

# Andrew Protocol Converters

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**Product Summary**

**Editor's Note**

Andrew has released a steady stream of new protocol conversion products, including the InterLynx/400 protocol converter; the Newport/Coax and Newport/Twinax synchronous adapters for the HP LaserJet; the Malibu/Coax and Malibu/Twinax printer adapters; and the InterLynx 3000/Coax and InterLynx 4000/Twinax printer adapters, which include front panel displays and internal baluns accommodating twisted-pair wire.

**Description**

Andrew markets a variety of products performing asynchronous-to-synchronous protocol conversion for displays, printers, and microcomputers.

**Strengths**

Andrew offers a complete line of products for IBM mainframe and midrange systems, supporting individual devices or up to 32 devices. The products are user friendly and offer a rich selection of customization features.

**Limitations**

No major limitations.

**Competition**

IBM, Micom Corp., Renex Corp., Telematics International Inc., and Wall Data.

**Vendor**

Andrew Corporation  
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 Torrance, CA 90503  
 (213) 320-7126

**In Canada:**

Louis Albert Associates, Inc.  
 P.O. Box 7160, 5411 Canotek Road  
 Gloucester, ON K1J 8Y5  
 (613) 748-9751

**Prices**

Protocol Converters equipped with four ports cost from \$2,000 to \$3,000. Adapter products are priced from \$595 to \$1,295. Personal computer software costs from \$150 to \$195.

# Analysis

## Product Strategy

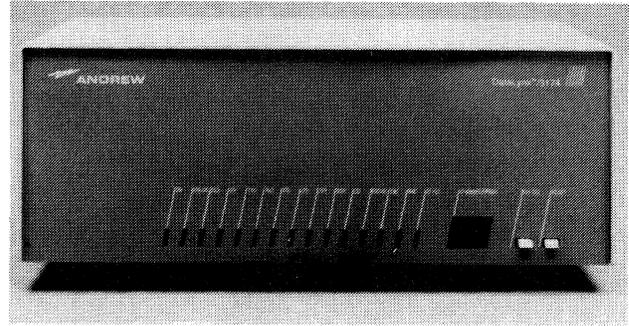
Andrew Corporation is a leading vendor of protocol conversion products supporting communications between asynchronous devices and IBM's synchronous computers. Andrew's DataLynx/3174 and DataLynx/5294 protocol converters, designed for mainframe and midrange hosts, respectively, accommodate up to 32 asynchronous display terminals, printers, and microcomputers. These units support two synchronous host connections. User friendly, they provide menu screens with online help for easy system configuration.

Andrew also markets a family of adapters supporting protocol conversion for individual printers and displays. One unit, VersaLynx/3278, provides reverse (synchronous-to-asynchronous) conversion for an IBM 3178- or 3278-compatible display terminal. Andrew's TruLynx family of personal computer software supports synchronous display emulation and file transfer capability, providing features such as multiple concurrent sessions, automated operations capability, and keyboard customization.

## Competitive Position

The demand for products supporting communications between incompatible equipment and systems remains strong. While the movement away from host-based display systems to intelligent DOS workstations tied to a local area network has negatively affected the market, LAN communications provides another avenue for business.

Protocol conversion is a mature technology, one that has not changed rapidly over the years. Vendors continue to fine tune their products, providing faster file transfer speeds, offering greater configuration flexibility, and making products more user-friendly. Some vendors, including



*Andrew's DataLynx/3174 allows non-IBM equipment to connect to IBM hosts.*

Renex Corporation, have introduced protocol converters that provide the power and attachment options normally found on a full-size communications controller, but for a lower price.

The protocol conversion market is dominated by IBM, whose offerings, which include the Model 7171 Protocol Converter, the 5208 ASCII-5250 Link Protocol Converter, and the 3708 Network Conversion Unit, have cut sharply into the business of other vendors since 1982. (Prior to that time, IBM sold only synchronous display products. Competitors offering a low-cost connectivity solution that uses asynchronous displays and printers were, therefore, highly successful until IBM countered.)

Andrew's DataLynx/3174 and DataLynx/5294 also face competition from Micom Communications Corporation's MB3 Protocol Converter, Renex Corporation's TMS Three Communications Controller, Telematics International's SmartNet Protocol Converters (formerly marketed by Protocol Computers Inc., which has been acquired by Telematics), and Wall Data's DCF II products. Digital Communications Associates' IRMAprint 2 and Avatar Corporation's PA1500G are printer adapters competing with those of Andrew.

A spokesperson for Andrew's Network Products Group estimates that the company controls from 10 to 15 percent of the protocol conversion market. Sales of asynchronous-to-synchronous conversion products generate from 60 to 70 percent of the group's business; the remainder comes from the sale of local area network products.

Andrew intends to extend this market reach not only by developing a broader line of new products, but by acquiring other companies that complement Andrew's strengths. The most noteworthy

## Company Profile Andrew Corporation

### Corporate Headquarters

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### In Canada

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### Officers

*President and CEO:* Floyd  
L. English  
*Senior Vice President:*  
George R. Forbes  
*Chairman:* Edward J. An-  
drew

### Company Background

*Year Founded:* 1937  
*No. Employees:* 3,000

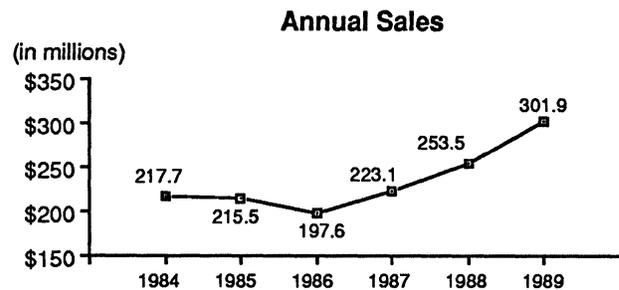
Andrew Corporation was founded 53 years ago by Victor J. Andrew, a physicist with experience in electromagnetic wave propagation. The company first focused directional antenna systems for AM broadcasters. In the 1940s, Andrew Corporation introduced microwave antenna systems and coaxial cable products for fixed and vehicular radio systems. The sale of these products to both military and commercial markets formed the bulk of Andrew's business through the mid-1980s.

In 1985, Andrew suffered a substantial decline in sales. Recognizing that the organization's future

success depended upon more product and market diversity, Andrew began an aggressive campaign to find new government and military markets for its existing products; to acquire businesses that complement its own marketing and engineering strengths; and to enter the corporate communications world, providing new products and services supporting local area networks, protocol conversion, and the integration of voice, data, and video.

In 1987, the vendor acquired Local Data, a leading designer and manufacturer of communications products linking asynchronous equipment to IBM synchronous systems, and providing gateways to LANs, data PBXs, and packet switched networks. In November 1989, Andrew acquired KMW Systems Corporation, a manufacturer of products for the transmission and processing of electronic data, including protocol converters, image processors, and channel interfaces. Andrew/KMW has provided additional products and distribution capabilities in existing markets, allowing further entry into new niches in the fast growing connectivity market.

Through these and other smaller acquisitions, to-



gether with aggressive funding of product development and marketing, Andrew is applying its communications expertise to local area networks and other communications environments; the vendor is thus moving deliberately downstream, closer to the end user.

### Business Overview

Andrew Corporation is a multinational, high-technology company offering a broad line of electronic communications products and systems to commercial, government, and military customers. Its markets are driven by the need for products that enhance the ability to communicate on a global basis. Organized into functional operating groups, Andrew focuses on three major market areas.

The *Commercial Products Group* serves cellular, land mobile, common carrier, and broadcast markets with complete communications systems composed of terrestrial microwave and satellite earth station antennas, coaxial cable, waveguides, towers, and shelters.

