

Seven utilities are provided with the SpiderMonitor 220:

- **INSTALL:** Used for setting up the SpiderMonitor 220 equipment.
- **MAKE123:** Converts SpiderMonitor files into a form that can be used with Lotus 1-2-3. MAKE123 converts the following file types: full statistics, full error statistics, per station statistics, and summary and statistics log files.
- **CONVERT:** Allows users to convert configuration or trace files generated before release of the SpiderMonitor 220.
- **ADDMOD:** Allows users to assign vendor names to Ethernet addresses in the Address Table.
- **REPPACK:** Reads corrupt packet log files and copies each valid packet to a new file.
- **PASSWORD:** Lets the user set or change passwords.
- **SETATTR:** Permits users to change the attributes on the SpiderMonitor screen and writes selected options to the start-up files.

The SpiderMonitor P220 features a dual-mode plasma display of 80 characters by 25 lines. The screen can be tilted, and brightness is adjustable. The 91-key keyboard is detachable and has two positioning angles. This test unit has a memory capacity of 1.28M bytes.

The SpiderMonitor K220 is designed to install in and run on an IBM PC/XT or PC/AT or compatible with MS-DOS Version 3.0 or later, a diskette drive, a keyboard with 10 function keys, a 5M-byte or larger hard disk, 640K bytes of memory, and a full-sized card slot. Software is provided on a 5.25-inch or 3.50-inch diskette.

### **SpiderAnalyzer 320 Series**

This series is designed to be used with Ethernet IEEE 802.3 and token-ring IEEE 802.5 LANs with up to 1,024 stations (Ethernet) or 990 stations (token-ring). The SpiderAnalyzer 320 Series is available in two versions:

- SpiderAnalyzer P320, a portable model packaged in a Compaq Portable III personal computer. It has an Ethernet Controller/Analyzer board, appropriate software, an Ethernet connection cable, user documentation, and tutorial instructions.
- SpiderAnalyzer K320, a kit that includes an Ethernet Controller/Analyzer board, appropriate software, an Ethernet connection cable, user documentation, and tutorial instructions. A Thin Ethernet transceiver, cable, and BNC T-piece are available as options.

Like the SpiderMonitor 220, the SpiderAnalyzer 320 incorporates seven operating modes. The Alarms, Performance, Statistics, Summary, and Test modes are the same for both. The SpiderAnalyzer 320 Development and Traffic Generation modes, however, differ somewhat and are described below.

**Development Mode:** This mode isolates problems caused by incorrect protocol or bad packets. It provides four filters for capturing packets, using predefined patterns and error states. In addition, it provides a second level of filters: MARK or SHOW for packets passing the filter. Filter patterns can trigger on a packet that matches one or more filters, a packet that does not match one or more filters, an alarm, or a specified time.

The Development mode traps "ANY", "ERROR", or "NONERROR" packets that otherwise meet trigger or filter conditions. Captured packets can be filtered to a buffer of 1,500 packets, filtered directly to disk in real time, or saved as ASCII for later analysis or as binary for refiltering. All captured packets are time stamped to 100 ms.

The Development mode automatically decodes TCP/IP, ISO, XNS, DECnet, IPX, and AppleTalk up to OSI Layer 4 (Transport Layer). Spider expects to offer Banyan Vines decode this year. Optional higher level decodes are available for DECnet, TCP/IP, Novell NetWare, ISO, AppleTalk, LAT, and, expected this year, Banyan Vines.

**Traffic Generation Mode:** This mode measures the impact of new applications or stations by adding load to the existing network. It generates packets of random or fixed lengths at random or fixed intervals. The user can specify the size of the packets to be generated, as well as the frequency, the content (up to 216 bytes), and the error type. The Traffic Generation mode can generate packets with CRC errors as well as packets that are too short or too long. In addition to reporting collisions, this mode reports on loads generated, packets sent, and transmissions deferred.

The SpiderAnalyzer 320, like the SpiderMonitor 220 and the SpiderAnalyzer 320-R, lets the user save address maps and setup screens and store them together as an "environment." This test unit creates files when a user saves or logs screens or packets. Each file has a unique suffix and description. The SpiderAnalyzer can display a list of suitable files from which to choose for loading.

The SpiderAnalyzer 320 Series has the same seven utilities as the SpiderMonitor 220 Series. These utilities operate in the same manner for both series.

The following table compares the various models discussed. The user should be aware these models differ significantly among their operating modes.

Model	Network Size	Memory (bytes)
SpiderMonitor 220	1,024 stations	1280K
SpiderMonitor 225	1,024 stations	1280K
SpiderAnalyzer 320	1,024 stations	1280K
SpiderAnalyzer 325	1,024 stations	1280K
SpiderAnalyzer 320-R	260 stations	896K

#### Software Upgrades for 220 and 320

Spider has a remote monitoring software package that lets users remotely perform all the LAN management capabilities of the 220 and 320. Remote software runs directly over the network without a serial line or terminal server connection. A master station can access a slave at network speed. This software lets the manager dynamically determine which station(s) on the network will be the master and which will be a slave. The company calls this "Dynamic Master Definition." More than one master station can be designated; all master stations can operate concurrently. A master can monitor any segment that has a slave, or it can run DOS applications while simultaneously monitoring the local segment. The slave, too, is multitasking; it can monitor its segment while it executes DOS applications, such as Lotus 1-2-3. All remote information can be saved on a master station.

#### SpiderAnalyzer 320-R Series

The SpiderAnalyzer 320-R Series is designed to be used with token-ring and IEEE 802.5 LANs. It is available in two versions:

- SpiderAnalyzer P320-R, a portable test unit packaged in a Compaq Portable III personal computer. It includes a token-ring controller/monitor board, appropriate software, user documentation, and tutorial instructions.
- SpiderAnalyzer K320-R, a kit consisting of a token-ring controller/monitor board, appropriate software, user documentation, and tutorial instructions

The SpiderAnalyzer 320-R incorporates nine operating modes:

**Open Mode:** This mode opens up the 320-R as an active station on the ring.

**Error Mode:** This mode logs the time, source address, and information contained in the error reporting packets, which active stations issue upon detecting ring error conditions, such as continually transmitting stations or loss of signal.

**Alarms Mode:** Users can generate alarms for the following criteria:

- User-specified load level exceeded
- User-specified soft error level exceeded
- New station on the ring
- Station going dead
- Neighbor notification incomplete
- Beaconsing ring
- Active monitor error

Alarms can be visual or audible. Users can switch off alarms as well as log them to disk.

**Development Mode:** This mode isolates problems that are caused by incorrect protocol or bad packets. It provides four filters for capturing packets, using predefined patterns and error states. In addition, it provides a second level of filters. Filter patterns can trigger on a packet that matches one or more filters, a packet that does not match one or more filters, an alarm, or a specified time.

The Development Mode captures "ANY" packets, "MAC" packets only, or "non-MAC" packets only. Captured packets can be filtered to a buffer of 500 packets, with 256 bytes per packet; saved as ASCII for later analysis or saved as binary for refiltering. All captured packets are time stamped to 100 ms.

The Development mode automatically decodes MAC control frames, LLC, TCP/IP/UDP, ISO CONS/CLNS, SNA over NETBIOS or directly over LLC, and IPX protocols. Higher level decode options are available for NETBIOS/SMB, ISO, TCP/IP, and Novell.

**Performance Mode:** This mode performs the same functions for the SpiderAnalyzer 320-R Series as it does for the SpiderMonitor 220 Series and SpiderAnalyzer 320 Series.

**Statistics Mode:** The Statistics Mode tracks network operation by continuously acquiring statistics. It counts packets, bytes, and error packets per station, and it displays activity by station or throughout the total network. This mode identifies 10 soft error types per station and allows the user to save statistics in ASCII format and load them into a spreadsheet.

**Summary Mode:** The Summary Mode profiles how the network is used over a period of time, displaying average usage, peak activity, and error rate. The Summary Mode records at user-specified intervals of 1 minute to 16 hours.

**Test Mode:** The Test Mode verifies low-level communication between stations using MAC and ISO echo and loop tests.

**Traffic Generation Mode:** This mode measures the impact of new applications or stations by adding load to

the network. It generates random or fixed-length packets; generates packets of user-specified length, interval, or load; defines the packet content up to 216 bytes; and simulates error reporting packets or source routing.

The SpiderAnalyzer 320-R, like the SpiderMonitor 220 and the SpiderAnalyzer 320, creates files when the user saves or logs screens or packets. Each file type is identified by a unique suffix and a description. The unit can display a list of suitable files to choose from for loading.

The SpiderAnalyzer 320-R Series has the same utilities as the SpiderMonitor 220 Series and the SpiderAnalyzer 320 Series. These utilities operate in the same manner for all three series.

Spider Systems introduced an upgrade to the SpiderAnalyzer 320-R that lets it join a token-ring network even when an error disrupts normal operation (a state referred to as "beaconsing"). This Beaconsing Ring Access Unit upgrade is standard with all new models and will be supplied free to current SpiderAnalyzer 320-R owners.

The SpiderAnalyzer P320-R features a dual-mode plasma display of 80 characters by 25 lines. The screen can be tilted, and brightness is adjustable. The 91-character keyboard is detachable and has two positioning angles. This test unit has a total memory capacity of 896 kilobytes.

The SpiderAnalyzer K320-R is designed to run on an IBM PC/XT, PC/AT, or compatible system, with MS-DOS Version 3.0 or later, a diskette drive, a keyboard with 10 function keys, 5 megabytes of hard disk space, 640 kilobytes of memory, and a full-sized card slot. Software is provided on a 5.25-inch or 3.50-inch diskette.

### **SpiderProbe B130**

Introduced at the ICA show in May 1990, the SpiderProbe B130 is designed to work with Ethernet, IEEE 802.3, and eventually with token-ring LANs and Simple Network Management Protocol (SNMP) support. It is a test device that works with a "master" station, which can be either a SpiderMonitor 225 or a SpiderAnalyzer 325. Attached to a local LAN segment (up to 1,024 stations), the SpiderProbe B130 lets the user perform complete monitoring and analysis at a distant location without having to dispatch a technician and separate equipment.

Monitoring and analysis functions include the following:

- Detailed traffic and error statistics
- Alarms
- Traffic generation
- Hardware test facilities
- Packet capture
- Protocol decoding

The SpiderProbe B130 communicates with the master unit by a proprietary protocol: Spider Remote Monitoring Protocol (SRMP). Each master/slave path can operate over the network across bridges and IP routers or over an RS-232 serial link.

The SpiderProbe passes information from a segment to the assigned master, which displays all information. Multiple masters may access the SpiderProbe under the control of the Network Administrator.

The SpiderProbe B130 operates in seven modes. Its Alarms, Performance, Statistics, and Test modes correspond to the master's modes of the same names, whether the master is a SpiderMonitor or SpiderAnalyzer. Its Traffic Generation and Development modes are unique to either a SpiderMonitor or a SpiderAnalyzer, depending on which one is the master. In addition, the SpiderProbe B130's Packet Capturing and Decoding mode permits up to 1,000 packets to be filtered to buffer or to disk on the master. These packets can be filtered as ASCII or as binary. This mode decodes up to OSI Layer 4 when a SpiderMonitor 220 is used as the master. Spider offers an enhanced version of the SpiderProbe B130 that decodes up to Layer 7 when the SpiderAnalyzer 320 is used as the master.

