

Netlink SNA_Gate

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Product Summary

Editor's Note

Protocol conversion systems evolved to support communications between IBM (synchronous) and non-IBM (asynchronous) environments. Protocol converters allow the use of less expensive, asynchronous peripheral devices for communications with an IBM host, and help integrate otherwise incompatible systems, thus protecting a user's investment in hardware and software.

Description

Netlink's SNA_Gate allows conversion between systems employing async and IBM BSC protocols, and an IBM SNA/SDLC environment. The unit emulates an IBM PU Type 2 cluster controller and accommodates up to 255 non-SNA devices.

Strengths

SNA_Gate is a versatile product that can function as a protocol converter, a cluster controller, a line concentrator, and a remote job entry station facility.

Limitations

The unit supports only one IBM host via a 37X5 communications controller. Controllers marketed by IBM, Apertus Technologies, AT&T, and Memorex/Telex support multiple IBM and asynchronous hosts without the aid of a 37X5.

Competition

IBM, Apertus Technologies, AT&T, and Memorex/Telex.

Vendor

Netlink, Inc.
 3214 Sprint Forest Road
 Raleigh, NC 27604
 (919) 878-8612

Prices

The async/bisync 3703-1 ranges in price from \$7,000 to \$9,500; the 3703-1A, asynchronous-only model ranges from \$4,000 to \$8,000; and the 3703-1B, bisynchronous-only model costs between \$5,250 and \$6,000. Netlink offers quantity discounts.

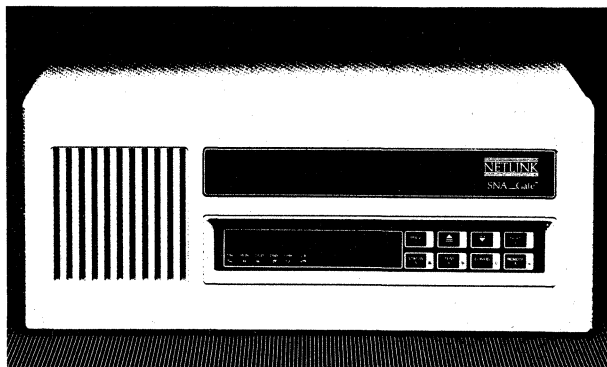
—By *Martin Dintzis*
Assistant Editor

Analysis

Product Strategy

The history of Netlink began nine years ago in Australia when a former employee of IBM, Paul Wood, established a company called Systems Technology Pty, Ltd. In 1982, Wood introduced the company's first product, the 3703 Network Processor. The product achieved so much success that European and American distributors (such as Codex) signed agreements to market 3703 technology. (Codex sells and services SNA_Gate under the name 4255 SNA Gateway.) After the success of the first product, Wood established Netlink, Inc. in 1984 to expand the development of SNA technology in the United States. Netlink now manufactures SNA_Gate, the successor to the 3703 in Raleigh, NC. The company also markets SNA_Hub network concentrator, which is Netlink's alternative to a remote IBM 3720.

SNA_Gate is Netlink's answer to environments in which bisynchronous and asynchronous devices exist within an SNA network. Although called a gate, the unit does not function as a gateway between networks. Rather, SNA_Gate is actually an IBM Physical Unit Type 2 (PU.T2) cluster



Netlink's SNA_Gate allows asynchronous and bisynchronous devices to access Systems Network Architecture (SNA).

controller and a multifunction protocol converter in one device, connecting non-SNA devices to SNA networks. The specific equipment supported includes bisync 3270 and 3780/2780 devices, bisync hosts and minicomputers, and all asynchronous devices. The product has its own Intel 8086 microprocessor and memory, and functions as a software-based system, accommodating a number of different protocols in the SNA network.

SNA_Gate connects to the host through an IBM 37X5 or compatible control unit running any version of IBM's Network Control Program (NCP). Connection to the control unit occurs either directly or through a modem. Netlink's Network Support Program (NSP) provides downline load and upline dumping capabilities for network control information and status displays. Users can configure operating parameters through macros in NSP, which runs under MVS and DOS operating systems. SNA_Gate also supports IMS, CICS, TSO, and RJE (JES2, JES, and POWER), and operates under IBM's network management products.