The *Government Products Group* markets radar and communications reconnaissance systems, direction finding systems, weather navigational radar antennas, positioners, cable, and waveguide products.

The *Network Products Group* provides connectivity solutions critical to the efficient connection of incompatible computers and peripherals. The constantly expanding product line of this division of Andrew Corporation includes token-ring products, protocol converters, gateway devices, image processors, coaxial multiplexers, and channel interfaces.

### Financial Profile

Sales for 1989 rose 19.1 percent over the previous year, reaching a record \$301.9 million. This sales increase was across the board, with businesses in all markets, except defense electronics, recording good gains. Net income reached \$16.2 million, an improvement of 16.8 percent over 1988, and earnings per common share were \$1.62, up 15.7 percent from the previous year.

**Table 1. Display Terminal Adapters for IBM Mainframe Systems**

Product	InterLynx/3278	VersaLynx/3278
<b>Function</b>	Provides IBM 3278 Model 2 display terminal emulation for an asynchronous display, minicomputer, or microcomputer running InterLynx/3270-PC software; also supports communications between the display and an asynchronous host and between the asynchronous computer and the IBM host	Provides asynchronous display emulation for an IBM 3278/3178 (or 3X78 compatible) display; also supports a synchronous connection for a pass-through session with an IBM mainframe host; the standard version of VersaLynx/3278 supports VT52/100/102, TV925, IBM 3101, and TTY emulation; the deluxe version emulates all of the above, while supporting up to four custom emulations
<b>Device Attachment</b>	One RS-232-C/V.24 asynchronous device port, configurable as a DTE or DCE connection	One Type A coaxial port connecting to an IBM 3278/3178 display terminal; the deluxe version also provides an auxiliary RS-232-C/V.24 port supporting ASCII printer emulation for an IBM printer
<b>Primary Host Connection</b>	One Type A coaxial interface to a local IBM 3X74 communications controller; optionally supports twisted-pair wire using a balun	One RS-232-C/V.24 port supporting a local or remote asynchronous minicomputer, microcomputer, data PBX, or other asynchronous device
<b>Secondary Computer Connection</b>	One RS-232-C/V.24 port, configurable as a DCE or DTE connection, for a pass-through session with an asynchronous device or system	One Type A coaxial cable interface to a local IBM 3X74 communications controller, for a synchronous pass-through session; optionally supports twisted-pair wire using a balun
<b>Data Transmission Rate</b>	110 to 19.2K bps	110 to 19.2K bps
<b>Important Features</b>	A special driver provides synchronous display emulation for the async host, for bidirectional file transfer between IBM and asynchronous computers; includes a menu-driven configuration system with on-screen help; supports the IBM status line for the attached display and type-ahead capability; provides host logon security and a forced logoff feature	Deluxe model: supports up to four custom emulations, international character sets, keyboard remapping, and character translation; allows a display-attached IBM-compatible printer to emulate an asynchronous printer; provides a configuration menu system with on-screen help

► *(Analysis continued)*

recent acquisition, in November 1989, was that of KMW Systems, now known as Andrew/KMW. Founded in 1971, KMW was the pioneer of protocol converters. Its product family supports communications between IBM hosts and Apple Macintosh computers, ASCII/ANSI displays, and ASCII printers.

While the spokesperson was unwilling to discuss in detail any future products Andrew planned to release, he acknowledged that a more powerful successor to DataLynx/3174, one that will act as a remote cluster controller supporting applications using IBM's LU6.2 protocol, is on the way.

**Decision Points**

Andrew Corporation is a full service vendor, providing a complete product line for IBM main-

frame, IBM midrange, and desktop environments. These products are available worldwide from a number of distributors, and serviced through various third party organizations. Users have rated Andrew's user documentation as easy to understand and comprehensive—a big plus for the vendor.

Andrew's products are highly versatile. With customization of device drivers, the products can provide protocol conversion for microfiche devices, FAX machines, weight scales, voice mail systems, and optical scanners, just to name a few applications.

Another strong point of Andrew's products, and particularly the printer adapters, is their configurability. The InterLynx 3000/Coax, InterLynx 4000/Twinax, and Malibu/Coax adapters provide PC-driven configuration menus, and support permanent storage of multiple configuration and command strings. The range of configuration options

supported by Andrew's printer adapters also sets the vendor apart from DCA, Avatar Corporation, and other competitors.

## Characteristics

### Models

The following tables provide the announcement and release dates for the products covered in this report.

#### Protocol Converters

Product	Date Announced	Date Released
DataLynx/3174	September 1986	December 1986
DataLynx/3780	July 1980	October 1980
DataLynx/5294	June 1988	September 1988
InterLynx/400	July 1989	October 1989
InterLynx/5251	July 1985	October 1985

#### Display Terminal Adapters

Product	Date Announced	Date Released
InterLynx/3278	April 1984	July 1984
VersaLynx/3278	June 1984	September 1984

#### Printer Adapters

Product	Date Announced	Date Released
InterLynx 3000/Coax	January 1990	March 1990
InterLynx 4000/Twinax	November 1989	February 1990
Laguna/Coax	January 1988	April 1988
Malibu/Coax	November 1987	February 1988

Product	Date Announced	Date Released
InterLynx 3000/Coax	January 1990	March 1990
Malibu/Twinax	August 1988	November 1988
Newport/Coax	October 1988	January 1989
Newport/Twinax	February 1989	May 1989

#### Personal Computer Software

Product	Date Announced	Date Released
TruLynx/400	August 1989	November 1989
TruLynx/3270-PC	November 1985	February 1986
TruLynx/5251-PC	August 1986	November 1986

**Number Installed to Date:** Over 59,000 hardware products (all models).

#### Mainframe Products

Andrew's product line for IBM System/370-compatible mainframes includes the DataLynx/3174 and DataLynx/3780 protocol converters, a family of adapters providing conversion for individual displays and printers, and terminal emulation and file transfer software for personal computers.

#### Protocol Converters

**DataLynx/3174** appears to the host as a BSC or SNA Physical Unit (PU) 2 IBM 3174 Controller, allowing attached asynchronous display terminals, personal computers running TruLynx/3270-PC software, and asynchronous printers to emulate IBM 3278 displays and IBM 328X printers. It supports communications with one or two local or remote IBM synchronous hosts. An asynchronous port allows one pass-through session with an ASCII host. Each connection supports transmission speeds from 110 to 19.2K bps. The unit can optionally function as an X.25-to-SNA gateway, or connect to a data PBX.

DataLynx/3174 comes with four standard asynchronous device ports, and is expandable to 32 devices through four-or eight-port cards. The unit accommodates more than 150 different popular printer models, and also allows users to generate up to six custom printer drivers.

Included with DataLynx/3174 is a configuration menu system that simplifies system setup. A system management mode supports deactivation, reactivation, and data stream analysis of any synchronous or asynchronous port, and the gathering of maintenance statistics for SNA's Network Problem Determination Application.