### SpiderMonitor 225 and SpiderAnalyzer 325

The SpiderMonitor 225 and SpiderAnalyzer 325 are devices that can be configured as either a master or a slave. Two versions are available:

- SpiderMonitor P225/SpiderAnalyzer P325, which comes in a Compaq Portable III personal computer and includes an Ethernet Controller/Monitor board, appropriate software, and user documentation.
- SpiderMonitor K225/SpiderAnalyzer K325, a kit that contains an Ethernet Controller/Monitor board, appropriate software, and user documentation.

In the master mode, these units provide continual monitoring of the network, logging statistics, and reporting alarms. In addition, they can provide detailed monitoring and analysis of a specific local segment and of a remote segment monitored by a slave. The slave can be a SpiderProbe B130 or another SpiderMonitor 225 or SpiderAnalyzer 325. In the slave mode the system monitors only the local segment to which it is attached, dispatching information back to a master.

### Modes for Integrated Networks

There are two operating modes when the SpiderMonitor 225 and SpiderAnalyzer 325 are used with an integrated network. The alarm mode operates in the same manner as the alarm mode for the SpiderMonitor and SpiderAnalyzer products discussed earlier in this report. At the master location, alarms can be visible or audible, can be switched on or off, and can be logged to disk or a printer and viewed on screen in chronological order.

The statistics mode counts packets, bytes, and error packets broken down into malformed packets and packets that are too long. It also counts collisions, short packets, packets sent, and packets received.

### Modes for Individual Segments

The alarm mode is the same as described for integrated networks. The statistics mode is the same as described for integrated networks, too, but it also displays error statistics or all statistics for selected stations by activity, address map, or total errors. Users can periodically log between slave and master units.

The performance mode is the same as that described for the SpiderMonitor and SpiderAnalyzer.

The summary mode is also the same as with the SpiderMonitor and SpiderAnalyzer, but scaling or auto scaling is available.

The test mode is the same as with the SpiderAnalyzer 320, except that the 225/325 displays details and results and logs to a printer.

The traffic generation mode is similar to that of the SpiderMonitor and SpiderAnalyzer; password protection is enabled at the master station.

The packet capturing and decoding mode lets up to 1,000 packets be filtered to buffer or to disk on the master unit as either ASCII or binary. Four prefilters and two postfilters are available for capturing packets using predefined patterns and error states. All captured packets are time stamped to 100 ms. This mode decodes TCP/IP, ISO, XNS, DECnet, Novell IPX, and AppleTalk up to Layer 7. Spider expects to offer Banyan Vines this year. High-level decode options are available for LAT, Novell Netware, TCP/IP, ISO, XNS, DECnet, Novell IPX, and AppleTalk. Spider expects to offer high-level decodes for Banyan Vines this year.

### Utilities

With the exception of the REPPACK and CONVERT utility, the SpiderMonitor 225 and SpiderAnalyzer 325 have all the same utilities as the SpiderMonitor 220 and the SpiderAnalyzer 320.

### SpiderAnalyzer 320 High-Level Decodes

The SpiderAnalyzer 320 comes with certain low-level decodes as part of the standard software. Spider provides a selection of optional decodes that can handle traffic as high as the ISO Transport Layer. The following high-level decodes are available as options with the SpiderAnalyzer 320:

- ISO
- TCP/IP
- DECnet/LAT
- Novell
- AppleTalk
- Banyan Vines (this year)

**ISO:** The standard versions of the SpiderMonitor 220 and the SpiderAnalyzer 320 support the ISO model through Layer 3 (Network Layer). They support the following protocols at the Data Link Layer: Logical Link



Control Type 1 and Type 2. At the Network Layer, they support the following protocols: X.25 Connection Oriented Network Service, Connectionless Network Service, and End System to Intermediate System.

The ISO High-Level Decode option supports the ISO model up to the Transport Layer, and it understands each of the five classes of Transport protocol defined in ISO 8073, classes 0 to 4.

**TCP/IP:** The standard versions of the SpiderMonitor 220 and SpiderAnalyzer 320 support TCP/IP through Layer 4 (Transport Layer). They automatically decode the Internet Protocol, the Internet Control Message Protocol, the User Datagram Protocol, the Transmission Control Protocol, and the Address Resolution Protocol.

The TCP/IP High-Level Decode package supports TCP/IP up to the Application Layer. In addition to the standard decodes, it decodes the following protocols: TELNET, File Transfer Protocol, Simple Mail Transfer Protocol, Trivial File Transfer Protocol, Bootstrap Protocol, Network File System, Routing Information Protocol, Simple Network Management Protocol, and Domain Name Protocol.

**DECnet:** The standard versions of the SpiderMonitor 220 and SpiderAnalyzer 320 support DECnet through Layer 4 (Transport Layer). They automatically decode the Maintenance Operation Protocol, the Routing Layer Protocol, and the Network Services Protocol.

The DECnet High-Level Decode package supports DECnet through the Application Layer. It automatically decodes the following protocols: Session Control Protocol, Data Access Protocol, Network Virtual Terminal Protocol, and Network Information Control Exchange Protocol. Local Area Transport (LAT) is also supported.

**Novell:** The standard versions of the SpiderMonitor 220 and SpiderAnalyzer 320 support Novell as high as Layer 4 (Transport Layer). They automatically decode the XNS (IPX) Transport-level protocol.

The Novell High-Level decode package supports Novell Netware up to the Application layer. It automatically decodes the Service Advertising Protocol and the Netware Core Protocols.

**AppleTalk:** The standard versions of the SpiderMonitor 220 and SpiderAnalyzer 320 support AppleTalk as high as Layer 4 (Transport Layer). They automatically decode the following protocols: LocalTalk Link Access, EtherTalk Link Access, Datagram Delivery, AppleTalk Address Resolution, AppleTalk Transaction, Routing Table Maintenance, AppleTalk Echo, and Name Binding.

The AppleTalk High-Level option decodes protocols up to the Application Layer. It understands the following protocols: AppleTalk Filing, AppleTalk Data Stream, Zone Information, AppleTalk Session, and Printer Access.

## Physical Specifications

The SpiderMonitor K220, SpiderAnalyzer K320, and SpiderAnalyzer K320-R are kit models. The printed circuit board in each is 34-mm. thick and measures 246 mm. by 108 mm.

The SpiderMonitor K225 and SpiderAnalyzer K325 are kits. The PCB in these kits is 0.70 in. thick and measures 13.10 by 4.25 in.

The following table gives the dimensions for the other products discussed in this report.

Unit	H x W x D (in.)	Weight (lb.)
SpiderMonitor P220	17.7 x 9.5 x 7.0	21.0
SpiderAnalyzer P320	17.7 x 9.5 x 7.0	21.0
SpiderAnalyzer P320-R	17.7 x 9.5 x 7.0	21.0
SpiderProbe B130	13.1 x 10.1 x 2.9	6.6
SpiderMonitor P225	17.7 x 9.5 x 7.0	21.0
SpiderAnalyzer P325	17.7 x 9.5 x 7.0	21.0

## Pricing

The following prices apply to the Spider Systems test equipment product line:

**SpiderMonitor K220 and P220:** \$8,600 to \$13,700.

**SpiderAnalyzer K320 and P320:** \$10,500 to \$15,600.

**SpiderAnalyzer K320-R and P320-R:** \$10,500 to \$15,600.

**SpiderAnalyzer K320-ER and P320-ER:** \$18,000 to \$23,100.

**SpiderProbe B130:** \$3,450 to \$4,950.

**SpiderMonitor 225:** \$9,550 to \$14,650.

**SpiderAnalyzer 325:** \$11,450 to \$16,550.

**High-Level Decodes:** \$750. ISO costs \$500. Upgrades are available. ■



---

# Standard Microsystems Local Area Network Products

---

## In this report:

Analysis .....	-102
Characteristics.....	-105
Pricing.....	-109

## Product Summary

### Editor's Note

Standard Microsystems can justly claim to be the leading vendor of Arcnet hardware. SMC has a comprehensive array of products for Arcnet and has recently made a strong entry into the crowded Ethernet market.

### Description

A line of networking hardware for Arcnet and Ethernet networks, including adapter cards, hubs, repeaters, transceivers, and concentrators.

### Strengths

A complete line of products for Arcnet networks including adapter cards; intelligent, active, and passive hubs; and repeaters. Expanding support for Ethernet 10BASE-T networks.

### Limitations

Arcnet's 2.5M bps speed is slow by 1990 standards, and 20M bps Arcnetplus has not been delivered yet.

### Competition

*Arcnet:* Thomas-Conrad, Tiara;  
*Ethernet:* David Systems, Network, 3Com, Western Digital.

### Vendor

Standard Microsystems Corp.  
35 Marcus Boulevard  
Hauppauge, NY 11788  
(516) 273-3100  
In Canada:  
Paradigm Marketing  
70 Strathearn Avenue  
Richmond Hill, ON L4B 2J5  
(416) 737-6701

### Price

Arcnet adapter card prices range from \$245 for an 8-bit PC card to \$995 for the Arcnet-EISA3200 card for the EISA bus.

### GSA Schedule

Yes.

---

—By *John Krick*  
Associate Editor

# Analysis

## Product Strategy

Standard Microsystems has long been one of the chief supporters of Arcnet, the widely used but little publicized network hardware developed by Datapoint. Widely available through mail order marketing for as little as \$100 an adapter card, and supported by dozens of vendors, Arcnet has found wide acceptance among users of smaller networks. Arcnet supporters like to say that if you do not know what the underlying hardware in your network is, it is probably Arcnet.

Despite its faith in Arcnet, SMC is hedging its bets somewhat by expanding into the Ethernet market. The company also expects to announce a complete line of token-ring products at Networld in Boston in February 1991.

## Expanding into Ethernet

Like most other vendors these days, SMC is most concerned with the 10BASE-T subsection of the IEEE 802.3 standard. SMC's director of marketing, Geof Karlin, noted in a recent interview that "...

there is no great 10BASE-T company yet. Our strategy is to be that company."

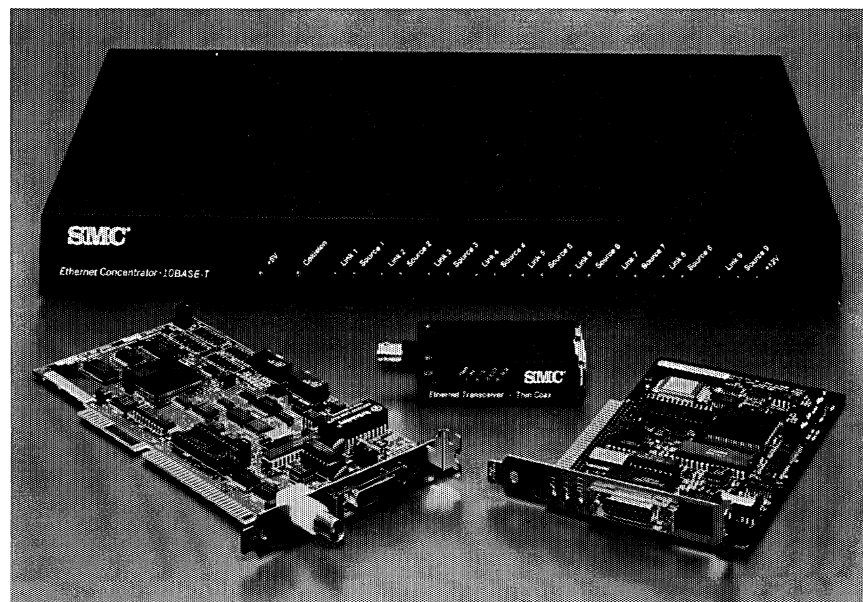
Not surprisingly, SMC is not the only vendor following such a strategy. Companies such as David Systems and NetWorth have quickly made names for themselves on the strength of their already very complete 10BASE-T lines. What it should take to be "the great" 10BASE-T company that Karlin envisions is a product line that includes everything 10BASE-T network users could need. The companies mentioned, as well as several others, have done just that, but it will probably take time to ascertain if any of them is a "great" 10BASE-T company.