SNA_Gate supports five basic software modules for various types of emulation. The product supports a modular software structure that conforms to that of SNA. The *Asynchronous Communications Module* allows ASCII devices to work as LU Type 0, Type 1, or Type 2 equipment in an SNA network. This module also supports access to RJE packages, and a "swap-on-bind" command allows a user to log on to a Type 2 device and then switch to a Type 1 device and reverse the process. An *RJE Station Facility* allows SNA_Gate to act as a multiple logic unit (MLU) RJE station. A *Bisynchronous Communications Module* maps BSC protocols to SNA and allows IBM 2770, 2780, 3275, 3780, 3741, 3271, 3174, 3274, 3275, and 3276 devices to access an SNA host. An optional *Burroughs Poll Select Module* allows Burroughs TD 830 terminals to emulate LU Type 2 devices with TD 830 limitations, and TC 4000 printers to emulate LU Type 1 units. This module also provides a Burroughs terminal-to-host upstream pass-through capability that allows the user to log on to either an IBM or Burroughs host.

Competitive Position

The need for communications across IBM's broad range of communications protocols, and conversion between IBM and non-IBM environments,

Company Profile Netlink, Inc.

Corporate Headquarters

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Raleigh, NC 27604
(919) 878-8612

Officers

President and CEO: Steve
McRae

*Vice President, Strategic
Planning:* Paul Wood
Director of Engineering:
Don Bouchard

Company Background

Netlink, Inc. is a company dedicated to providing enhanced multivendor connectivity and systems management solutions for

SNA data communications networks, thereby creating competitive advantages for its customers.

The company, originally known as Systems Technology Pty, Ltd., was founded in 1979 by Paul Wood, who had previously worked with IBM in the design and performance evaluation of SNA networks using advanced simulation techniques. Like Wood, other Netlink executives possess extensive career experience with IBM, in the development and marketing of

SNA-related communications products, and in the computer industry in general.

Initially, Systems Technology consulted on major SNA networking installations. In 1982, Wood released the firm's first product, the 3703 Network Processor. The success of this early protocol conversion product enabled the company to build distribution and OEM relationships across the United States and in Europe. In 1984, Wood established Netlink, Inc. through the backing of major venture capitalists, including Citicorp, Accel Partners, and Morgan Holland.

More recent hardware products released by the

vendor include SNA_Gate, an advanced network interface that allows non-SNA devices to communicate with SNA networks, and SNA_Hub, which enables multiple SNA devices to communicate over shared, high-speed host trunks. Netlink's SN/View mainframe software works with IBM's NetView to provide increased levels of network management in concentrated device environments.

Netlink has established itself as a leading international provider of SNA interconnections and transport facilities. The company has also signed strategic relationships with major computer and communications suppliers.

continues to drive a strong market for protocol converters. One trend in recent years, however, has been away from processors specializing in a single type of conversion (e.g., ASCII/ANSI display to IBM 3278 display) to intelligent communications controllers capable of transparently linking IBM BSC and SNA 3270, asynchronous host, token-ring LAN, and other environments concurrently. IBM, AT&T, Memorex/Telex, and Apertus Technologies (formerly known as Lee Data, which was renamed after being purchased by Intelligent Information Systems) currently offer IBM-compatible communications controllers supporting this level of integration.

IBM dominates the protocol conversion market with the 3174 Establishment Controller. Although IBM continues to market the 7171 Protocol Converter and the 3708 Network Conversion Unit, which accommodate a greater variety of devices through customizable tables, the vendor has clearly

positioned the 3174 as its flagship protocol conversion product for the years to come.

Netlink's customers include end users who need gateway service to the SNA network, and manufacturers that want to incorporate their products into the SNA market.

Netlink has earned a successful reputation abroad and is attaining a reputation domestically as a responsible company with reliable devices, but the struggle for dominance in the SNA environment has become tougher since IBM has such a strong market presence in the U.S. End users with a mixed bag of protocols who have chosen SNA_Gate, however, are quick to recommend the device.

Decision Points

Netlink's SNA_Gate is a versatile product that can act as a protocol converter, a cluster controller, a line concentrator, and a remote job entry station facility. The unit provides multiple protocol conversions, including concurrent asynchronous and bisynchronous to Systems Network Architecture (SNA). SNA_Gate emulates an IBM Physical Unit Type 2 cluster controller, providing a gateway to the IBM SNA/SDLC environment.