**Table 2. Printer Adapters for IBM Mainframe Systems**

Product	InterLynx 3000/Coax	Malibu/Coax	Newport/Coax	Laguna/Coax
<b>Function</b>	Provides feature-by-feature emulation of IBM's 3287 Model 2 printer in both DSC and SCS modes for a low-cost ASCII printer or plotter; also allows sharing of the printer between the IBM host and a PC, a local area network, or an asynchronous host	Provides feature-by-feature emulation of the IBM 3278 Model 2 printer in both DSC and SCS modes for an ASCII printer; also allows sharing of the printer between the 3270 system and a PC, a local area network, or an asynchronous host	Provides 3270 communications capability to an HP LaserJet Series II or IID printer	An OEM product supporting communications between 3270 systems and parallel Centronics ASCII printers and plotters
<b>Device Attachment</b>	One Centronics parallel printer port	One Centronics parallel printer port	Installs directly into, and is powered by, the HP LaserJet	One parallel Centronics port
<b>Synchronous Host Connection</b>	One Type A coaxial interface to a local IBM 3X74 communications controller; also includes an internal balun for twisted-pair wire	One Type A coaxial connection to a local IBM 3X74 communications controller; also accommodates twisted-pair wire using a balun	One Type A coaxial interface for communications with a local IBM 3X74 communications controller; also accommodates twisted-pair wire using a balun	One Type A coaxial interface to a local IBM 3X74 communications controller; optionally accommodates twisted-pair wire using a balun
<b>Secondary Computer Connection</b>	One RS-232-C/V.24 interface for connection to an asynchronous device or system	One RS-232-C/V.24 port for connection to an asynchronous device or system	None	None
<b>Data Transmission Rate</b>	75 to 38.4K bps	Up to 19.2K bps	The unit is compatible with the full 2.3M bps IBM data rate and word format	Dependant upon the application
<b>Important Features</b>	Configuration parameters can be entered through the unit's front panel, or using a menu-driven PC configuration program; allows permanent storage of multiple configuration and command strings in EEPROM; supports the full range of ASCII printer features, including graphics, bar codes, multiple fonts/formats, and page orientation; provides 29 standard IBM LU1 language character sets	Drives printers at up to 2,300 cps; supports the entire range of ASCII printer capabilities; includes a menu-driven PC configuration program, debugging tools, 29 LU1 international character sets, and customizable translation tables; supports third-party graphics software	Text files containing configuration commands can be downloaded from the host; a pseudo-transparency feature allows access to LaserJet selection, line and character spacing, and margin changes; includes debugging tools, 29 LU1 international character sets, and customizable translation tables	Drives printers at up to 2,300 cps; includes debugging tools; supports configuration download capability and storage of up to eight user-defined preset configurations; provides a control panel interface, 29 LU1 international character sets, and customizable character translation tables; supports third-party graphics software

**DataLynx/3780** enables asynchronous display terminals, printers, minicomputers, and microcomputers to operate as remote job entry stations, for batch communications with an IBM BSC host, an IBM-compatible peripheral, or the JES/Power facilities of a large computer system. DataLynx/3780 emulates IBM 3780, 2780, 2770, and 3741 protocols, selectable by DIP switch settings. The unit supports both local and remote communications, and provides CRC-16 error detection and correction. Three serial ports— a synchronous host port, a printer port, and a console port— provide independent transmission speeds of up to 19.2K bps each.

**Display and Printer Adapters**

Each of the following adapters, with the exception of VersaLynx/3278, supports communications between an individual asynchronous device and an IBM System/370-compatible host via a local 3X74 communications controller. VersaLynx/3278 provides reverse protocol conversion for both an IBM synchronous display and an IBM printer. All of these products support both Type A coaxial cable and twisted pair wire. More information about these products can be found in Tables 1 and 2.

**InterLynx/3278** allows an asynchronous display, minicomputer, or microcomputer to emulate an IBM 3278 Model 2 display terminal. InterLynx/3278 provides

**Table 3. Printer Adapters for IBM Midrange Systems**

Product	InterLynx 4000/Twinax	Malibu/Twinax	Newport/Twinax
<b>Function</b>	Provides emulation of an IBM Model 3812, 5219, 5224, 5225, 5256, or 4214 printer for one ASCII dot matrix or laser printer for communications with an IBM System/3X or AS/400 host; also supports sharing of the printer between the IBM host and an asynchronous host, a PC, or a local area network	Provides feature-by-feature emulation of an IBM 5219, 5224, 5256, or 4214 model printer for a single ASCII printer for communications with an IBM System/3X or AS/400 host; also allows sharing of the printer between the synchronous host and an asynchronous host, PC, or local area network	Supports communications between an HP LaserJet Series II or IID printer and an IBM System/3X or AS/400 computer
<b>Device Attachment</b>	One parallel printer port	One Centronics parallel printer interface	Installs directly into, and is powered by, the HP LaserJet
<b>Synchronous Host Connection</b>	One twinaxial connection to the midrange host or an IBM Model 5251, 5294, or 5394 Workstation Controller	One twinaxial connection to the midrange host or an IBM Model 5251, 5294, or 5394 Workstation Controller	One twinaxial connection to the midrange host or an IBM Model 5251, 5294, or 5394 Workstation Controller
<b>Secondary Computer Connection</b>	One RS-232-C/V.24 interface for sharing of the printer with an asynchronous device or system	One RS-232-C/V.24 interface for connection to an asynchronous device or system	None
<b>Data Transmission Rate</b>	75 to 38.4K bps	75 to 33.4K bps	Information not available
<b>Important Features</b>	Configuration parameters can be entered through the unit's front panel or using a menu-driven PC program; allows permanent storage of multiple configuration and command strings in EEPROM; supports the entire range of ASCII printer features, including graphics, bar codes, multiple fonts/formats, and page orientation; InterLynx 4000/Twinax provides customizable translation tables, a diagnostic dump feature, and fully IBM-compatible runtime controls	Provides access to the entire range of ASCII printer capabilities, including graphics, bar codes, multiple fonts/formats, and page orientation; provides debugging tools, built-in international language support, and fully IBM-compatible runtime controls	Allows text files containing configuration commands to be downloaded from the host; multiple user-defined configurations can be stored in non-volatile EEPROM memory; provides access to LaserJet graphic features such as font selection, line and character spacing, and margin changes; provides configuration print and diagnostic dump modes

one device-attachment port, one synchronous port, and an asynchronous port for an ASCII pass-through session.

**VersaLynx/3278** provides Type A Coax-to-RS-232-C/V.24 conversion, allowing an IBM 3178/3278 display terminal (or a 3X78-compatible display) to emulate any of several asynchronous displays, for communications with a microcomputer, a minicomputer, a data PBX, or another asynchronous device. A coaxial connection to an IBM host via a local IBM 3X74 communications controller is also supported, allowing simultaneous access to a synchronous pass-through session.

VersaLynx/3278 comes in a standard version and a deluxe version. Both versions support emulation of Digital Equipment VT52 and VT100/102, IBM 3101, TeleVideo 925, and TTY displays. The deluxe model also supports user-defined emulations, key remapping, and international and special characters.

**InterLynx 3000/Coax** and **Malibu/Coax** provide feature-by-feature IBM 3287 Model 2 printer emulation for an ASCII printer. Both units provide one coaxial interface as well as an asynchronous port through which an ASCII device or system can share the printer. These adapters support the full range of ASCII printer capabilities, such as graphics, bar codes, multiple fonts and formats, and page orientation.

**Laguna/Coax** is an adapter developed for original equipment manufacturers (OEMs) needing to connect parallel Centronics asynchronous printers and plotters to 3270 systems. Laguna/Coax provides feature-by-feature 3278 Model 2 printer emulation for a single device, while supporting the full range of ASCII printer capabilities.

**Newport/Coax**, codeveloped with Hewlett-Packard Company, is an IBM 3270 adapter for the HP LaserJet Series II and IID printers. This product installs into and is powered by the HP LaserJet. Malibu/Coax bypasses the limitations normally imposed by the IBM

system, allowing users to take full advantage of LaserJet features such as font selection, line and character spacing, and margin changes.

### **Personal Computer Software**

**TruLynx/3270-PC** software, used in conjunction with DataLynx/3174, provides IBM 3278 Model 2 display terminal emulation and bidirectional PC-to-host file transfer capability to a personal computer running DOS versions 2.0 through 3.3. TruLynx/3270-PC provides access to up to five concurrent sessions via a "hot key" and allows jobs to be spooled to a PC-attached printer. Included with the software are customizable keyboard maps, display characters for international applications, and an application program interface (API).