SMC, unlike the others, has brought out products in other Ethernet categories as well. So far, SMC has delivered six Ethernet controller boards, one each for twisted-pair and coaxial applications, in 8-bit PC, 16-bit PC AT, or PS/2 Micro Channel Architecture (MCA) bus versions. The company has also brought out a line of concentrators for thin coaxial, fiber optic cable, and 10BASE-T unshielded twisted pair, and transceiver units for all of these wiring schemes. The concentrators and transceivers facilitate the connection of Ethernet segments running on different media types.

## A Faster Arcnet

While many analysts claim that Arcnet has passed its maturity and will begin to decline in popularity, Arcnet vendors have new products under development that argue otherwise. Standard Microsystems

*Standard Microsystems' new Ethernet product line includes—clockwise from top—Ethernet Concentrator for 10BASE-T; SMC3008TP 8-bit card for 10BASE-T; and SMC30016 16-bit card for thin coaxial Ethernet networks. At center: Thin Coax Ethernet Transceiver.*



## Company Profile Standard Microsystems Corporation

### **Corporate Headquarters**

35 Marcus Boulevard  
Hauppauge, NY 11788  
(516) 273-3100

### **In Canada**

Paradigm Marketing  
70 Strathearn Avenue  
Richmond Hill, ON  
L4B 2J5  
(416) 737-6701

### **Officers**

*Chairman:* Paul Richman  
*CEO/President:* Victor F.  
Trizzino  
*Executive VP, Systems  
Products Division:* Gerald  
E. Gollub

### **Company Background**

*Year Founded:* 1971  
*No. Employees:* 450  
*Installed Base:* 750,000  
Arcnet nodes

### **Business Overview**

Standard Microsystems is divided into two major divisions—Component Products and System Products. The Component Products division produces semiconductor devices for OEMs. The System Products division develops, manufactures, and markets hardware and software for Arcnet and Ethernet networking,

including adapter cards, hubs, and network management software. Standard Microsystems is a public corporation and its shares are traded on the NASDAQ exchange.

### **Financial Profile**

Standard Microsystems reported record sales and revenues of \$77,201,000 for fiscal year 1990, a 7.8 percent increase over fiscal 1989. Gross profit as a percentage of sales and revenues increased to 47.1 percent from fiscal 1989's 30.6 percent. Revenue sources other than product sales include licensing agreements for SMC-held patents.

### **Management Statement**

"As a PC LAN company, SMC is committed to providing quality solutions that satisfy the needs of

the marketplace, regardless of the technology. With the upcoming introduction of Arcnetplus (Arcnet at a 20M bps data rate), SMC expects its Arcnet product line to maintain its current market share. Focusing on the high-performance segment of the LAN market, the company has already introduced an entire family of Ethernet products. In early 1991, it will be debuting more Ethernet solutions and a full line of token-ring products. SMC will also increase its line of network management hardware and software."

and Datapoint announced 20M bps Arcnet early in 1990. To date, this product, called Arcnetplus, has not shipped.

Arcnetplus will reportedly be completely compatible with existing 2.5M bps Arcnet, so that when communicating with a 2.5M bps card, the new 20M bps cards will run at the slower speed. When two 20M bps cards are in communication, however, the faster data rate will be in effect.

The system that comes closest to the new Arcnet in speed is 16M bps token-ring. In its IBM incarnation, that network runs only on shielded twisted pair and is expensive. Several manufacturers have promised 16M bps token-ring cards for unshielded twisted pair for over a year, but only recently began to deliver. The next best performer, in terms of rated speed, is Ethernet at 10M bps. That means Arcnetplus would be twice as fast as Ethernet, and, as Arcnet proponents have long

claimed, Arcnet's token-passing access method can give dramatically better performance in most circumstances.

SMC could be holding off to gauge the effect of certain other developments in the Arcnet world, most notably, Thomas-Conrad's 100M bps TCNS system. TCNS runs on fiber now and is reported to be similar in most respects to Arcnet. Rumors throughout the industry say that Thomas-Conrad will soon be announcing a version that runs on unshielded twisted pair. The availability of 100M bps performance on unshielded twisted pair would probably leave Arcnetplus sitting on the dealer's shelves—or in SMC's warehouses.

### **Arcnet Interconnectivity Weak**

One complaint about Arcnet often heard among analysts concerns its few internetworking options. Most bridge and router manufacturers do not now

support Arcnet. Whether this is a significant shortcoming for the majority of Arcnet's user base is not clear. As noted earlier, most of these users have implemented small, truly local networks of under a hundred nodes. For these users, interconnecting networks, either locally or remotely, is not a major concern. SMC's Karlin remarks that interconnectivity for Arcnet can be easily achieved by setting up a bridge or router with one Arcnet card and one Ethernet card. Still, this is an awkward solution at best, and one can only speculate about what Arcnet's market share might look like now if more attention had been paid a few years ago to bridges and routers to support Arcnet.

---

### Competitive Position

Standard Microsystems is the leading vendor of Arcnet products. Many vendors produce Arcnet cards, including offshore firms based in Taiwan, Korea, and Malaysia. Perhaps SMC's most worthy competition in this market comes from Thomas-Conrad, which is probably the only company that matches the scope of SMC's Arcnet product line.

In entering the Ethernet market, SMC is taking on a strong group of competitors with much experience in this area. The 10BASE-T segment of the market is particularly hot right now, with seemingly every manufacturer jumping on the bandwagon. Companies such as 3Com and SynOptics, with lots of experience in networking, as well as large systems manufacturers such as Hewlett-Packard, are all competing for a piece of the 10BASE-T pie. It is not yet clear where SMC fits in this picture, but the company is pursuing an aggressive advertising campaign in the LAN-related industry media. Perhaps the best foundation the company could build on here would be OEM agreements with other manufacturers who would offer SMC cards bundled with their systems.

---

### Decision Points

Arcnet is clearly the lowest cost networking hardware now available. While 10BASE-T Ethernet will probably begin to give Arcnet some stiff competition very soon, Arcnet is still a good choice for the small- to medium-sized network. Most vendors have only recently begun to bring 10BASE-T products to market, while Arcnet has been running on

unshielded twisted-pair telephone wiring successfully for some time now. Indeed, it almost seems as if the designers of 10BASE-T Ethernet took a few notes on Arcnet before they began. The advent of wiring centers or concentrators in Ethernet systems has been heralded as a giant step forward in network manageability, while Arcnet has always been a hub-based topology.

Arcnet is no speed demon, but where network transactions are many and small, Arcnet performs as well as its much faster counterparts. Users with applications that involve the passing of large database or graphics files across the network will probably not want Arcnet, at least not until the faster Arcnetplus becomes available. For the average user, however, Arcnet's speed is more than adequate. Arcnet's lack of support for internetworking is another consideration for users who require such functionality.

These caveats aside, the user considering Arcnet could do far worse than choosing Standard Microsystems as the primary vendor. Standard Microsystems' commitment to Arcnet is perhaps the strongest within the industry. The company has had a long and successful experience with Arcnet and offers a broad and complete product line. National Software Testing Laboratories (NSTL), in its report on Arcnet cards (Report 800-301), rates SMC's cards fourth, noting that ". . . it is precisely because of SMC's leadership standing that other competitors benefit. Competitors license technology from the market leader and strive to provide incremental performance improvements . . . reduced production overhead gives these vendors a competitive product pricing advantage as well."

Where Ethernet is concerned, SMC is a relative newcomer to a crowded market. The company has consistently delivered quality products in its Arcnet line, and it is likely that the Ethernet products will exhibit this same quality as well.

# Characteristics

**Model:** Several models of Arcnet and Ethernet networking hardware.

**Date of Announcement:** First Arcnet card for IBM PC: 1983; SMC3508 Ethernet concentrators: September 1990.

**Date First Installed:** First Arcnet card for IBM PC: 1983; SMC3508 Ethernet concentrators: September 1990.

**Number Installed:** Approximately 750,000 Arcnet nodes.

**Distribution:** Distributors, value-added resellers, and OEMs.

## Architecture

Standard Microsystems primarily builds Arcnet products, but has recently entered the Ethernet market. Arcnet dates from 1977, when it was developed by Datapoint Corp. Arcnet is a token-passing network, which can be arranged in either a bus or a hub-based star topology. Arcnet exhibits the deterministic performance characteristic of token-passing networks, meaning that its performance remains predictable and consistent under varying degrees of load, in contrast to collision avoidance networks such as Ethernet. Arcnet can run on all types of commonly used network media, including unshielded twisted-pair and fiber optic cabling. Arcnet hubs can be simply passive connection points for the arms of a star topology, or they can be active hubs that enhance the signal quality, allowing longer cabling distances between hub and workstation, or intelligent hubs capable of delivering network management information. The Arcnet bus topology is typically used only in very small networks. Arcnet's speed of 2.5M bps is slow by 1990 standards, and Datapoint and Standard Microsystems have announced a 20M bps version called Arcnetplus, but so far no products for the faster version have shipped.

Ethernet is a carrier sense multiple access network, meaning that to gain access to the network media for data transmission a workstation must "listen" to the line and sense the presence of its carrier signal. If there is traffic on the line, the workstation waits for a random period of time before attempting to retransmit. Since two workstations could detect carrier and initiate a

transmission at exactly the same time, collisions can occur. In this case, each workstation waits for a random time period before attempting to resend the transmission. Ethernet's transmission speed is 10M bps and it can run on a variety of cable types, including thick coaxial cable, thin coaxial cable, unshielded twisted-pair wire, and fiber optic cable. Ethernet specifications have been standardized by the IEEE under its 802.3 specification. Subsections of the 802.3 standard specify characteristics for each type of media commonly in use. The 10BASE-T subsection describes Ethernet implementation using unshielded twisted pair and a hub-based star topology.

## Arcnet Adapter Cards

### Coax Adapters

**Arcnet-PC130** is a half-slot card for the IBM PC XT 8-bit bus. The PC130 card uses RG-62/U coaxial cable in a star topology.

**Arcnet-PC130E** is an 8-bit, half-size card similar to the PC130 and also features diagnostic LEDs and node ID switches. The node ID switches are external so that node addressing can be reconfigured without opening the workstation's cover. The PC130E works in a star or bus network and includes the Turbo-1 driver kit.

**Arcnet-PS110** is a 16-bit card for the IBM Micro Channel Architecture (MCA) used in the PS/2 Models 50 and above. The PS110 operates with RG-62/U cable in star topologies. It can be configured via software using the PS/2's Programmable Option Select (POS). It can support twisted-pair wiring using a balun device.