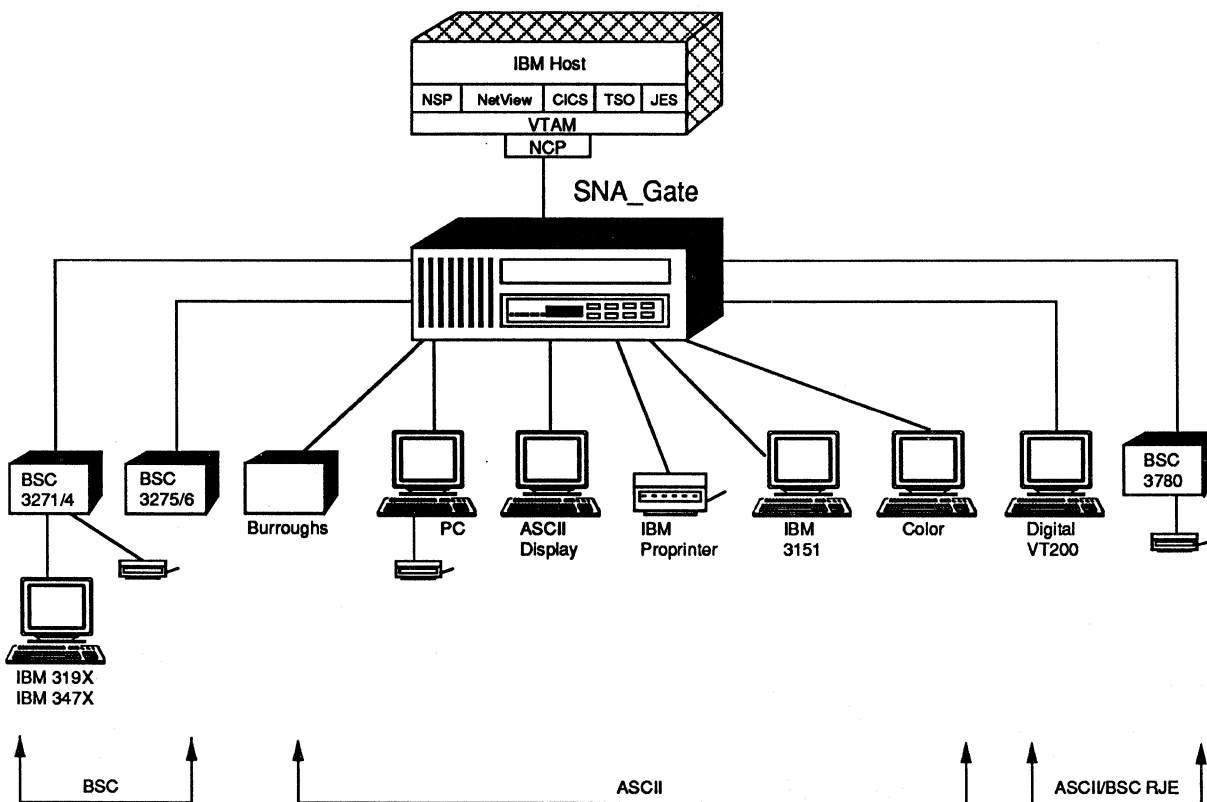
SNA_Gate supports direct, leased, multi-drop, and dial-up lines. The unit eliminates separate communications lines and host front-end ports for non-SNA devices. It also eliminates host/front-end processor support facilities, such as EP and NTO, for non-SNA devices. The product's capability for being softloaded and centrally managed

makes it especially attractive. The softloading feature of SNA_Gate allows a user to configure and reconfigure downstream resources without affecting VTAM and NCP.

SNA_Gate performs various applications, such as providing an SNA gateway for ASCII terminals. In this configuration, SNA_Gate connects to a 3705 communications controller and acts as a local concentrator in the network. Terminals can attach directly or via modems on dial-up or leased lines, and terminal users can access multiple application sessions at one time through hot-key switching.

SNA_Gate also supports remote BSC-to-SNA protocol conversion. In this application, SNA_Gate attaches to the communications controller via a modem, and through a daisychain port, other SNA devices can share the line to the host. SNA_Gate can also function as a remote concentrator

Figure 1.
SNA—Gate Operating as a PU.T2 Cluster Controller



Operating as a PU.T2 cluster controller, SNA—Gate provides access to the IBM SNA environment for a variety of devices using asynchronous and IBM BSC protocols.

in which up to 16 lines, including dial-up terminals, can attach to an SNA host. By using SNA_Gate to concentrate lines, users can conserve ports on a communications controller or front-end processor and eliminate the need to multiplex and demultiplex datastreams at the local site. In addition, several SNA_Gates can be multidropped on the same line, allowing users to save a scanner or frame on the control unit.