### **Midrange Computer Products**

Andrew's products for IBM midrange computer systems include the DataLynx/5294, InterLynx/400, and InterLynx/5251 protocol converters; a family of adapters for individual printers; and terminal emulation and file transfer software for personal computers.

### **Protocol Converters**

**DataLynx/5294** provides access to up to two IBM System/3X or AS/400 processors over twinaxial cable or modem connections. Communications through an X.25 packet switched network is also supported. Emulating an IBM 5251 Model 12 or 5294 Workstation Controller, DataLynx/5294 allows asynchronous displays, IBM-compatible PCs running TruLynx/5251-PC software, and printers to appear as IBM 5251/5291 displays and IBM 5224/5225/5256 printers. The unit comes with four standard asynchronous device ports, and is expandable to 32 ports in increments of four and eight. DataLynx/5294 supports synchronous data transmission speeds of up to 19.2K bps.

DataLynx/5294 provides a system management mode allowing the user to monitor the signals of any synchronous or asynchronous port, compile SDLC line statistics, and check the status of any of the logical units (LUs). These tasks can be done from either a local or remote display.

**InterLynx/400** is a protocol converter that allows up to seven asynchronous display terminals, printers, and personal computers, running Andrew's TruLynx/400 software package and IBM's AS/400 PC Support software, to access an IBM AS/400 computer. Each asynchronous device port appears to the AS/400 as an IBM enhanced emulation PC adapter card.

InterLynx/400 supports 27 international character sets for attached printers, on-screen assignment of workstation addresses, user-friendly configuration menus with help screens, and programmable drivers that allow connection of almost any simple asynchronous device. InterLynx/400 provides full error detection, with up to 19.2K bps transmission speed.

**InterLynx/5251** emulates an IBM 5251 Model 12 Workstation Controller, for communications with an IBM System/3X or AS/400 host computer. With DataLynx/

5251, asynchronous display terminals and personal computers, running TruLynx/5251-PC software, appear as IBM 5251 Model 11 workstations; printers emulate an IBM Model 5224, 5225, 5256, or 4214 dot matrix printer, or an IBM 5219 letter-quality printer. The unit accommodates from one to seven asynchronous devices, expandable in one- or two-port increments. The twinaxial port supports a 38.4K bps transmission rate.

InterLynx/5251 provides configuration menus with help screens, which can be viewed on any personal computer or asynchronous display terminal. Workstation addresses are assignable on screen, allowing greater versatility. A cable-through feature allows synchronous devices to operate downstream from the protocol converter on the same twinaxial line.

### **Printer Adapters**

The following adapter products support communications between ASCII printers and local IBM midrange hosts over twinaxial cable or twisted pair wire. More information about each adapter can be found in Table 3.

**InterLynx 4000/Twinax** provides feature-by-feature emulation of IBM's 3812, 5219, 5224, 5225, 5256, or 4214 printer for an ASCII line or laser printer, allowing it to communicate with an IBM System/3X or AS/400 host. An asynchronous port allows dynamic sharing of a printer between the synchronous host and an asynchronous device or system.

**Malibu/Twinax** provides feature-by-feature emulation of an IBM 5219, 5224, 5225, 5256, or 4214 model printer for a single ASCII printer, enabling communications with an IBM System/3X or AS/400 host. An asynchronous port allows sharing of the printer between the synchronous computer and an asynchronous device or system.

**Newport/Twinax** installs into the I/O slot of a Hewlett-Packard LaserJet Series II or IID printer, for communications with an IBM System/3X or AS/400 host. This adapter supports all LaserJet options, while providing access to the entire range of ASCII printer commands and functional capabilities.

### **Personal Computer Software**

**TruLynx/400** software, used in conjunction with the InterLynx/400 protocol converter, provides an IBM-compatible PC running IBM's PC Support/400 software with full access to an IBM AS/400 host. AS/400 PC Support controls character translation, keyboard mapping, and screen attributes. "Hot-key" access to as many as five concurrent sessions, plus a DOS session, is supported, along with features such as virtual disk, virtual printer, message passing, and file transfer. Automatic error detection and retransmission, data compression, and auto-dial/auto-answer capability are also provided.

**TruLynx/5251-PC Software** provides 5251 display terminal emulation for a personal computer connected to an Andrew protocol converter for IBM midrange systems. TruLynx/5251-PC also supports file transfer capability through IBM's PC Support/3X or File Support Utility software products. All communications parameters, including baud rate, data and stop bits, and display

translations, are user defined. Additionally, TruLynx/5251 allows customization of the keyboard layout. A "hot key" feature permits switching between emulation mode and DOS. Error detection and correction, signal monitoring and diagnostics, and auto-dial/auto-answer capability are also supported.

**Transmission Specifications**

This section provides transmission- and connection-related information for Andrew's protocol converters. For detailed information about the display terminal and printer adapters, see Tables 1, 2, and 3.

**DataLynx/3174** provides two RS-232-C/V.24-compatible synchronous channels, which are configurable as DCE or DTE connections; one RS-232-C/V.24-compatible port for a local or remote asynchronous host, and from four to 32 serial RS-232-C/V.24-compatible ports for local or remote devices. Each connection supports user-selectable transmission rates from 110 to 19.2K bps. DataLynx/3174 emulates an IBM 3174 SNA or BSC controller.

**DataLynx/3780** provides one RS-232-C/V.24-compatible synchronous channel and two RS-232-C/V.24-compatible ports for local or remote asynchronous devices. Each connection allows a maximum transmission rate of 19.2K bps. Emulating IBM's 3780, 2780, 2770, and 3741 protocols, DataLynx/3780 connects to a remote BSC host over a leased line or dial-up connection, or to a local BSC host through an integral modem eliminator. The unit provides CRC-16 error detection and correction.

**InterLynx/5251** provides one twinaxial interface to a local IBM midrange host (or an IBM Model 5251 or 5294 Workstation Controller), supporting a maximum transmission rate of 38.4K bps. InterLynx/5251 also supports up to four serial RS-232-C and three parallel Centronics device ports, each configurable as a DCE or DTE connection.

**DataLynx/5294** supports two RS-232-C/V.24-compatible channels, each configurable as DTE or DCE connections, for communications with an IBM System/3X or AS/400 host at data transmission rates of up to 19.2K bps. Emulating an IBM 5251 Model 12 Workstation Controller, DataLynx/5294 supports up to 32 RS-232-C/V.24-compatible asynchronous ports for local or remote devices.

**InterLynx/400** provides one twinaxial interface for communications with an IBM AS/400 host or an IBM Model 5251 or 5294 Workstation Controller at a maximum data transmission rate of 19.2K bps. InterLynx/400 also supports up to four serial RS-232-C/V.24-compatible and three parallel Centronics ports for local or remote asynchronous devices.

**Pricing**

Andrew offers a 1-, 2-year warranty for hardware products, and a 90-day warranty for software products. Hot line support and factory service, which are provided freely during the warranty period, can be extended through factory maintenance agreements. The following section lists the purchase prices and maintenance agreement charges for the products covered in this report.