**Arcnet-PS210** is a 16-bit card for the IBM PS/2 Micro Channel Architecture (MCA) similar to the PS110 described above, but operates in a bus network with RG-62/U coaxial cable.

**Arcnet-PC500FS** is a 16-bit card for the IBM PC AT bus that is optimized for use in file servers. It features diagnostic LEDs and external node ID switches. The PC500FS operates in either star or bus networks with RG-62/U coaxial cable.

**Arcnet-PC500WS** is a 16-bit card for the IBM PC AT bus designed for use in workstations. It includes diagnostic LEDs and external node ID switches and can be used in a star or bus topology with RG-62/U cable.

### Twisted-Pair Adapters

**Arcnet-PC270E** is a half-slot card for the IBM PC XT 8-bit bus. The PC270E card uses unshielded twisted-pair cable in a star or daisy-chain topology. The card features diagnostic LEDs and external node ID switches. The PC270E is shipped with the Turbo-1 driver kit and a twisted-pair terminator.

**Arcnet-PC550FS** is a 16-bit card for the IBM PC AT bus optimized for use in file servers. It features diagnostic LEDs and external node ID switches. The PC550FS can be used in both star and daisy-chain topologies with unshielded twisted-pair wiring.

**Arcnet-PC550WS** is a 16-bit board designed for use in IBM PC AT and compatible workstations. The PC550WS uses unshielded twisted-pair wire in either star or bus configurations. Diagnostic LEDs and external node ID switches are provided.

### **Arcnet Fiber Optic Adapters**

**Arcnet-PC330** is an 8-bit, half-slot card for the IBM PC XT bus. The PC330 uses 50-, 62.5-, or 100-micron duplex fiber optic cable in a star topology. The card includes diagnostic LEDs and external node ID switches.

### **Arcnet Laptop Adapters**

**Arcnet-T100** is designed for the Toshiba T5100, T3100, T3100a, T6100, T1200, and T1100Plus laptop computers. The T100 card uses RG-62/U coaxial cable in star or bus networks. The card features an external power switch so that it does not drain laptop power when not in use. I/O and memory buffer addresses are user selectable.

**Arcnet-T250** fits the same Toshiba laptop models as the T100 described above, and has similar features, but uses unshielded twisted-pair wire and includes a twisted-pair installation kit.

**Arcnet-LC100** is an external adapter designed to allow any laptop computer with a parallel port to be connected to an Arcnet network. It supports both coaxial cable in a star or bus configuration, and unshielded twisted pair in a star or daisy-chain topology. The LC100 features a parallel pass-through port for local printer connection. Diagnostic LEDs and external node ID switches are also included. The LC100 is shipped with SMC's NetWare drivers. AC power is supplied by an external transformer. Two versions are offered—the LC100 120 for 120-volt operation and the LC100 240 for 240-volt lines.

### **Macintosh Arcnet Cards**

**Arcnet SE100** is an Arcnet card for the Apple Macintosh SE on coaxial networks. It has a 16-bit-wide data bus and node IDs are software selectable. It is shipped with SMC's ArcTalk drivers for AppleTalk on Arcnet networks.

**Arcnet SE250** is an Arcnet card for the Apple Macintosh SE similar to the coax card described above, but is for unshielded twisted-pair networks and includes ArcTalk drivers.

**Arcnet NB100** is an Arcnet card for all models of the Apple Macintosh II on coaxial networks. It has a 32-bit-wide data bus and node IDs are software selectable. It is shipped with SMC's ArcTalk drivers for AppleTalk on Arcnet networks.

**Arcnet NB250** is an Arcnet card for all models of the Apple Macintosh II similar to the coax card described above, but is for unshielded twisted-pair networks and includes ArcTalk drivers.

### **Arcnet Hubs**

#### **Coax Hubs**

**Coax Active Hub-03** is an eight-port hub that connects workstations and additional, cascaded hubs to an Arcnet coaxial network with cabling distances up to 2,000 feet. It includes eight diagnostic LEDs and one power-on LED. No ports need be used to cascade hubs, since they are provided with a rear panel jack for this purpose. This feature also allows easy connection of hubs for different cabling types. The Coax Active Hub-03 can be rack or wall mounted or sit on the desktop. Two versions are offered—the Coax Active Hub-03 120 and 240 for 120-volt and 240-volt applications, respectively.

**Coax Intelligent Hub** is an intelligent version of the active hub described above. The network management software included with it features a menu-driven user interface that graphically displays network maps and monitors hub status. The software allows remote control of hub ports from any workstation.

**Coax Internal 4-Port Hub** is a half-slot card for any IBM or IBM-compatible PC, that puts a four-port, cascaded, active hub in a network workstation. Hubs can be cascaded via an internal ribbon cable connection, so that no ports are taken up. Four diagnostic LEDs are provided to aid troubleshooting.

**Passive Hub** is a four-port hub that connects up to four workstations to build a small coax star network, or expand an active hub port. Passive hubs support distances up to 100 feet.

#### **Twisted-Pair Hubs**

**Twisted-Pair Intelligent Hub** is an eight-port, cascaded hub featuring a stackable, low-profile design. It is shipped with network management software that provides a menu-driven graphic interface to allow users to view hub status and control hub ports from any workstation. The hub has three-color status LEDs for each port.

**Twisted-Pair Active Hub-03** is an eight-port hub similar to the Intelligent Hub described above, but does not include network management capabilities. It can relay network transmissions up to 400 feet and works with the



traditional point-to-point star topology, or can be used to connect daisy-chained segments to the network.

**Type 1/Type 2 Active Hub** is a version of the Active Hub-03 described above that uses IBM Cabling System Type 1 or Type 2 shielded twisted-pair cabling. It is available in versions for 120- or 240-volt operation.

**Twisted-Pair Internal 4-Port Hub** is a twisted-pair version of the coax internal hub described above. It is a half slot, four-port, cascadable active hub on a card. Hubs can be cascaded via an internal ribbon cable connection, so that no ports are taken up. Four diagnostic LEDs are provided to aid troubleshooting.

### ***Fiber Optic Hubs***

**4-Port Active Fiber Hub** connects workstations or additional hubs to a duplex fiber optic network in a point-to-point star topology and can relay network transmissions up to 10,400 feet. It features a low-profile, stackable design and can be mounted on a wall, in a rack, or on the desktop. It can be cascaded to other hubs and includes four diagnostic LEDs.

### ***Other Arcnet Hardware***

**Active Link** is a two-port device used to link two coaxial bus networks. The Active Link is available in two versions—the Active Link 120 and the Active Link 240 for 120-volt or 240-volt operation, respectively.

**Twisted-Pair Repeater** is a two-port device designed to link two daisy-chained, twisted-pair network segments. The Twisted-Pair Repeater 120 is offered for 120-volt operation and the Twisted Pair Repeater 240 is available for use in 240-volt circuits.

**Twisted-Pair Link** is a two-port device for linking coaxial and twisted-pair network segments. Twisted-Pair Link 120 and Twisted-Pair Link 240 are offered for 120-volt and 240-volt operation, respectively.

**Twisted-Pair Installation Kit** includes two modular plugs for use with 24- or 26-gauge solid or 26-gauge stranded wire, one modular coupler, and one 100-ohm terminator.

**Arcnet Coax Tester** is a tool that aids in installation and diagnosis of cabling problems on Arcnet networks that use coaxial cable. Used to test both Arcnet boards and cabling, it features an activity LED and is battery operated.

**Arcnet Twisted-Pair Tester** is a version of the tester described above for use with twisted-pair networks. An LED indicates a reverse polarity condition in twisted-pair wiring.

### **Ethernet Adapter Cards**

**SMC3008** is an 8-bit card for the IBM PC XT bus and works with thick or thin Ethernet coaxial cable. It features an 8K packet buffer of dual-ported RAM, so that both the network controller and the PC can access the buffer simultaneously. Transmit and receive LEDs enable monitoring of card and network activity. It is equipped with both AUI and BNC connectors.

**SMC3008TP** is an 8-bit card for the IBM PC XT bus and works with unshielded twisted-pair wire in an Ethernet 10BASE-T network. It features an 8K packet buffer of dual-ported RAM, so that both the network controller and the PC can access the buffer simultaneously. Transmit, receive, and link integrity LEDs enable monitoring of card and network activity. It is equipped with both RJ45 and AUI connectors.

**SMC3016** is a 16-bit card for the IBM PC AT bus and works with thick or thin Ethernet coaxial cable. It features a 16K packet buffer of dual-ported RAM, so that both the network controller and the PC can access the buffer simultaneously. Transmit and receive LEDs enable monitoring of card and network activity. It is equipped with both AUI and BNC connectors.

**SMC3016/MC** is a 16-bit card for the IBM PS/2 Micro Channel Architecture bus and works with thick or thin coaxial cable Ethernet. It features a 16K packet buffer of dual-ported RAM, so that both the network controller and the PC can access the buffer simultaneously. The card is software configurable using the PS/2's Programmable Option Select (POS) feature. Transmit and receive LEDs enable monitoring of card and network activity. It is equipped with both AUI and BNC connectors.

**SMC3016TP** is a 16-bit card for the IBM PC AT bus and works with unshielded twisted-pair wire in an Ethernet 10BASE-T network. It features a 16K packet buffer of dual-ported RAM, so that both the network controller and the PC can access the buffer simultaneously. Transmit, receive, and link integrity LEDs enable monitoring of card and network activity. It is equipped with both RJ45 and AUI connectors.

**SMC3016TP/MC** is a 16-bit card for the IBM PS/2 Micro Channel Architecture bus and works with unshielded twisted-pair wire in an Ethernet 10BASE-T network. It features a 16K packet buffer of dual-ported RAM, so that both the network controller and the PC can access the buffer simultaneously. The card is software configurable using the PS/2's Programmable Option Select (POS) feature. Transmit, receive, and link integrity LEDs enable monitoring of card and network activity. It is equipped with both RJ45 and AUI connectors.

**SMC3402TP Ethernet 10BASE-T Transceiver** is a two-port transceiver that allows connection of unshielded

twisted-pair cabling to any Ethernet interface card or concentrator. It features one AUI connector and one RJ45 connector. A link integrity test, collision detection, selectable Signal Quality Error (SQE) heartbeat, jabber control, and smart squelch noise filtering are all included. It has six LEDs—power, link integrity, receive, transmit, collision, and SQE status.

**SMC3402NC Thin Ethernet Transceiver** is similar to the 10BASE-T transceiver described above but has a BNC connector for use with thin coaxial cable.

**SMC3402F Ethernet Fiber Transceiver** is similar to the 10BASE-T transceiver described above but has two ST connectors for use with duplex fiber optic cabling.

**SMC3508TP** is an eight-port 10BASE-T concentrator that serves as the central hub of a star-based, unshielded twisted-pair network. It is rack mountable and features an automatic link integrity test that shuts down a bad port on detection of a problem in cabling or at the node. It automatically reconnects the node when the problem is resolved. A ninth port can be ordered by the user in one of four configurations—AUI, for connection to any media with a transceiver; BNC, for thin coaxial cable; RJ45 for unshielded twisted pair; or two ST connectors for duplex fiber optic cabling.