SNA_Gate's software-based operation adapts to asynchronous protocols and a variety of BSC implementations, particularly older ones for which there are few conversion products. Many BSC devices operate differently from the IBM standard and, therefore, do not implement all functions. Because SNA_Gate is software driven, it is possible to overcome idiosyncrasies in the BSC protocol that can affect operation in the SNA network.

Users of BSC 3270 terminals attached to SNA_Gate can improve response times by upgrading the line speed from the controller to SNA_Gate. In addition, customers with data collection applications on remote minicomputers that support BSC 2780/3780 protocols can achieve significant reductions in the time required to transfer data into host computers.

Centrally controlled and loaded, SNA_Gate operates under IBM's network management programs. Since the unit accommodates multiple protocols downstream, users can achieve a pure SNA backbone in the network. A unique characteristic is its capability to allow a user to log on to an application through SNA_Gate as an LU Type 2 device, and switch to an LU Type 1 device. This feature allows interleaving operation in both interactive and batch modes.

SNA_Gate offers several advantages to the user in a typical IBM environment. Moving BSC processing to an SNA_Gate frees a significant number of 37X5 cycles for SNA processing, thereby making more efficient use of existing equipment. In applications in which incompatible terminals, such as an interactive 3270-type device and a remote RJE, perform input and high-speed output functions, SNA_Gate does not require incompatible datastreams from these devices to share a band-splitting or channelized modem. By converting both streams to SNA, SNA_Gate eliminates the need for an Emulator Program and a byte-multiplex channel, and reduces the number of ports needed on the control unit.

SNA_Gate also allows personal computers to dial into an SNA_Gate port and perform interactive and batch applications concurrently through a "swap-on-bind" command that supports switching back and forth from LU Type 2 to LU Type 1 operation. By accommodating multiple logical units (MLUs) through a single port, SNA_Gate enables the personal computer to be in session with TSO while JES is transmitting output data to a printer or disk file. In this application, the personal computer user logs on to TSO, CICS, or IMS as a 3270 display screen, and then logs on to JES to emulate an IBM 3777/3/4 terminal with MLUs.

SNA_Gate's support for PC-to-host file transfer allows PC users to transfer files into host applications, such as TSO or CICS, through popular PC-based file transfer programs. PC users can also transfer data directly into JES by emulating an RJE reader device.

By incorporating support for the Baudot Code into the product, Netlink has addressed the needs of customers who require only low-volume access to an SNA host. Without acquiring any more terminals, these users can now exchange messages with an IBM host by using their telex machines and inexpensive asynchronous modems.

SNA_Gate incorporates graphics support, allowing asynchronous terminals to access host-based graphics applications over a full-screen (LU.T2) session or a line-by-line LU.T1 session. Netlink based the graphics support on the requirements of the SAS/Graph program, but other graphics packages such as Tektronix Plot 10 can also use this feature. Devices supported include Tektronix 4010 terminals and 46XX plotters, HP 2600 display terminals, or any PC executing the SAS/RTERM terminal emulation program.

Two limitations of SNA-Gate are support for only one IBM SNA host connection, which must occur through an IBM 37X5 communications controller, and no access to asynchronous host environments. (Users, however, can still access multiple IBM hosts via 37X5 host attachment options and functions provided by the IBM host-resident software.) Newer communications controllers on the market not only support conversion between async, BSC, and SNA protocols, but provide multiple, direct connections to IBM and asynchronous hosts, and accommodate token-ring networks. These newer products include IBM's

3174 Establishment Controller, AT&T's 6544 Multifunction Communication Controller, Memorex' 1174 Network Controller, and Apertus Technologies' Datastar 5000 Communications System. The systems of AT&T, Memorex, and Apertus Technologies also support enhanced functionality for attached display terminals, such as windowing on multiple sessions.

For async-to-SNA conversion, however, SNA_Gate still excels in the number and variety of devices that can be accommodated. The largest 3174 models, for example, can accept a maximum of only 64 synchronous and 24 ASCII displays concurrently, and the 3174 supports only 29 different display terminal models; if a user has a display terminal that is not on the 3174 list, that terminal cannot connect to the SNA environment. SNA_Gate, on the other hand, supports up to 255 non-SNA devices of any kind.

Through software assistance, IBM's 3708 Network Conversion Unit, another async-to-3270 protocol conversion product, can be expanded to include any asynchronous device. Unlike SNA_Gate, however, the 3708 is limited to a maximum of 18 devices and cannot perform conversion of multiple protocols to SNA concurrently.