**Equipment Prices**

	Purch. Price (\$)	Annual Maint. (\$)
<b>Protocol Converters</b>		
DataLynx/3174 (with 4 device ports)	3,000	400
4-port upgrade kit for DataLynx/3174	1,095	—
8-port upgrade kit for DataLynx/3174	2,200	—
DataLynx/3780	1,445	175
DataLynx/5294 (with 4 device ports)	2,000	300
4-port upgrade kit for DataLynx/5294	1,000	—
8-port upgrade kit for DataLynx/5294	2,000	—
InterLynx/400 (with 4 device ports)	2,900	325
2-port upgrade kit for InterLynx/400	700	—
InterLynx/5251 (with 4 device ports)	2,500	275
2-port upgrade kit for InterLynx/5251	600	—

	<b>Purch. Price (\$)</b>	<b>Annual Maint. (\$)</b>
<b>Display Terminal and Printer Adapters</b>		
InterLynx/3278	995	125
VersaLynx/3278 (standard version)	595	100
VersaLynx/3278 (deluxe version)	645	100
InterLynx 3000/Coax	1,295	125
InterLynx 4000/Twinax	1,295	130
Laguna/Coax	695	125
Malibu/Coax	995	125
Malibu/Twinax	995	125
Newport/Coax	895	100
Newport/Twinax	895	100

## Software Prices

	<b>Purch. Price (\$)</b>	<b>Annual Maint. (\$)</b>
<b>Personal Computer Software</b>		
TruLynx/400 (free with the purchase of InterLynx/400)	0	100
TruLynx/3270-PC	195	100
TruLynx/5251-PC	150	100

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# Andrew/KMW Protocol Converters

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**Product Summary****Editor's Note**

In November 1989, KMW Systems was acquired by Andrew Corporation. Now known as Andrew/KMW, the vendor recently released the very first Macintosh II-resident gateway, linking an entire AppleTalk network to an IBM midrange host.

**Description**

Andrew/KMW offers a complete line of asynchronous-to-synchronous protocol conversion products that accommodate displays, printers, IBM-compatible and Macintosh personal computers, minicomputers, and a variety of other devices.

**Strengths**

NetAxxess is an economical alternative to equipping multiple Macintoshes with emulation boards. Andrew/KMW's TwinAxxess Series II and Series III products accommodate traditional asynchronous devices, as well as Macintosh computers.

**Limitations**

Personal computers running Andrew/KMW's terminal emulation software and connected to Andrew/KMW's TwinAxxess Series II and III protocol converters have only single-session capability. Board-level solutions offered by IDEAssociates and other vendors offer up to seven concurrent sessions.

**Competition**

IBM, Micom Systems, Wall Data, IDEAssociates, and others.

**Vendor**

Andrew/KMW Systems  
6034 W. Courtyard Drive  
Austin, TX 78730  
(512) 338-3090  
In Canada:  
Atelco Inc.  
55 Renfrew Drive  
Markham, ON L3R 8H3  
(416) 479-8590

**Prices**

NetAxxess sells for \$3,995. Series II products equipped with one device port cost from \$1,295 to \$3,995. Series III products sell for \$1,295.

# Analysis

## Product Strategy

KMW was founded in 1971 to market graphics processors for engineering graphics applications. Early in the evolution of the company, however, the vendor recognized the need for an IBM-compatible synchronous transmission scheme. Developments in this technology led to the introduction of the company's first protocol converter in 1977. Andrew/KMW is generally recognized as the first vendor of protocol converters.

Andrew/KMW offers a complete line of protocol conversion products for both IBM midrange and mainframe environments, although the products for midrange systems form the vendor's flagship product line. For communications between an IBM midrange host and up to seven local or remote asynchronous devices, including display terminals, IBM-compatible and Macintosh personal computers, printers, and minicomputers, Andrew/KMW markets the TwinAccess Series II protocol converter. Introduced in February 1990, NetAccess is the vendor's newest and most advanced midrange system product for the Macintosh. NetAccess transforms a Macintosh II into a gateway

that links an entire AppleTalk network to an IBM AS/400 or System/3X host. At the time of this writing, NetAccess is the only such gateway available.

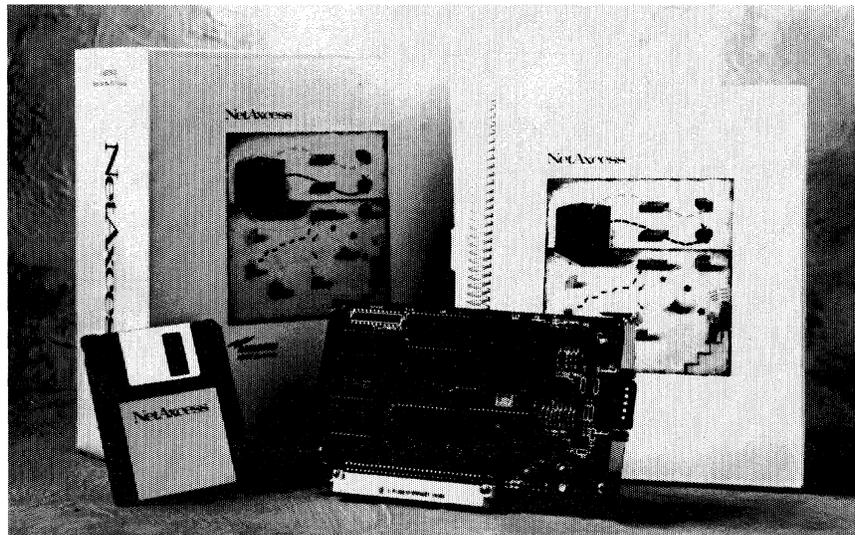
For linking up to eight asynchronous devices to an IBM mainframe, Andrew/KMW offers the Series II 3270, Series II 2780/3780, and Series II 3770 protocol converters. Series II 3270 provides emulation of an IBM 3X74 communications controller; Series II 2780/3780 and Series II 3770 emulate remote job entry workstations.

Andrew/KMW also offers protocol converters for individual devices. TwinAccess for the Mac II is a board-level product providing IBM Model 5251/5291 display terminal emulation. TwinAccess Series III is a smaller version of TwinAccess Series II providing one device port. Series III 3287/Coax is another compact unit providing IBM 3287 printer emulation for a single low-cost asynchronous output device, such as a printer.

Andrew/KMW also markets terminal emulation and file transfer software for personal computers using any of the midrange products.

The sale of protocol converters accounts for over half of Andrew/KMW's business. The vendor also markets the 8000 Series of IBM channel interfaces through its Auscom division. These devices allow IBM mainframes to interface with Ethernet and other "non-IBM" LANs. Appearing to the host as one or more IBM control units, an Auscom channel interface connects to an IBM byte or block multiplexer, selector, or FIPS-60 channel. The units are fully programmable, incorporate extensive diagnostics, and can recognize any subset of 256 subchannel addresses.

*The NetAccess card installs into a Macintosh II personal computer, enabling it to function as a gateway linking an entire AppleTalk network to an IBM midrange host.*



## Company Profile Andrew Corporation

### Corporate Headquarters

10500 W. 153rd Street  
Orland Park, IL 60462  
(708) 349-3300

### Officers

*President and CEO:* Floyd L. English  
*Senior Vice President:* George R. Forbes  
*Chairman:* Edward J. Andrew

### Company Background

*Year Founded:* 1937  
*No. Employees:* over 3,000

Andrew Corporation was founded 53 years ago by Victor J. Andrew, a physicist with a background in electromagnetic wave propagation. The company's initial focus was on directional antenna systems for AM broadcasters. In the 1940s, Andrew Corporation introduced microwave antenna systems and coaxial cable products for fixed and vehicular radio systems. The sale of these products to both military and commercial markets formed the bulk of Andrew's business through the mid-1980s.