**SMC3508** is an eight-port concentrator similar to the SMC3508TP described above, but with eight BNC connectors for use with Ethernet thin coaxial cabling. Each port can support a thin Ethernet segment with up to 29 devices.

**SMC3508F** is an 8-port concentrator similar to the models described above, but with 16 ST connectors to support eight duplex fiber optic lines.

---

## Software

**SMC Monitrix for Arcnet:** Based on Cheyenne Software's popular Monitrix network management software,

and combined with SMC's own graphics-based network management tools, this package works in conjunction with SMC's Intelligent Hubs and Novell NetWare. Running on a NetWare server as a Value Added Process (VAP), Monitrix for Arcnet monitors all network activity. A Node Configuration Database stores information about each node, including version numbers of software, interface card type, switch settings, and user IDs. Monitrix can interrogate individual workstations, intelligent hubs, file servers, and bridges for realtime network statistics.

**NETBIOS Emulator** is a network-independent implementation of the IBM/Microsoft NETBIOS communications interface standard. It works with DOS 3.XX, OS/2, and OS/2 LAN Manager. It includes drivers for SMC interface cards and a license for four PCs.

**ArcView** is a network diagnostic and performance measurement tool that allows managers to view overall network operation. It includes two parts, a monitor module that features a dynamically updated graphic display of network activity, and a report module that gathers and displays statistics on the total number of reconfigurations.

**Arcnet Turbo-1 Kit** is a package that includes high-performance drivers for Novell NetWare Versions 2.1 and higher, and one driver PROM for the Arcnet PC120, PC130, PC220, or PC260.

**Arcnet Turbo-4 Kit** is a four-workstation version of the Turbo-1 kit described above.

**Arcnet Turbo-8 Kit** is an eight-workstation version of the Turbo-1 kit described above.

**Arcnet Turbo-1B Kit** is a version of the Turbo-1 kit that includes one auto boot driver PROM.

**Equipment Prices**

	<b>Purchase Price (\$)</b>
<b>Arcnet Adapter Cards</b>	
Arcnet-PC130	245
Arcnet-PC130E	295
Arcnet-PS110	595
Arcnet-PS210	595
Arcnet-PC500FS	695
Arcnet-PC500WS	495
Arcnet-T100	595
Arcnet-T250	595
Arcnet-LC100	595
Arcnet-PC270E	295
Arcnet-PC270E with Twisted-Pair Installation Kit	305
Arcnet-PC550FS	695
Arcnet-PC550WS	495
Arcnet-PC330 (fiber optic adapter)	525
Arcnet-EISA3200 for EISA bus (available in twisted-pair and coax versions)	995
Arcnet-SE100 coax card for Macintosh SE	495
Arcnet-NB210 coax card for the Macintosh II	495
Arcnet-SE250 twisted-pair card for the Macintosh SE	495
Arcnet-NB250 twisted-pair card for the Macintosh II	495
<b>Arcnet Hubs, Repeaters, and Other Hardware</b>	
Coax Intelligent Hub 120/240	749
Coax Intelligent Hub-03 120/240	549
Coax Internal 4-Port Hub	295
Passive Hub	100
Twisted-Pair Intelligent Hub	895
Twisted-Pair Active Hub-03	695
Type 1/Type 2 Active Hub	950
Twisted-Pair Internal 4-Port Hub	345
4-Port Active Hub for fiber optic	1,295
Twisted-Pair Repeater	375
Twisted-Pair Link	375
Twisted-Pair Installation Kit	15
Type 1/Type 2 Installation Kit	15
Active Link	375
<b>Ethernet Hardware</b>	
SMC3008 8-bit card for Ethernet coaxial networks	295
SMC3016 16-bit card for Ethernet coaxial networks	395
SMC3016/MC 16-bit Ethernet card for Micro Channel Architecture	450
SMC3008TP 8-bit card for Ethernet 10BASE-T networks	325
SMC3016TP 16-bit card for Ethernet 10BASE-T networks	395
SMC3016TP/MC 16-bit Ethernet 10BASE-T card for Micro Channel Architecture	495
SMC3508TP/AUI 8-port 10BASE-T concentrator with AUI connector for ninth port	1,195
SMC3508TP/BNC 8-port 10BASE-T concentrator with BNC connector for ninth port	1,420
SMC3508TP/TP 8-port 10BASE-T concentrator with RJ45 connector for ninth port	1,195
SMC3508TP/F 8-port 10BASE-T concentrator with ST (fiber optic) connectors for ninth port	1,750
SMC3508/AUI 8-port thin coaxial concentrator with AUI connector for ninth port	2,395
SMC3508/BNC 8-port thin coaxial concentrator with BNC connector for ninth port	2,620
SMC3508/TP 8-port thin coaxial concentrator with RJ45 connector for ninth port	2,395
SMC3508/F 8-port thin coaxial concentrator with ST (fiber optic) connectors for ninth port	2,950
SMC3508F/AUI 8-port fiber concentrator with AUI connector for ninth port	3,395
SMC3508F/BNC 8-port fiber concentrator with BNC connector for ninth port	3,620
SMC3508F/TP 8-port fiber concentrator with RJ45 connector for ninth port	3,395
SMC3508F/F 8-port fiber concentrator with ST (fiber optic) connector for ninth port	3,950
SMC3402TP 2-port Ethernet transceiver for 10BASE-T	169
SMC3402BNC 2-port Ethernet transceiver for thin coax	219
SMC3402F 2-port Ethernet transceiver for fiber optic	549
<b>Software</b>	
SMC Monitrix for Arcnet	895
ArcView	124
NETBIOS Emulator	258



# SynOptics LattisNet Intelligent Hub Systems

## In this report:

Analysis .....	-102
Characteristics.....	-108
Pricing.....	-113

## Product Summary

### Editor's Note

Since our last report on SynOptics, the company has introduced products that support 4M and 16M bps token-ring on shielded and unshielded twisted-pair wiring (STP and UTP), local and remote bridging and routing, UNIX- and DOS-based network management, and integrated network management for Ethernet and token-ring.

### Description

SynOptics approaches local area networking through a system constructed around an intelligent hub, which acts as the control point in a network, integrating physical connectivity and internetworking technologies and enabling them to interoperate. The hub also serves as a foundation for network management.

The LattisNet System 3000 Intelligent Hub family is the platform that integrates LAN access methods and internetworking products, as well as supports network management. To round out the System 3000 platform, SynOptics introduced 4M and 16M bps token-ring for STP and UTP, initiated 100M bps FDDI over STP,

—By *Barbara Callahan*  
*Associate Editor*

and integrated Ethernet remote bridges and multiprotocol Ethernet routers into the family.

### Strengths

SynOptics stretches the limits of existing technologies and offers a unified, consistent approach to LANs and network management through its intelligent hubs. Its products support Ethernet, token-ring, and FDDI.

### Limitations

SynOptics does not offer an AppleTalk module but is working on one with Farallon Computing.

### Competition

Cabletron, Chipcom, David Systems, Digital Equipment Corp., Hewlett-Packard, IBM, Proteon, Ungermann-Bass.

### Vendor

SynOptics Communications, Inc.  
4401 Great American Parkway  
Santa Clara, CA 95052-8185  
(408) 988-2400

### Price

System 3000 costs between \$350 and \$500 per node, depending on the configuration.

### GSA Schedule

Yes.

# Analysis

After the concept of local area networking caught on, most vendors attempted to deal with explosive network growth by producing bridges and routers to handle the traffic and reduce downtime. Fortunately, these devices did the job, enabling network administrators to direct and control data flow. Unfortunately, the process of scattering bridges and routers across the network complicated an already complicated environment.

SynOptics took a step back from the crowd, observed the frantic activity, and concluded that no amount of energy or good will would offset the complexity of local area networking until a vendor filled in the large gap created by the lack of a cohesive method to manage and control LAN growth. By 1988, SynOptics presented the industry with its solution to uncontrolled LAN proliferation, a solution arrived at not through stringing more devices onto a network, but through installing the LattisNet family of intelligent hubs—concentrators in wiring closets.

To direct the intelligent hubs, SynOptics introduced LattisNet Network Management System, a hardware/software combination. The system is integrated with LattisNet intelligent hubs, controlling them and other physical features of the LAN. SynOptics followed its entry into network management with the LattisNet System 3000, an intelligent hub family that serves as a platform for integrating multiple LAN access methods and internetworking products.

Rounding out the System 3000 platform, SynOptics added support for 4M and 16M bps token-ring over shielded and unshielded twisted-pair cabling, demonstrated the 100M bps data rate for FDDI over shielded twisted-pair cabling, and incorporated Ethernet local and remote bridges and multiprotocol Ethernet routers into the family.

Over the years, SynOptics has continued to refine its theories on network management, basing its approach on three principles:

- network managers must know the exact topology of the network in realtime;

- network managers must receive complete and accurate measurements in realtime of configuration, fault, and performance; and
- network managers must be able to change the configuration of the network all the way to the port level.

To achieve these goals, SynOptics devised a system architecture based on Distributed Management Intelligence, a concept that distributes system horsepower and engines throughout the network to zero in on the source of problems. At the same time, the architecture ensures that the horsepower, engines, and other network resources are integrated into the intelligent hubs to promote effective management.

In March 1991, as evidence of its commitment to equipping its customers with the tools they need to determine accurate performance and configuration, SynOptics released a suite of network management systems for Ethernet and token-ring networks. The company not only improved its DOS-based systems, but also added a UNIX-based system integrated with the SunNet Manager network management platform.

At the time of the network management introductions, SynOptics also announced the Network Control Engine (NCE), which works with the UNIX-based network management system. The NCE acts as the engine that drives distributed management intelligence, functioning as intelligent hub modules that collect information from a network-defined domain. The modules analyze and compress data into concise formats for transmission to the central station for the use of the network manager.

---

## Competitive Position

The idea of managing a network from a central place is quite appealing to network managers who daily labor in the electronic labyrinth. The intelligent hub or wiring center or concentrator in a closet—whatever a user or vendor chooses to call it—simplifies the complex process of keeping a network up and running to the satisfaction of the many who use it. In addition to SynOptics, several other vendors have focused on the hub as their platform for networking, most notably Ungermann-Bass, Cabletron, Chipcom, and David Systems.

**Table 1. Concentrators**

Model	Component	Description	Model	Component	Description
3000	Premises Concentrator	Includes chassis, Ethernet backplane with dedicated network management interface bus and 460-watt power supply; holds up to 11 System 3000 Ethernet modules of any type, plus a retiming or network management module; options are available for Ethernet Only, Ethernet/Token-Ring, and Ethernet/Token-Ring/FDDI buses; 460-watt power supply is available with 9 slots.			vanced Network Management; includes diagnostic indicators, power supply, and Internet Protocol (IP) firmware required to support SNMP management; compatible with IEEE 802.3i Type 10BASE-T, it provides 36 RJ-45 unshielded twisted-pair Ethernet host ports and one attachment unit interface (AUI).
3030	Department Concentrator	Includes chassis, Ethernet backplane with dedicated network management interface bus and power supply; holds up to four System 3000 Ethernet modules, one of which must be a retiming or network management module; options are available for Ethernet Only, Ethernet/Token-Ring, and Ethernet/Token-Ring/FDDI buses.	2800	10BASE-T Workgroup Concentrator	Compatible with IEEE 802.3i Type 10BASE-T; includes a single 12-port host board, link status LEDs, and internal power supply; provides 12 unshielded twisted-pair Ethernet host ports and one attachment unit interface (AUI) 15-pin D interconnect port.
2310	10BASE-T Area Concentrator	Preconfigured Ethernet concentrator with built-in SNMP-based LattisNet Basic or Ad-	2810	Managed 10BASE-T Workgroup Concentrator	Physically identical to Model 2800, it features integrated LattisNet Basic or Advanced Network Management capabilities and the IP firmware to support SNMP management; self-boot option available.