Characteristics

Models: 3703-1 (multifunction SNA_Gate); 3703-1A (asynchronous-only version); and 3703-1B (bisynchronous-only model).

Date of First Announcement: 1986.

Date of First Delivery: 1986.

Number Installed to Date: Over 1,500.

Serviced by: Netlink, Inc.

Models

SNA_Gate is a cluster controller that can connect up to 255 non-SNA devices to SNA networks. Bisynchronous and asynchronous terminals can connect directly to SNA_Gate, or indirectly through modems. The unit provides a 3270 emulator that acts like a 3274 51C control unit to which 3278 display stations can be attached.

Netlink offers the product in three versions:

- **3703-1:** Multifunction SNA_Gate supports concurrent async/BSC conversion to and from SNA
- **3703-1A:** Asynchronous SNA_Gate converts async devices to SNA
- **3703-1B:** Bisynchronous SNA_Gate interfaces bi-sync 3270, 3780/2780, and other bisync devices to SNA

Configuration

The basic SNA_Gate consists of the following:

- An Intel 8086, 16-bit microprocessor running at 8MHz with 128K bytes of ROM for diagnostics and loading from the host, as well as 1M byte of RAM, some of which is reserved for the downline-loaded programs and data buffers
- One SDLC daisychain communications port using Direct Memory Access (DMA)
- Asynchronous or synchronous communications port cards for a maximum of 16 ports
- An industry-standard Multibus backplane for the insertion of additional circuit cards

Users can configure SNA_Gate to extend network management and SNA session integrity down to the BSC device level. SNA_Gate can supply a secure mapping of SNA services into a BSC subnetwork.

The RJE Station Facility enables inexpensive asynchronous or BSC terminals to appear as RJE workstation devices to an IBM JES host, capable of inputting card-image data or receiving print data at a remote location. In this environment, SNA_Gate appears to the host as an IBM 3770 single or multiple logical unit remote RJE workstation. SNA_Gate incorporates session initiation and session recovery features and provides flexibility in selecting attached devices to receive JES datastreams.

Configuration options enable SNA_Gate to recognize that file transfer is occurring and to change its mode of operation to support maximum data throughput. Among some of the programs supported are IBM's PC/HOST File Transfer and Terminal Emulator Program (FTTERM), Coefficient Systems' VTERM II, and RELAY Communications' Relay Gold. SNA_Gate also supports PC file transfer directly into the IBM JES programs.

Transmission Specifications

SNA_Gate houses all the hardware required to support up to 16 ASCII and/or bisync lines in any combination. The device acts as a multifunction IBM Physical Unit Type 2 (PU.T2) cluster controller that concurrently maps multiple protocols from attached devices to IBM Logical Unit (LU) 0, 1, and 2. SNA_Gate supports the following conversions: ASCII to SNA; BSC 3271 and 3275 to SNA; and RJE to SNA. The unit connects to an SNA host directly or remotely via a modem through an IBM 37X5 or compatible communications controller running any version of IBM's Network Control Program (NCP). A host-resident VTAM application, called the Network Support Program (NSP), sends SNA_Gate its operating configuration and receives memory dumps and diagnostics. SNA_Gate does not support a direct channel attachment to the host, but it can interface with the host through an Integrated Control Adapter (ICA), an Integrated Communications Processor (ICP), or a 37XX Communications Controller.

SNA_Gate allows an asynchronous printer to participate in an IBM Logical Unit Type 3 with a host application. IBM's Logical Unit Type 3 enables intelligent printers to interpret and execute 3270 buffer commands and orders, typically sent on an LU T2 session. In this environment, SNA_Gate performs command interpretation and data management for the printer.

The Network Support Program (NSP) also furnishes downline loading and upline dumping capabilities for network control information and status displays. Macros in NSP provide the means to configure SNA_Gate ports for ASCII or BSC operation. NSP works under the MVS and DOS operating systems. SNA_Gate interfaces with IBM host database subsystems, including IMS, CICS, TSO, and RJE (JES2, JES3, and POWER). In addition, SNA_Gate responds to commands from IBM's network management products.

SNA_Gate supports a 64K bps, SDLC data link on the host side and 300 to 9600 bps links to data devices on the terminal side. The unit connects to the host through multidrop, dial-up, or leased lines. Through an integral modem-sharing facility, SNA_Gate can be daisy-chained so that other SNA devices can share the same line. In this type of application, SNA_Gate appears as a multidropped PU.T2 in the network.