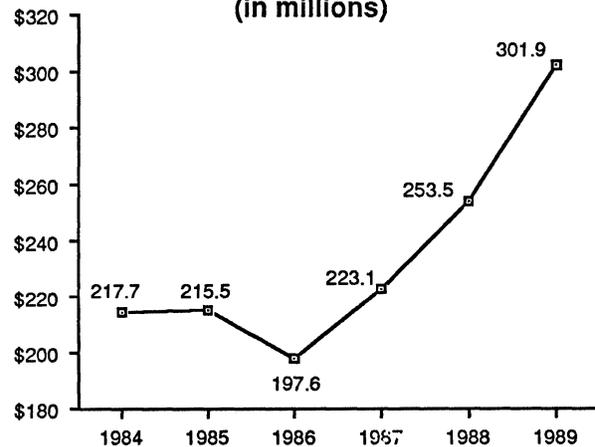
In 1985, Andrew suffered a substantial decline in sales. Recognizing that the organization's future success depended upon more product and market diversity, Andrew began an aggressive campaign to seize hold of new government and military markets for its existing

products; to acquire businesses that complement its own marketing and engineering strengths; and to enter the corporate communications world, providing new products and services supporting local area networks, protocol conversion, and the integration of voice, data, and video.

In 1987, the vendor acquired Local Data, a leading designer and manufacturer of communications products linking asynchronous equipment to IBM synchronous systems, and providing gateways to LANs, data PBXs, and packet switched networks. In November 1989, Andrew purchased KMW Systems Corporation. Finally, in April 1990, Andrew acquired Emerald Technology Inc., a developer of hardware and software products supporting communications between IBM midrange systems and DOS-based personal computers, UNIX-based systems, and Macintosh systems. KMW and Emerald Technology have provided Andrew with additional protocol conversion products and distribution capabilities, allowing further entry into new niches in the fast growing connectivity market.

Through these and other smaller acquisitions, together with aggressive funding of product development and marketing,

**Annual Sales**  
(in millions)



Andrew is applying its communications expertise to local area networks and other communications environments; the vendor is thus moving deliberately downstream, closer to the end user.

### Business Overview

Andrew Corporation is a multinational company offering a broad line of electronic communications products and systems to commercial, government, and military customers. Its markets are driven by the need for products that enhance the ability to communicate on a global basis. Organized into functional operating groups, Andrew focuses on three major market areas.

*The Commercial Products Group* serves cellular, land mobile, common carrier, and broadcast markets with complete communications systems composed of terrestrial microwave and satellite earth station antennas, coaxial cable, waveguides, towers, and shelters.

*The Government Products Group* markets radar and

communications reconnaissance systems, direction finding systems, weather navigational radar antennas, positioners, cable, and waveguide products.

*The Network Products Group* provides connectivity solutions critical to the efficient connection of incompatible computers and peripherals. The constantly expanding product line of this division of Andrew Corporation includes token-ring products, protocol converters, gateway devices, image processors, coaxial multiplexers, and channel interfaces.

### Financial Profile

Sales for 1989 rose 19.1 percent over the previous year, reaching a record \$301.9 million. This sales increase was across the board, with businesses in all markets, except defense electronics, recording good gains. Net income reached \$16.2 million, an improvement of 16.8 percent over 1988, and earnings per common share were \$1.62, up 15.7 percent from the previous year.

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► *(Analysis continued)*

In addition to protocol converters and IBM channel interfaces, Andrew/KMW offers a comprehensive line of raster (pixel) graphics products. These products convert line segments, text, and other graphics information into pixel format—a process normally handled by a mainframe computer. By off-loading this conversion function to an Andrew/KMW graphics processor, users can free up host CPU time for more critical tasks. The graphics processor also supports the connection of input sources and hard copy output devices from many vendors.

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### Competitive Position

For years, the market has been saturated with feature-competitive asynchronous-to-synchronous protocol conversion products for the 3270 environment. Many vendors, including Andrew/KMW, are therefore shifting their emphasis to connectivity products for IBM's AS/400 computer, which has rapidly grown in popularity since its introduction in June 1988. At the same time, the widespread proliferation of the Apple Macintosh computer has created a strong demand for protocol converters linking Macintoshes to IBM midrange hosts.

Multiport protocol converters for the 3270 environment competing with those of Andrew/KMW include IBM's 7171 ASCII Device Attachment Control Unit, Micom Systems' MB3 protocol converter, Telematics International's SmartNet 276 (formerly marketed by Protocol Computers Inc., which has been acquired by Telematics), and Wall Data's DCF II/3270.

For IBM midrange connectivity, Andrew/KMW's TwinAccess Series II protocol converter vies with IBM's 5208 ASCII-5250 Link Protocol Converter, Telematics International's SmartNet 5250/T, and Wall Data's DCF II/5250. Of these competing products, however, SmartNet 5250/T is the only one supporting terminal emulation and file transfer capability for an attached Macintosh personal computer.

Like Andrew/KMW, Emerald Technology and IDEAssociates offer board-level products providing a direct host connection to an individual Macintosh. Emerald Technology, also recently acquired by Andrew Corporation, offers MacTwin,

which provides IBM 5250 display terminal emulation to a Macintosh SE or Macintosh II. The price of MacTwin is \$995 for SE models, and \$1,095 for the Macintosh II family. IDEAssociates markets IDEAcomm Mac, a product for the Macintosh II or Macintosh SE that provides emulation of either an IBM Model 3180 or 3196 display terminal, or an IBM Model 5224, 5225, or 5256 printer. IDEAcomm Mac for the Macintosh SE sells for \$995; the Macintosh II version sells for \$1,195.

Andrew's Series III protocol converters are single-port, standalone units marketed as alternatives to board-level products, which take up valuable space within a personal computer and require special installation.

Andrew/KMW has made substantial gains in the protocol conversion market by offering its products through OEMs and distributors. As a result of its presence in the specialized market for graphic element processors, which are used for engineering graphics applications, the company also has an especially strong reputation in engineering and industrial environments.

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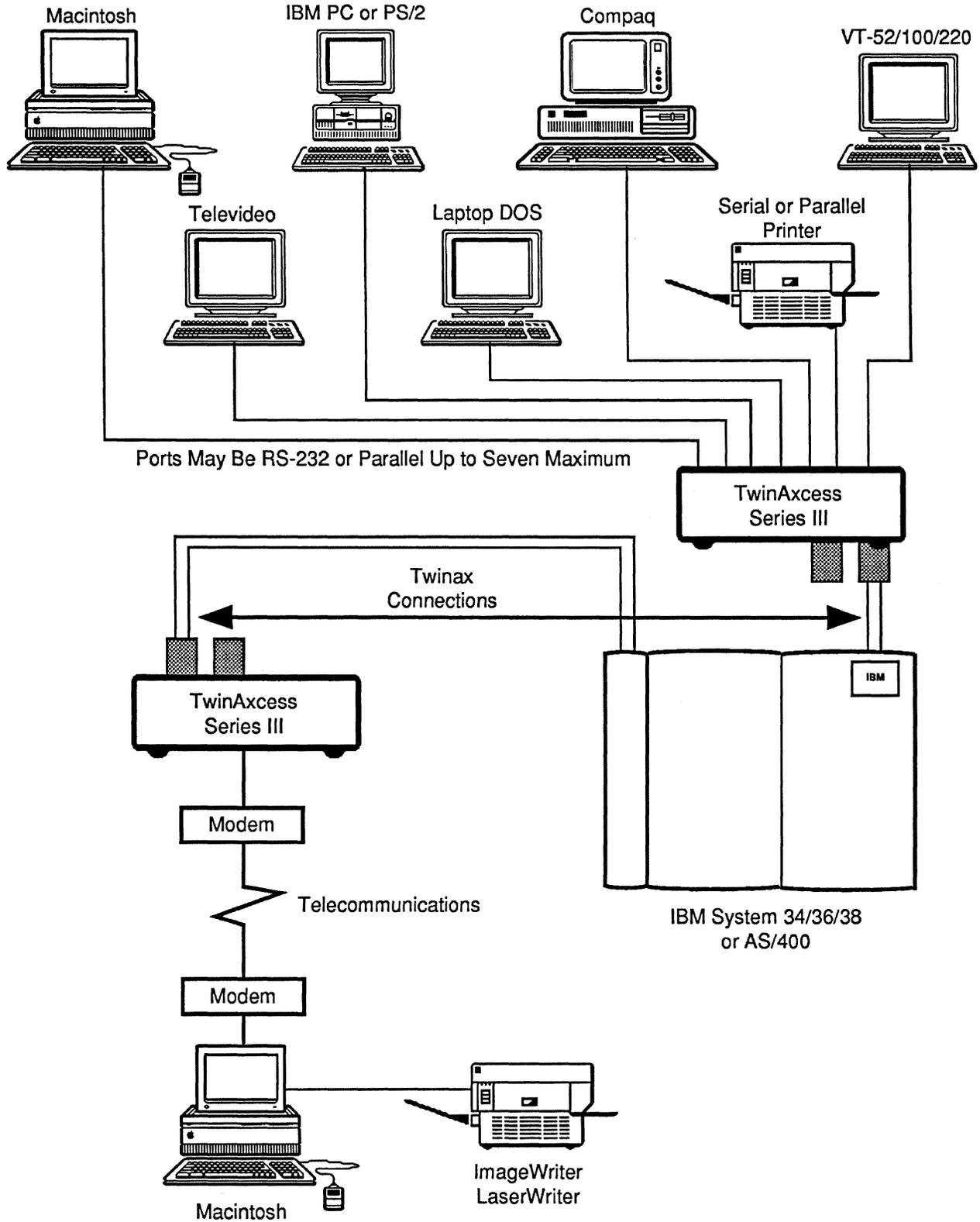
### Decision Points