Although Ungermann-Bass made its mark quite early with the industry's first transparent token-ring-to-Ethernet bridge and went on to flesh out its Net/One Series with fine hardware and software, the company has made known its desire to be primarily recognized now as a hub vendor. Its smart hub, Access/One, is U-B's fastest-growing product and has the statistics to prove it. In 1990, Access/One revenues increased 122% over 1989's. U-B has sold over 10,000 Access/One enclosures and over 500,000 ports. U-B has also sold about 3,000 bridges within Access/One.

According to industry analysts, SynOptics leads in the number of ports installed. Dataquest states that in the number of U.S. ports installed, SynOptics has 39%, Cabletron 13%, and U-B 10%. In Dataquest's figures, David Systems checks in with 7%. On an international level, IDC ranks SynOptics as having 40.1% of the installed ports, Cabletron as having 14.4%, and U-B as having 13%. David Systems ranks fourth in IDC's analysis with 5.1%.

Unlike U-B, SynOptics does not have to reacquaint the user community with its role as a hub

## Company Profile SynOptics Communications Inc.

### **Corporate Headquarters**

4401 Great America Parkway,  
Santa Clara, CA 95052-  
8185  
(408) 988-2400

### **In Canada**

SynOptics Communica-  
tions Canada, Inc.  
The Madison Centre  
4950 Yonge Street, Suite  
1434  
North York, ON M2N 6K1  
(416) 733-8348

### **Officers**

*President and Chief Executive Officer:* Andrew K. Ludwick  
*Senior Vice President and Chief Technical Officer:* Ronald V. Schmidt, Ph.D.  
*Vice President of Technology Development:* Amatzia Ben-Artzi  
*Senior Vice President of Worldwide Sales and Customer Support:* Michael M. Clair  
*Vice President of Engineering:* Peter S. Cross,

Ph.D.  
*Vice President of North American Sales:* Larry R. Goodwin  
*Vice President and Chief Financial Officer:* William J. Ruehle  
*Vice President of Marketing:* William A. Lanfri  
*Vice President of Manufacturing:* William L. Whisnant

### **Company Background**

*No. Employees:* 1,000 worldwide

SynOptics' history parallels that of Ethernet. In the early 1980s, Ronald V. Schmidt, now senior vice president and chief technical officer of SynOptics, led a team that spearheaded the development of LattisNet technology at Xerox PARC. To heighten Ethernet's acceptance in the marketplace, the LattisNet team focused on star topology, noncoaxial Ethernet adaptations.

With the blessing of Xerox, Andrew K. Ludwick, now president and chief executive officer of SynOptics, prepared a business plan for the venture that became SynOptics. In July 1985, Xerox granted the company a license to the LattisNet technology and made an equity investment in the fledgling company, which set up operations for its 12-person staff in a trailer. Within the year, SynOptics introduced its first product, a 10M bps Ethernet implementation over shielded twisted-pair wire (the IBM Cabling System). In February 1986, SynOptics extended LattisNet's capabilities by introducing 10M bps Ethernet over fiber optic cable in a star topology. In August 1987, LattisNet appeared in a 10M bps Ethernet version, operating on unshielded twisted-pair wiring, a technological breakthrough that created a new market niche within the LAN industry.

By the fall of 1988, the LattisNet family consisted of intelligent hubs, which are essentially concentrators in wiring closets, that

housed any mix of Ethernet modules. The LattisNet System 3000 intelligent hub family made its debut in 1989, and in 1990, SynOptics extended the System 3000 platform with 4M and 16M bps token-ring for shielded and unshielded twisted-pair cabling. At that time, the company also demonstrated the 100M bps FDDI access method over STP and integrated Ethernet remote bridges and multiprotocol Ethernet routers into the System 3000.

### **Financials**

For its fiscal year ending December 28, 1990, SynOptics reported revenues of \$175,957,000. Net income for the same period was \$28,227,000 or \$1.42 per share adjusted for the 2-for-1 stock split effected July 20, 1990. These results represent an increase over fiscal 1989's revenue of \$77,289,000 and net income of \$9,444,000, or \$0.61 per share adjusted.

In the first quarter of 1991, SynOptics reported revenues of \$61,111,000 and net income of

vendor, having specialized in hubs since 1988. SynOptics' strategy calls for equipping its hubs with the functionality of internetworking devices. Two of its competitors, Cabletron and Chipcom, are following the same route. To accomplish the complex task of transforming hubs into hosts for routers, the three vendors turned to Cisco Systems and entered into agreements which authorize Cisco to build router cards that will be inserted into their hubs. Also interested in stretching the capabilities of its Access/One, Ungermann-Bass signed an

agreement with Advanced Computer Communications (ACC) to incorporate its multiprotocol bridge/router technology into U-B hubs.

SynOptics is already marketing the results of the Cisco agreement in its Model 3383/3384 local Ethernet routers that fit into the System 3000, which also supports the 3323S/3324S local Ethernet bridges. Through an agreement with Retix, SynOptics released the 3356 Remote Ethernet Bridge for the System 3000. Chipcom has recently



\$9,521,000 or \$0.46 per share for its first fiscal quarter ended March 29, 1991. These figures compare with revenue of \$30,092,000 and net income of \$4,155,000 or \$0.22 per share on a postsplit basis for the same period last year.

Referring to the first-quarter results, President Andrew K. Ludwick commented, "During the first quarter we experienced good demand for our successive token-ring product introductions, combined with continued strength in our Ethernet offerings. We have also seen an expansion in our international business reflecting our efforts in this area."

#### **Recent Agreements**

**August 1990**—entered into an agreement with 3Com, authorizing 3Com to resell SynOptics' System 3000 Ethernet intelligent wiring hubs and integrate the System 3000 into its network management architecture. In turn, SynOptics agreed to integrate 3Com-managed

adapter cards into its network management system and offer 3Com adapters.

**September 1990**—signed licensing agreements with Interphase, Silicon Graphics, Network Peripherals, and Communications Machinery that allow these companies to use SynOptics' FDDI-over-shielded-wire products.

**October 1990**—entered into an agreement with Xyplex under which the two integrate Xyplex terminal server technology into the LattisNet System 3000 intelligent wiring hub platform.

**November 1990**—announced an agreement with Farrallon Computing, a privately held company based in Emeryville, CA, in which the two companies entered into a long-term joint product and technology exchange. The agreement calls for SynOptics to incorporate Farrallon's patented PhoneNET technology into the LattisNet 3000 platform, extending the connectivity of the System 3000 to support Apple-Talk.

**January 1991**—announced an agreement with Madge Networks under which SynOptics licensed Madge's FastMac and Bridge Management software for use in the LattisNet token-ring line.

**February 1991**—signed agreements with AT&T, Hewlett-Packard, Network Technology & Design, and TECHS International, authorizing them as the first participants in SynOptics' Investment Protection Program (IPP), which leverages the expertise and service capabilities of established network vendors to provide expanded support solutions for SynOptics' customers.

**June 1991**—signed a three-year OEM agreement with Siemens AG Telecommunications Cables, for SynOptics' intelligent hub systems to be sold under the Siemens label in Europe.

#### **Standards Participation**

Approximately 11 SynOptics engineering professionals spend part of their time participating in more

than 14 standards committees or industry consortia. Most of their participation takes place in major official standards committees, such as the Institute of Electrical and Electronic Engineers (IEEE) Project 802, the American National Standards Institute (ANSI), the International Electrotechnical Commission (IEC), and the International Organization for Standardization (ISO).

SynOptics unshielded twisted-pair and 10BASE-T Ethernet products are based on the attachment unit interface (AUI) portion of the IEEE 802.3 standard. LattisNet fiber host modules are based on the IEEE's Fiber Optic Inter-Repeater Link (FOIRL) standard. SynOptics token-ring products conform to the 802.5 Token-Ring standard. FDDI products are compatible with ISO 9314-1 FDDI Physical Protocol (PHY) standard, ISO 9314-3 FDDI Physical Medium Dependent (PMD) standard, and ANSI FDDI X3T9.5 Station Management (SMT) specification.

announced an internetworking module for its ON-line Concentrator, the ONline Ethernet Bridge. Chipcom is focusing mainly on the ONline series as the premier products in its line. The ONline Series has contributed over one third of the company's revenue in less than a year. At this time, Cabletron has not announced a routing module for its MMAC intelligent hub products.

Clearly, SynOptics has taken a commanding lead in extending the capabilities of intelligent hubs, making its smart devices even smarter. In

addition to adding bridges and routers to its hub, SynOptics is integrating terminal servers into its hub and has beaten competitors to market. In October 1990, the company announced a technology agreement with Xyplex to incorporate a Xyplex terminal server into its wiring center. In January 1991, the project came to fruition with SynOptics' announcement of the LattisNet Model 3395 Terminal Server module, which enables asynchronous

**Table 2. Host Communication Modules**

Model	Component	Description	Model	Component	Description
3301	Ethernet Thin Net Host Module	Provides eight 10BASE2-compatible BNC connectors to support connections to compatible Ethernet host devices.	3505	Token-Ring Unshielded Twisted-Pair Host Module	over shielded and unshielded twisted pair. Provides 12 host communications channels to support Token-Ring stations and compatible Token-Ring modules operating at 4M bps or 16M bps over D-Inside wire or high-performance unshielded twisted-pair wire.
3304-ST	Ethernet Fiber Optic Host Module	Provides FOIRL-compatible signaling to Ethernet host devices via six dual ST-type fiber connectors.	3902	FDDI Shielded Twisted-Pair Host Module	Offers four DB-9 connectors for supporting FDDI host stations operating at 100M bps over shielded twisted-pair cable; supports distances of 100 meters over IBM Type 1, Type 2, and Type 6 shielded twisted pair cable.
3307	50-pin 10BASE-T Host Module	Compatible with IEEE 802.3i Type 10BASE-T electrical interface; features a 50-pin connector to provide communications channels to compatible Model 508A 10BASE-T transceivers, network interface cards, or other host module ports.	2904	FDDI Fiber Optic Host Module	Offers four fiber-optic media interface connectors (MICs) to support FDDI host stations operating at 100M bps over fiber optic cable; allows connections of up to 2km between the host station and the concentrator for use in widespread networking environments; operates over existing 50/125 and 62.5/125 micron fiber optic cabling.
3308	Ethernet 10BASE-T Host Module	Compatible with IEEE 802.3i Type 10BASE-T; features 12 RJ-45 connectors to provide communications channels to compatible Ethernet host devices and compatible Ethernet modules over shielded and unshielded twisted-pair wire			
3502A	Token-Ring Shielded Twisted-Pair/Unshielded Twisted-Pair Host Module	Provides 12 host communication channels to support Token-Ring modules operating at 4M bps or 16M bps			

terminals and serial printers to access Digital LAT and TCP/IP host computers from anywhere on the network.