SNA_Gate's SDLC port, which serves as the link to the host, supports the following: an RS-232-C connector; internal or external clocking; synchronous or asynchronous transmission; 110 to 19.2K bps transmission speeds; half- or full-duplex operation; and NRZI or non-NRZI coding. An optional V.35 interface card supports SDLC speeds to 64K bps. Users can configure the SDLC port for any eight-bit SDLC polling address.

A digital splitter on the SDLC port drives the daisy-chain port, which appears as a multidrop on the SDLC link. This port has an RS-232-C interface and can take or supply clocking. It has pass-through signals on pins 2 through 8, 15, 17, 20, and 24.

Devices attach to the SNA_Gate through terminal ports that support the RS-232-C interface, internal or

external clocking, full EIA pinout, DTE or DCE operation, synchronous or asynchronous transmission, full-duplex operation, and 300 to 9600 bps transmission speeds.

SNA_Gate supports the five-bit CCITT alphabet No. 2, also known as the Baudot Code, which enables telex machines to communicate over an SNA network through an LU.T1 session.

Device Control

The installation of SNA_Gate resembles the installation of any other SNA-type controller. SNA_Gate must be accurately identified to VTAM, NCP, and host subsystems, and all devices attached to SNA_Gate must be defined through configuration macros. To generate an SNA_Gate configuration, users must assemble macros defining the characteristics of each SNA_Gate attachment and execute a configuration generator program to format internal tables for devices attached to the SNA_Gate. The system incorporates supermacros that define the characteristics of commonly used terminals. Error indications show up on an alphanumeric display, and LEDs monitor system status and line activity. ASCII and BSC port parameters, configured via a host-resident Network Support Program, are downline loaded to SNA_Gate.

If necessary, a user can extend supermacros and retain configurations and executable code in a host-resident library. ASCII and BSC port parameters, configured via the host-resident Network Support Program, are downloaded to SNA_Gate. (The NSP controls SNA_Gate when it is attached to the network.)

SNA_Gate's operating program includes commands used to communicate with the host and the NSP that resides within it. These commands send a message from the SNA_Gate to the host, establish a local session between SNA_Gate and another attached device, establish a session with SNA_Gate's Network Processor Control Point, display SNA_Gate status, send an SNA command, send a message on behalf of another attached device, or end a local session. A user can enter the SNA_Gate commands from any attached device that supports a keyboard.

After power-on or reset, SNA_Gate runs a series of diagnostics for ROM checksum, RAM nondestructive and destructive tests, an SDLC line test, a timer test, and a test of power supplies. After successful completion of the diagnostic tests, a bootstrap program logs on to the host-resident NSP and identifies itself by sending a logon from the Network Processor Control Point, which provides network services such as loading, dumping, and status. Logon requests repeat automatically every two minutes until a session is bound with NSP. When a session is bound, the SNA_Gate either dumps or loads its memory. After the operating program, configuration, and any patches are loaded into SNA_Gate, NSP is unbound. No further communication occurs between SNA_Gate and NSP until another downline load or upline dump is required or an operator

sends a command through NSP to the SNA_Gate Network Processor Control Point.

Users can monitor and control the activity of NSP through a Network Support Console, which can be any configuration-authorized LU Type 1, Type 2, or Type 3 device located anywhere in the network. While logged on, the console receives messages about NSP activities. To access these messages, users enter a pre-defined terminal logon sequence and a valid password. After logon through a Network Support Console, an operator can command a printer to log all NSP message traffic. Through a series of NSP commands entered through the console, operators can perform a variety of functions, such as starting or stopping a log of NSP activity, adding an SNA_Gate definition to those defined in the start-up procedure, reloading the SNA_Gate from the host, and communicating with the Network Processor Control Point about SNA_Gate control.