Andrew/KMW is known for the reliability of its products and the high-quality service it provides to its customers. An innovative company with a strong engineering orientation, Andrew/KMW is prepared to offer customized equipment upon request.

NetAccess, the only System/3X- or AS/400-to-AppleTalk gateway currently available on the market, provides a much more economical alternative to purchasing individual adapter cards for multiple Macintosh personal computers. Andrew/KMW's Series II and Series III TwinAccess protocol converters provide greater versatility by accommodating both IBM-compatible PCs and Macintosh personal computers. The NetAccess and TwinAccess products give Andrew/KMW a strong foothold in the multivendor networking market.

Andrew/KMW's Series III units offer two main advantages over traditional board-level terminal emulation products for personal computers: they do not occupy valuable PC card slot space, and they allow full remote dial-in capability—an option that is not feasible on board-level products.

Figure 1.  
Andrew/KMW's TwinAccess Protocol Converters



*TwinAccess Series II accommodates up to seven local or remote asynchronous devices, including IBM-compatible and Macintosh personal computers, display terminals, and serial or parallel printers. TwinAccess Series III is a one-port version of the TwinAccess Series II unit.*

Unlike adapter cards, the Series II units work with a wide range of devices.

A weakness of the TwinAccess Series II and Series III products, however, is the limit of one host session for attached personal computers running Andrew/KMW's terminal emulation software. Although IBM's AS/400 PC Support software, used in conjunction with IBM's Enhanced 5250 Emulation Adapter, requires a great deal of memory and can cost thousands of dollars, it supports up to five concurrent host sessions and a variety of advanced capabilities. Board-level emulation products for the Macintosh marketed by IDEAssociates and Emerald Technology provide seven-session capability for as little as \$995. Adapter cards for the IBM-compatible PC marketed by IDEAssociates, Emerald Technology, and a host of other vendors offer seven-session capability for less than \$900.

## Characteristics

### Models

The following tables list the announcement and release dates for each of the products covered in this report.

#### Protocol Converters for the IBM Midrange Environment

Product	Date Announced	Date Released
NetAccess	November 1989	February 1990
TwinAccess for the Mac II	June 1989	October 1989
TwinAccess Series II and Series III	June 1980	June 1981

#### Protocol Converters for the IBM 3270 Environment

Product	Date Announced	Date Released
Series II 2780/3780	October 1981	October 1981
Series II 3270	October 1981	October 1981
Series II 3770	October 1981	October 1981
Series III 3287/Coax	September 1987	

### Terminal Emulation and File Transfer Software

Product	Date Announced	Date Released
TwinAccess LINK	June 1989	May 1990
5250 Software Program	*	*
Emulator Transfer Utility (ETU)	1983	1983

\*Information not available.

## Products for the IBM Midrange Environment

### Protocol Converters

**NetAccess** is a combination of hardware and software that transforms a Macintosh II personal computer into a gateway that links an entire AppleTalk network to an IBM midrange host. Macintosh workstations appear as IBM Model 5251, 5291, 5292, 3196, 3197, or 3180 display terminals. Apple printers running on the network emulate IBM Model 5224, 5225, or 5256 printers.

The hardware component of NetAccess is a card that installs into one of the Macintosh II gateway's internal slots. Each card provides seven ports for Macintosh computers and one twinaxial interface to an IBM midrange host. A Macintosh II or IIx configured as a gateway can support up to five NetAccess cards, while a Macintosh IIcx or IIci can accept up to two cards. Multiple cards in a single gateway, or multiple gateways within an Apple Macintosh network, allow access to several IBM hosts from any attached Macintosh workstation. Host links support synchronous data transmission speeds up to 19.2K bps.

NetAccess software running in each Macintosh computer on the network provides windowing capability, terminal emulation, and accessories for the Macintosh Control Panel and Chooser.

Macintosh users have simultaneous access to up to seven IBM midrange host applications and any number of Macintosh-resident applications. Sessions can be viewed either together in overlapping windows or individually on full screens. Using the Macintosh's Notepad, users can copy both text and spreadsheet information from Macintosh to IBM host applications. (Copying in the reverse direction, however, is not allowed.) Using standard Macintosh system components such as the Chooser and the Control Panel, users can switch between multiple IBM host gateways, select any of several Apple printers, graphically manipulate complex IBM configurations, and customize window appearances.

NetAccess also provides a HyperCard Application Programming Interface (API) that allows host interaction sequences to be simplified and automated. Emulator Transfer Utility (ETU), an optional utility program that runs on the IBM host, supports file transfer between IBM and Macintosh systems.

**TwinAccess for the Mac II** is a board-level product that can be installed in any member of the Macintosh II family, allowing it to attach directly to an IBM midrange host over twinaxial cable. Providing IBM Model 5251 or 5291 display terminal emulation, TwinAccess for the Mac II supports up to seven concurrent IBM host sessions while allowing any number of Macintosh-resident sessions. IBM manipulation of data within Macintosh software programs, such as Excel or MacWrite, is also possible. File transfer capability is supported by the host-resident Emulator Transfer Utility. Built-in diagnostics capability and Apple printer support are standard features of the unit. TwinAccess for the Mac II supports data transmission rates up to 19.2K bps.

**TwinAccess Series II** protocol converter allows up to seven asynchronous display terminals and printers, including Apple printers, to emulate IBM 5251 display terminals and IBM 5225/5256 printers, for communications with an IBM midrange host. TwinAccess Series II also provides single-session host access to IBM-compatible PCs running Andrew/KMW's 5250 Software Program, and Macintosh personal computers running the vendor's TwinAccess LINK terminal emulation software.

The standard unit includes one serial RS-232-C device port configured as a DCE channel. A modem eliminator for the standard device port, additional RS-232-C ports for local or remote devices, and parallel interfaces (Centronics or Dataproducts) are available options. TwinAccess Series II provides one twinaxial interface for a local IBM midrange host connection and an RS-232-C port, configured as a DCE channel, for communications with a remote IBM host, a data PBX, or an AppleTalk or DECnet network.