SnyOptics has also taken the lead in providing products for customers with mixed token-ring and Ethernet networks. The systems can manage both networks from a single management station platform. Through these systems, described in the Network Management section of this report,

SnyOptics became the first intelligent hub vendor to unify network management in mixed networks.

**Decision Points**

Although SynOptics is strongly identified with large, complex networking, the company has not neglected the small- and midsized user. For its entry-level 10BASE-T line, SynOptics has added

Simple Network Management Protocol (SNMP)-based network management capabilities. The product incorporating SNMP, LattisNet Basic Ethernet Network Management, is a DOS-based application, geared for lower density networks. Its geographic mapping feature allows network managers to use icons to sketch the network hierarchy. The system includes the Expanded View feature, which SynOptics introduced in its advanced network management system. Expanded View activates a realtime graphic representation of System 2000 and System 3000 concentrators.

Administrators of small networks, consisting of 25 to 100 nodes, can also make use of SynOptics' LattisNet Model 2800 10BASE-T Workgroup Concentrator, which features 12 unshielded twisted-pair ports to connect clusters of users sharing a common area. When the need for larger networks arises, administrators can use the AUI port to connect with various types of cabling media and backbones. SynOptics also supplies a 10BASE-T concentrator for midsized networks with 36 to 200 nodes. The LattisNet Model 2310 10BASE-T Area Concentrator features 36 unshielded twisted-pair ports, an AUI port, and integrated network management. The Model 2800 costs \$150 per port, and the Model 2310 sells for \$347 per port.

The company's recent announcement of integrated Ethernet/token-ring network management products for DOS and UNIX through SNMP-based applications is a cause for rejoicing by personnel who must manage mixed networks. The new products enable mixed-network customers to manage both types of networks from a single management station platform. When announcing the products, Bill Lanfri, vice president of marketing for SynOptics, commented, "As network integration and management platforms, our intelligent hubs already play a vital role in client/server networks. Now, by integrating detailed management for token-ring with our widely used Ethernet network management, we are able to bring the benefits of powerful network management to mixed-network customers—one of the fastest-growing categories within our current customer base." The products Lanfri references are LattisNet Advanced Network Management, LattisNet Basic Network Management, LattisNet Network Management for UNIX, and LattisNet NETMAP 2.0.

In June 1990, SynOptics announced the development of technology to run FDDI over IBM

**Table 3. Network Communication Modules**

Model	Component	Description
3333	Ethernet AUI Retiming Module	Reclocks packets, regenerates preamble, and extends fragments for Ethernet data entering the concentrator; electrically completes the concentrator backplane; features an AUI 15-pin D interconnect port for connecting to Ethernet modules in another concentrator.
3534-ST	Token-Ring Fiber Optic Repeater Module	Supports primary and secondary ring-in/ring-out connections with four fiber optic ST-type connectors; extends allowable distance of Token-Ring trunk between LattisNet concentrators to 2 km; detects cable faults between concentrators and automatically reconfigures the network to compensate for down lines.
3552	Token-Ring Shielded Twisted-Pair Ring-in/Ring-out Module	Features two DB-9 connectors for dedicated Token-Ring ring-in/ring-out connections to concentrators, IBM multistation access units, and other IEEE 802.5-compatible devices; detects cable faults between concentrators and automatically reconfigures the network to compensate for down lines.

Type 1 shielded twisted-pair cabling at distances of up to 100 meters, which conforms to standard building wiring specifications for desktop connectivity. For users who appreciate the functionality of fiber, but balk at its price, SynOptics' demonstration of FDDI over shielded twisted pair offers hope for less expensive fiber-to-desktop systems in

**Table 4. Transceivers**

Model	Component	Description
504-ST	Ethernet Fiber Optic Transceiver	Resides at the Ethernet host device; provides 802.3-standard, AUI, 15-pin D connector and ST-type fiber optic connector; operates with any FOIRL-compatible host or interconnect port, such as the Model 3304-ST host module.
504-FSMA	Ethernet Fiber Optic Transceiver	Resides at the Ethernet host device; provides an 802.3-standard, AUI, 15-pin D connector and an FSMA-type fiber optic connector.
508A	10BASE-T Transceiver	Resides at the Ethernet host device; provides an 802.3-standard, AUI, 15-pin D connector and an RJ-45 modular receptacle; compatible with IEEE 802.3i Type 10BASE-T equipment, including Models 3308 and 3307 10BASE-T host modules, plus Models 2800, 2810, and 2310 10BASE-T concentrators.
518	10BASE-T Transceiver for Apple Ethernet	Resides at the Ethernet host device; equipped with 14-position, Apple, AUI-compatible connector; compatible with IEEE 802.3i Type 10BASE-T equipment, including Models 3308 and 3307 host modules, plus Models 2800, 2810, and 2310 10BASE-T concentrators.

the future. To make desktop FDDI even more attainable, SynOptics is actively working in partnerships with FDDI vendors to promote the standard and to foster the development of network interface cards to connect to the IBM Cabling System.

For many users, preference for one vendor over another hinges on service. SynOptics has recently instituted the Investment Protection Program, which expands coverage and addresses service needs on multivendor networks. Participants in the program include AT&T, Hewlett-Packard, Network Technology & Design, and TECHS International. The support partnerships serve as a single point of contact in multivendor networks, eliminating the finger-pointing and entanglements that frequently occur in these types of networks.

## Characteristics

**Number of Nodes Installed:** Over 1 million LattisNet network nodes.

### Overview

SynOptics' goal is to provide systems to support LAN applications, using the intelligent hub as a control point for systems activity, management, and growth. LattisNet intelligent hubs integrate a choice of modular, standards-based connectivity, internetworking, and distributed management capabilities to deliver a complete networking solution from a single platform. Intelligent hubs, deployed throughout the network, implement customized networking solutions to meet the needs of the application running on the LAN. These devices, which usually reside in a building's central wiring closet, provide a common platform for basic Ethernet and token-ring functions.

### Hardware

#### System 3000 Intelligent Hub

The LattisNet System 3000, which integrates hubs with host and retiming modules, accommodates customers with complex networking requirements. The System 3000 provides a backplane to support multiple access methods to token-ring, Ethernet, and FDDI. The system's expanded networking capabilities include higher

**Table 5. Internetworking Products**

Model	Component	Description	Model	Component	Description
3323S	High-Speed Local Ethernet Bridge	Media access control-layer local Ethernet bridge; filters 29,000 data frames per second and forwards 13,650 data frames per second between LattisNet network segments; features an AUI 15-pin D connector for bridging into other network environments.	3384-ST	FOIRL Local Ethernet Router	route into other network environments; software media kit required. Identical to Model 3383, with the exception of an ST-type fiber optic connector to interconnect LattisNet segments or to route into other network environments.
3324S-ST	High-Speed Ethernet FOIRL Local Bridge	Identical to Model 3323S, with the exception of an ST-type fiber optic connector to bridge into other network environments.	3386	Remote Ethernet Router	Multiprotocol Ethernet router; forwards an aggregate 5,000 packets per second between LattisNet networks; filters 14,880 packets per second in bridging mode; supports serial or (optional) X.25 and frame relay connections; operates at speeds ranging from 9600 bps to 2.048M bps; front-panel 50-pin interface accommodates patch cables with RS-449, RS-232, V.35, and X.21 connections.
3356	Remote Ethernet Bridge	Dual-slot, high-performance Ethernet bridge; filters 14,880 packets per second and forwards 8,000 packets per second between LattisNet networks through a variety of serial links; factory- or field-installable Personality Modules feature G-703, RS-449, T1, V.35, X.21, and RS-232-C serial interfaces.	3395	Terminal Server Module	Modular server with 16 RJ-45 serial connectors for linking asynchronous terminals to a variety of local and geographically distributed host computers, including Digital LAT- and TCP/IP-based platforms; integrated into the LattisNet Network Management system; includes an SNMP agent for network management; software media kit required.
3383	Local Ethernet Router	Multiprotocol Ethernet router; forwards an aggregate 5,000 packets per second between adjoining LattisNet networks; can also be configured as a full-function bridge, filtering 15,000 data frames per second; features an AUI 15-pin D connector to interconnect LattisNet segments or to			

port and module density, integrated bridging, and network management functions. System 3000 concentrators reside in telephone wiring closets and data

communications centers where they implement Ethernet, token-ring, or FDDI networks over a building's structured cabling. The modular design of the System 3000 facilitates configuration. In modular System 3000

concentrators, network management modules collect information at the concentrator, board, and port levels to provide a report on overall network performance.

Host modules customize the System 3000 for Ethernet, token-ring, FDDI, or a combination of connectivity options on a variety of cabling. When configured as an Ethernet-only system, the hub supports up to 132 shielded or unshielded twisted-pair connections, 88 thin coaxial connections, or 66 fiber optic connections plus an Ethernet network management module. Users can make connections to a 10BASE5 coaxial Ethernet system through an external transceiver via an AUI port. Users can make interconnections through all three media to create large, hierarchical star networks.

In March 1990, SynOptics introduced a Tempest version of its fiber optic LattisNet 3000 product line. The Tempest version offers all the features of the standard System 3000, along with the added security features required for LANs in the government sector.

In June 1991, SynOptics announced products for the System 3000 that enhance network planners' flexibility in designing token-ring topologies. The products are the LattisNet Model 354-ST Fiber Optic Extender and the LattisNet Model 3532 Shielded Twisted Pair Repeater. The LattisNet Model 354-ST Fiber Optic Extender supports distances of up to two kilometers between SynOptics' hubs and IBM multistation access units (MSAUs) and bridges. Users can also connect token-ring stations to LattisNet hubs and IBM MSAUs via fiber optic cable by means of the Model 354-ST, running at 4M and 16M bps. The Model 3532 STP Repeater performs retiming at each hub, increasing trunk distances over STP between hubs to 1,100 feet at 16M bps and 2,500 feet at 4M bps.

### **LattisNet System 2000 Hubs**

Preconfigured LattisNet System 2000 hubs feature integrated 10BASE-T Ethernet connectivity and SNMP-based network management for small- and midrange LANs, supporting from 12 to 200 users. Users can configure System 2000 hubs as standalone devices or interconnect them with each other or within a System 3000 environment where smaller hubs serve lower density environments within the larger networks. These hubs are recognized and managed by LattisNet Basic and LattisNet Advanced Network Management systems and can be configured with either option.

The Model 2310 10BASE-T Area Concentrator is configured with thirty-six 10BASE-T Ethernet ports and one AUI port. It supports either LattisNet Basic or LattisNet Advanced Network Management. The Model 2800 10BASE-T Workgroup Concentrator is configured with twelve 10BASE-T ports and one AUI port. It does not support network management.

### **LattisNet Ethernet Implementation**

LattisNet differs from ordinary coaxial-based Ethernet only in physical topology and cabling media. Coaxial Ethernet is configured in a physical bus topology, but LattisNet arranges twisted-pair, coaxial cables, or fiber

optic cables in a physical star topology. LattisNet is compatible with IEEE 802.3 standards for Ethernet, including 10BASE-T for unshielded twisted-pair Ethernet, 10BASE2 for thin coaxial Ethernet, fiber optic inter-repeater link (FOIRL) for fiber optic, cable-based Ethernet, and attachment unit interface (AUI) for connections via 10BASE5.