To implement emulation, SNA_Gate supports software modules, which include SNA PU.T2, Asynchronous Communications, RJE Station Facility, and Bisynchronous Communications. The modules provide the following basic functions:

- **SNA PU.T2**—provides a modular software structure with well-defined interfaces between layers that conform to the structure of SNA. Discrete layered support includes Data Link Control, Path Control, Transmission Control, Data Flow Control, Network Addressable Unit Services, up to 255 Logical Units, SNA Capabilities, and Communications Network Management.
- **Asynchronous Communications**—allows asynchronous ASCII devices (TTY compatible) to work as LU Type 0, Type 1, or Type 2 devices in an SNA network. Additional support enables an ASCII device to look like the datastream from an IBM 3767 or 3776 with an extension supporting outbound Function Management Headers. This feature allows access to RJE packages, TSO, CICS, and IMS. ASCII devices that operate with SNA_Gate include keyboard printers, terminals, visual display units (VDUs), microcomputers, minicomputers, output-only devices, letter-quality printers, plotters, and optical character readers. The asynchronous module supports IBM 3767 screens in line-by-line or full-screen emulation of IBM 3278 Models 2, 3, 4, and 5 and 3279 four-color devices. This feature allows asynchronous ASCII VDUs to be functionally compatible with IBM 3278 VDUs. The module provides code and configuration parameters that take advantage of functions similar to those of an IBM 3278, commonly available on ASCII screens. An ASCII module "swap-on-bind" command allows a user to log on to SNA_Gate as an

LU Type 2 device and then switch to an LU Type 1 device and reverse the process. Another command authorizes the placement of multiple logical units on a single ASCII port.

- **RJE Station Facility**—allows SNA_Gate to act as a multiple logical unit (MLU) RJE station. The RJE Station Facility consists of a series of up to eight LUs that can log on to JES2 or JES3 automatically when SNA_Gate is loaded or from any device attached to SNA_Gate. To achieve this capability, the user must define additional LUs (end of sessions that run on the logical line defined in JES2 rather than on physical devices in SNA_Gate). LU Type 1 devices that establish local sessions with the RJE Station Facility identify themselves as readers, printers, punches, exchange disks, or consoles.
- **Bisynchronous Communications**—maps BSC protocols to SNA. This capability allows IBM 2770, 2780, 3780, and 3741; polled 3780 or 3270 devices; as well as RJE and data-entry terminals, minicomputers, microcomputers, or mainframes using the BSC protocol, to access a host operating under SNA. The mapping performed for BSC preserves the end-to-end nature of SNA.

As an option, users can equip SNA_Gate with a Burroughs Poll Select Emulator module so that Burroughs TD 830 terminals can emulate LU Type 2 devices with limitations and TC 4000 printers can emulate LU Type 1 units. This module also offers the following capabilities: upstream pass-through for Burroughs terminals to a Burroughs 6700, 6800 CPU; the ability to log on to either an IBM or Burroughs host and switch between the two on a session basis; support, through configuration macros, for configuring Burroughs terminals; and LU Type 0 emulation.

Physical Specifications

SNA_Gate is 7.08 inches high, 17.44 inches wide, 19.125 inches deep, and weighs approximately 30 pounds. Power requirements are as follows: 120 V AC or 240 V AC; 140 W; and 50 to 60 Hz.

Pricing

The async/bisync 3703-1 ranges in price from \$7,000 to \$9,500; the 3703-1A, asynchronous-only model ranges from \$4,000 to \$8,000; and the 3703-1B, bisynchronous-only model costs between \$5,250 and \$6,000. Netlink offers quantity discounts. ■

Netlink SNA_Gate

datapro ANALYSIS

UPDATE: *Since our last report on this product, Netlink has made significant enhancements to it, adding the following: multiple LU T2 session support for asynchronous terminals; support for graphics terminals; support for PC-to-host file transfer; performance improvements for BSC and asynchronous devices; new 64K bps SDLC connection to a central site host; enhancements to the RJE station facility; LU T3 support for asynchronous printers; enhancements to BSC support; and support for Baudot Code.*

The history of Netlink began nine years ago in Australia when a former employee of IBM, Paul Wood, established a company called Systems Technology Pty, Ltd. In 1982, Wood introduced the company's first product, the 3703 Network Processor. The product achieved so much success that European and American distributors (such as Codex) signed agreements to market 3703 technology. (Codex sells and services SNA_Gate under the name 4255 SNA Gateway.) After the success of the first product, Wood established Netlink, Inc. in 1984 to expand the development of SNA technology in the United States. Netlink now manufactures SNA_Gate in Raleigh, North Carolina. The company also markets SNA_Hub network concentrator, which is Netlink's alternative to a remote IBM 3720.

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VENDOR: Netlink Inc., 3214 Spring Forest Road, Raleigh, North Carolina 27604. Telephone (919) 878-8612, (800) NETLINK.

MODELS: 3703-1 (multifunction SNA_Gate); 3703-1A (asynchronous-only version); and 3703-1B (bisynchronous-only model).

COMPETITION: IBM 3708, 3710, and 3274 51C control unit.