TwinAccess Series II provides built-in diagnostics capability. The unit also allows transmission of untranslated IBM data to an attached printer to take advantage of special printer functions.

**TwinAccess Series III** is a miniaturized version of TwinAccess Series II providing one device port. This protocol converter is marketed as an alternative to board-level products, which take up valuable space in personal computers.

**Terminal Emulation and File Transfer Software Emulator Transfer Utility (ETU)**, developed by Emerald Technology (another division of Andrew Corporation), is host-resident software providing file transfer and data translation between the host and an asynchronous device connected to one of Andrew/KMW's protocol converters for IBM midrange systems. Different versions of ETU are available for System/36, System/38, and AS/400 hosts.

**The 5250 Software Program** runs on an IBM-compatible PC attached to a TwinAccess Series II or Series III protocol converter. This software provides

IBM 5250 display terminal emulation, simultaneous access to one IBM midrange host session and one PC-resident application, and automatic error detection and correction. Printer pass-through allows a PC-attached printer to be addressed as an IBM printer by the host. An application program interface (API) included in the software works in conjunction with the Emulator Transfer Utility (ETU) for file transfer.

**TwinAccess LINK** provides single-session 5250 display terminal emulation for any member of the Macintosh family connected to a TwinAccess Series II or Series III protocol converter. Features of this product included automatic error detection and correction; file transfer capability when used with ETU; printer pass-through for either an Apple ImageWriter or a LaserWriter attached to the Macintosh; copy and paste capability; color support on the Macintosh II; support for 5250 special keys through pull-down menus; and modifiable screen attribute and keyboard tables.

### Products for IBM Mainframe Systems

**Series II 2780/3780** emulates an IBM 2780/3780 remote job entry workstation, allowing up to eight attached asynchronous devices to communicate with an IBM 3270 host using the BSC protocol. Input devices such as digitizers and magnetic tape units appear to the host as IBM card readers. Output devices such as printers and pen plotters appear to the host as IBM line printers or card punches. Dynamic switching for devices with dual input/output capability (e.g., displays and minicomputers) allows them to appear either as card readers for data input, or line printers or card punches for data output.

Series II 2780/3780 provides automatic logon capability, and optionally supports an operator console. Built-in diagnostics capability supports troubleshooting of system components such as PROM, RAM, and I/O circuits, and the monitoring of test data transmission to peripheral devices. A setup mode allows definition of host session and asynchronous device parameters. Host session parameters include logon information, buffer size, and data transmission rate; device parameters include device type, input mode, output mode, character framing, data flow control, and data transmission rate. Setup data can be stored permanently in EEPROM.

**Series II 3270** allows attachment of up to eight asynchronous devices, including displays and printers, pen plotters, microcomputers emulating displays, and minicomputers, to an IBM 3270 host using the BSC or SNA/SDLC protocol. The Series II 3270 appears as either an IBM SDLC 3274 or BSC 3271 Control Unit with attached IBM Model 3278 displays and IBM Model 3287 printers.

Devices and processors can be supported through as many as eight serial RS-232-C and/or parallel Centronics interfaces. By attaching printers to displays, however, two devices can be supported using a single port.

In addition to emulating all standard 3278 functions, Series II 3270 supports a scroll mode that allows keyboard printer devices to perform full-screen edit operations. Support for third party graphics software packages, including SAS, PVI, and ISSCO, allows full screen emulation for data processing applications and an automatic transparent mode for full color graphics. Like Series II 2780/3780, this unit provides diagnostic capability and a menu-driven setup mode.

**Series II 3770** emulates either an IBM 3776 (Model 3 or 4) or 3777 (Model 3) remote job entry workstation, allowing up to eight attached asynchronous devices to communicate with an IBM 3270 host using the SNA/SDLC protocol. The unit treats input and output devices the same way as the Series II 2780/3780.

Series II 3770 provides duplicate character compression, support for an operator console, NRZ or NRZI line formats, and automatic logon capability. Like Series II 3270, the unit provides built-in diagnostic capability and a menu-driven setup mode.

**Series III 3287/Coax** provides IBM 3287 Model 1 or 2 printer emulation for a single low-cost asynchronous output device such as a printer or plotter, for communications with an IBM 3270 host via a 3X74 communications controller.

The front panel of Series III 3287/Coax includes an LCD display, which provides access to a series of setup options. The panel provides control over print functions such as PA1, PA2, cancel print, and reprint; it also includes indicator lights for monitoring the status of the unit. Device testing and resetting to default parameters are other supported functions.

Series III 3287/Coax offers built-in diagnostics capability, including PROM and RAM checks, and testing of I/O circuits and other system components. A

transparency mode allows output of untranslated data, so that special features of an output device can be used directly.

#### Device and Host Interface Options

Each standard Series II unit provides one serial RS-232-C device interface and one serial RS-232-C host interface, both configured as DCE channels. Series III 3287/Coax provides one Type A coaxial connection to an IBM 3X74 communications controller and one RS-232-C port for a remote device. For RS-232-C interfaces, optional model eliminators are available.

For Series II units, additional RS-232-C interfaces for local or remote devices as well as parallel interfaces (Dataproducts and Centronics) are available.

The Series II and Series III protocol converters for IBM mainframe systems support user-selectable data transmission speeds up to 19.2K bps for both devices and host connections. IBM CRC-16 error checking and correction over the host link is a standard feature of all these units. A V.35 host interface supporting 56K bps transmission is optionally available for the Series II 3770/Coax product.

#### Pricing

NetAxxcess and TwinAxxcess products come with a one year warranty; all protocol converters for the 3270 environment remain under warranty for 90 days. For factory service beyond the warranty period, Andrew/KMW offers a "Hot Spare Agreement," which provides overnight mail delivery of a spare protocol converter. The following section lists the purchase prices and annual factory service agreement charges for each product.

## Equipment Prices

	Purchase Price (\$)	Annual Maint. (\$)
<b>Products for IBM Mainframe Systems</b>		
Series II 2780/3780		
With 1 device port	1,995	395
With 3 device ports	2,595	395
With 5 device ports	3,495	495
With 8 device ports	4,395	495
Series II 3270		
With 1 device port	1,295	395
With 3 device ports	1,895	395
With 5 device ports	2,795	495
With 8 device ports	3,695	495
Series II 3770 (equipped with the standard 19.2K bps host interface)		
With 1 device port	2,995	395
With 3 device ports	3,595	395
With 5 device ports	4,495	495
With 8 device ports	5,395	495

	<b>Purchase Price (\$)</b>	<b>Annual Maint. (\$)</b>
<b>Products for IBM Mainframe Systems (Continued)</b>		
Series II 3770 (equipped with the optional 56K bps host interface)		
With 1 device port	3,995	395
With 3 device ports	4,595	395
With 5 device ports	5,495	495
With 8 device ports	6,395	495
Series III 3287/Coax	1,295	195
<b>Products for IBM Midrange Systems</b>		
NetAccess (includes one interface card, gateway software, and emulation software)	3,995	(1)
TwinAccess Series II		
With 1 device port	1,695	395
With 2 device ports	1,995	395
With 7 device ports	3,595	195
TwinAccess Series III	1,295	195
TwinAccess for the Mac II	1,095	(1)

(1) At the time of this writing, maintenance terms for this product had not been finalized.

## Software Prices

	<b>Purchase Price (\$)</b>
Emulator Transfer Utility (file transfer software)	
For an IBM System/36 host	500
For an IBM System/38 host	800
For an IBM AS/400 host	950
5250 Software Program (terminal emulation software for the IBM-compatible PC)	No charge
TwinAccess LINK (terminal emulation software for the Macintosh)	150 per copy