### **Transceivers**

Transceivers serve as Ethernet-compatible interfaces between the active star cabling system and the Ethernet device, conforming to the IEEE 802.3 specifications for the AUI. Ethernet host workstations connect to the transceiver via a standard IEEE 802.3 15-pin D connector or a 14-position Apple Attachment Unit Interface (AAUI)-compatible connector. LattisNet also supports Ethernet Version 1.0 and 2.0 devices.

### **LattisNet Token-Ring Implementation**

When configured for token-ring only, a single hub can support up to 132 unshielded or shielded twisted-pair devices, plus a token-ring network management module. To accommodate larger, more widespread token-ring networks, users can interconnect hubs with shielded twisted-pair or fiber optic cable through ring-in/ring-out, repeater, or token-ring network management modules.

Like conventional token-ring, LattisNet is a logical ring configured in a physical star topology using unshielded and shielded twisted-pair wire. LattisNet is compatible with the IBM Token-Ring Network and the IEEE 802.5 standard for token-ring. Over shielded or unshielded twisted pair, LattisNet Token-Ring accommodates as few as two lobes and can increase as network requirements grow.

Up to 40 FDDI host stations can be accommodated in a single hub running FDDI exclusively and supporting network management. SynOptics offers host modules for both shielded twisted-pair and fiber optic connections, both operating at 100M bps. The modules are compatible with the International Organization for Standardization's (ISO's) Physical Medium Dependent (PMD) and Physical Protocol (PHY) standards, as well as with the ANSI FDDI X3T9.5 Station Management (SMT) specification and FDDI Connection Management (CMT) specification.

When a combination of access methods is configured into one hub, the number of available ports varies. The connectivity host module connects to one or two of three backplanes on the System 3000 chassis: Ethernet/Power/Network Management (all modules connect here for power and network management access), Token Ring (one or both of two independent rings can be used), and FDDI. In this way, all three access methods can operate and be managed from the same platform.

### **Internetworking Products**

SynOptics integrates bridges and routers into the LattisNet intelligent hub. All SynOptics bridges and routers,

developed along with industry leaders such as Retix and Cisco, are modular devices that slide into the hub for plug-and-play operation in large networks. Since SynOptics integrates each internetworking device into the LattisNet Network Management system, users can manage the modules and LattisNet connectivity components from a single system. SynOptics offers local and remote Ethernet bridges.

LattisNet local Ethernet routers direct data traffic between adjoining 10M bps Ethernet networks at 5,000 packets per second. SynOptics incorporates both bridging and routing functionality into each LattisNet local router. Router modules simultaneously route packets of multiple network protocols to destinations anywhere on the enterprise network. LattisNet local routers can also operate as transparent learning bridges to support protocols, such as Digital LAT, that cannot be routed. LattisNet local routers are compatible with LattisNet bridges.

The LattisNet remote Ethernet router is a single-slot, modular device that connects Ethernet LANs over high-speed links, such as dedicated serial lines, X.25 networks, and frame relay connections. The remote routers support multiple protocols and a number of routing information protocols. A remote Ethernet router can act as a pipeline connecting large, central facilities (hubs) to a number of small, remote sites (spokes).

LattisNet terminal servers enable asynchronous terminals, printers, and modems to connect to host systems on an Ethernet network. Developed jointly by SynOptics and Xyplex, the modular terminal server occupies a single slot in a System 3000 intelligent hub. It is compatible with Digital VT100, VT220, and VT320 terminals.

For details on SynOptics' internetworking products, see Table 5.

### **Network Management**

SynOptics' LattisNet Network Management system makes use of a combination of hardware and software products to manage Ethernet, token-ring, and FDDI networks. SynOptics' strategy for network management is to "gather network management data as close to its source as possible, reduce it into meaningful information within the hub, and present the resulting data to a central management station for further action." This approach enables the actual management to occur in the hub, a technique that lifts the burden from central management resources.

LattisNet Ethernet, token-ring, and FDDI network management modules work within the LattisNet Network Management system. Installed in LattisNet hubs throughout the network, these modules perform the actual processing and data gathering functions as directed by software agents. The modules collect network performance information from other modules installed in the hub and forward the information to a network management station.

**LattisNet Network Control Engine (NCE):** The LattisNet Model 3040 Network Control Engine distributes network management processing capabilities throughout the network. The NCE features a 12.5 million instructions-per-second (MIPS) reduced instruction set (RISC)-based SPARCprocessor, 8M bytes of RAM, and a 10M-byte hard drive. Installed in System 3000 hubs at strategic locations within the network, NCE modules create autonomous domains. Through the use of SNMP, they gather management information from LattisNet Network Management modules and other SNMP-compatible devices within the domain. NCEs process and analyze the data and forward specific information to one or more management consoles for additional evaluation.

The module supports the NetMetrix Protocol Analyzer and Load Monitor applications, developed by Matrix Computer Systems and specifically tailored for use in SynOptics' distributed management environment. The Protocol Analyzer captures user-selected packets, automatically disassembles packets, detects nodes generating excessive packets, and debugs protocols. The Load Monitor examines the network load by time interval, source nodes, destination nodes, protocols, application, and packet size. An X Windows session on an Apple Macintosh, Digital Equipment DEC X-station, or a Sun SPARCstation can present domain- or network-wide information gathered from one or more NCEs. SynOptics plans more third-party applications in the future.

---

### **Software**

LattisNet Network Management software supports agents that determine the data to be collected and condensed by the network management modules. Subsequently, the software displays this information on the screen of a management station as part of a graphically oriented, realtime map of token-ring and/or Ethernet network configurations.

**LattisNet Basic Network Management:** A DOS-based system for small- to medium-sized Ethernet and/or token-ring networks, LattisNet Basic Network Management runs on an IBM 386-class, Compaq 386, or compatible PC. The system supports up to 250 nodes running multiple access methods. Through its support of SNMP, the software can obtain physical- and MAC-layer data from routers and bridges. The graphical user interface, based on Hewlett-Packard's OpenView, enables network managers to draw color-coded maps representing the network's logical, physical, or hierarchical configuration.

LattisNet Basic Network Management software supports SynOptics' Expanded View application, a realtime graphic representation of a selected concentrator on the control console screen. Network managers can partition individual ports and display port-level network diagnostic and activity information, including media access control and physical-layer statistics.

**LattisNet Advanced Network Management:** This version of network management software provides an open, standards-based communications and applications platform for the proactive management of large, complex token-ring and Ethernet networks from a common architecture. It includes physical- and MAC-layer management, SNMP compatibility, OpenView-based mapping capabilities, and Expanded View. The Advanced Network Management agent provides dynamic topology mapping of token-ring and Ethernet networks, the capability to set multiple user-defined thresholds, and out-of-band signaling and logging.

Users can obtain node lists at the Ring (token-ring), Segment (Ethernet), or Expanded View levels. These lists enable network managers to identify and locate critical network resources for baselining, fault recovery, optimization, integrity assurance, and planning.

The system features two dynamic mapping functions: Flat Network Views and Segment Views. Automatically generated by Advanced Network Management, Flat Network Views presents maps of individual token-ring and/or Ethernet networks connected by bridges and bounded by routers. Segment Views presents a detailed, system-generated overview of a specific token-ring or Ethernet concentrator segment bounded by bridges.

**LattisNet Network Management for UNIX:** Based on Sun Microsystems' SunNet Manager platform, LattisNet Network Management for UNIX accommodates users with large multivendor networks or requirements for a UNIX-based network management solution. The system includes integrated token-ring, FDDI, and Ethernet network management; an Expanded View graphical interface; and SNMP compatibility. Any changes users make on the physical LattisNet network automatically appear on the lower layer maps and filter up to the top-level SunNet Manager network maps.

**LattisNet NETMAP 2.0:** NETMAP 2.0 is a software application program that enables the IBM NetView network management system to simultaneously monitor and control LattisNet Token-Ring and Ethernet networks in a larger, multivendor environment. NetView users can monitor and control LattisNet networks from the NetView console, which is a 3270-type terminal attached to an IBM mainframe. Users can take advantage of NetView functionality for managing LattisNet networks from the NETMAP station, an OS/2 PC attached to both the LattisNet network and the SNA network.

---

## Support

In February 1991, SynOptics announced the Investment Protection Program (IPP) which consists of a Customer

Support Partner Program designed for value-added resellers to deliver service and support to SynOptics' customers. The certified partners have received training beyond that of the standard service reseller level and have access to advanced application and integration workshops. They receive discounts on services, have access to dedicated advanced technical support resources, and participate in SynOptics Customer Support Partner Council.

**AT&T:** As a member of IPP, AT&T comarkets cabling systems with SynOptics and provides pre- and post-sale support for SynOptics products. AT&T offers SynOptics customers and resellers design consulting; applications engineering; project management and coordination; equipment staging and integration; installation and testing; and cable plant design, installation, and certification. AT&T also provides on-site support for SynOptics customers and resellers from over 90 locations.

**Hewlett-Packard:** SynOptics has entered into an agreement with Hewlett-Packard under the HP Network Support Affiliate Program, which allows HP and SynOptics to combine forces to isolate and resolve network problems for their mutual customers. The procedures agreed upon by both companies enable them to exchange technical information, coordinate efforts for problem resolution, and deal with problems that require additional resources. A customer with an appropriate support contract can call either HP or SynOptics.

**Network Technology & Design:** SynOptics has signed a letter of intent with Network Technology & Design to provide voice, data, and network cabling support for all of SynOptics' distribution channels. Under this agreement, Network Technology & Design provides to SynOptics' customers and resellers worldwide the following: cable plant system evaluation, circuit mapping, certification and testing for all voice and data circuits, project management, cable plant design documentation and automation, requirements analysis and applications development, and education services.

**TECHS International:** A publisher of the Technical Encyclopedia of Computer Hardware and Software, TECHS International's agreement with SynOptics calls for TECHS to become the sole support database authorized to include SynOptics' technical documentation. All SynOptics products are supported by TECHS, thereby allowing resellers, distributors, and users to integrate and support SynOptics' products quickly and easily. The agreement also allows SynOptics to use TECHS to service its own products. Other technical support organizations can purchase TECHS to service SynOptics directly from TECHS International in Anaheim, CA.



## Equipment Pricing

	<b>Purchase Price (\$)</b>
LattisNet Basic Ethernet Network Management system for IBM AT and Micro Channel PCs, including adapter card, communications software, and network management software	2,295
LattisNet 3386 Remote Ethernet Router	6,995
Model 3323S Local Ethernet Bridge	4,795
Model 3324S Local Ethernet Bridge	5,295
LattisNet Model 3040 Network Control Engine (NCE)	9,995
LattisNet Model 2810 Managed Workgroup Concentrator	2,395
LattisNet Model 2810 Managed Workgroup Concentrator, with local-load option	2,595
LattisNet Model 3395-01 TCP/IP-based Terminal Server module	3,495
LattisNet Model 3395-02 TCP/IP- and LAT-based Terminal Server module	3,895
LattisNet Model 3383 Ethernet Local Router with AUI port	6,395
LattisNet Model 3383 Ethernet Local Router with AUI port	6,395
LattisNet Model 3384-ST with FOIRL port	6,795
LattisNet Model 3532-ST Repeater Module	1,995
LattisNet Model 354-ST Fiber Optic Extender	1,495

21