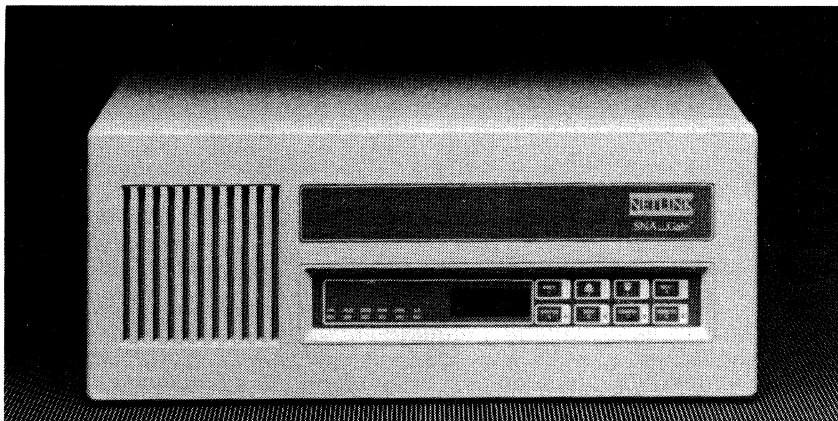
PRICE: 3703-1 ranges from \$6,000 to \$9,500; 3703-1A ranges from \$4,000 to \$8,000; and 3703-1B ranges from \$4,500 to \$6,000. Netlink offers quantity discounts.

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cluster controller and multifunction protocol converter in one device, connecting non-SNA devices to SNA networks. The specific equipment supported includes bisync 3270 and 3780/2780 devices, bisync hosts and minicomputers, and all asynchronous devices. The product has its own Intel 8086 microprocessor and memory and functions as a software-based system, accommodating a number of different protocols in the SNA network.

PRODUCT EVALUATION

Netlink's SNA_Gate is a versatile product that can act as a protocol converter, a cluster controller, a line concentrator, and a remote job entry station facility. The unit provides multiple protocol conversions, including concurrent



Netlink's SNA_Gate allows asynchronous and bisynchronous devices to access Systems Network Architecture (SNA).

Netlink SNA_Gate

asynchronous and bisynchronous to Systems Network Architecture (SNA). The SNA_Gate emulates an IBM Physical Unit Type 2 cluster controller, providing a gateway to the IBM SNA/SDLC environment.

SNA_Gate is basically an upgraded version of Netlink's 3703 Network Processor. The 3703 had 12 ports, but SNA_Gate supports 16 non-SNA lines over an SNA/SDLC host link. The 3703 handled 9600 bps upstream, but SNA_Gate can handle up to 64K bps. Netlink has greatly expanded the memory of the product to either 512K or 704K bytes, whereas the 3703 Network Processor had a 384K-byte memory capacity. The 3703 also came in two models only: one supporting both bisynchronous- and asynchronous-to-SNA conversions and the other supporting asynchronous-to-SNA conversions only. Netlink has taken SNA_Gate one step further by creating a third version that supports bisynchronous-only conversion. Netlink has also made the price of SNA_Gate more attractive than its predecessor's. The 3703 async/bisync version began at \$8,700 for four ports, while the newer model costs \$2,700 less.

SNA_Gate supports direct, leased, multidrop, and dial-up lines. The unit eliminates separate communications lines and host front-end ports for non-SNA devices. It also eliminates host/front-end processor support facilities such as EP and NTO for non-SNA devices. The product's capability for being softloaded and centrally managed makes it especially attractive. The softloading feature of SNA_Gate allows a user to configure and reconfigure downstream resources without affecting VTAM and NCP.

SNA_Gate differs from many other protocol converters on the market in its capability for handling a number of protocols at once. Many conversion products handle only one type of protocol conversion, such as ASCII to SDLC, at one time. Users who need more than one type of conversion in a network must purchase separate units for each type desired. SNA_Gate offers all of the following conversions in one product: asynchronous (ASCII) to SNA; BSC 3271 and 3275 to SNA; and RJE to SNA.

SNA_Gate is a versatile product that performs various applications, such as providing an SNA gateway for ASCII terminals. In this configuration, SNA_Gate connects to a 3705 communications controller and acts as a local concentrator in the network. Terminals can attach directly or via modems on dial-up or leased lines. As a recent enhancement, Netlink has expanded asynchronous ASCII support by enabling a terminal user to sustain multiple application sessions at one time and using hot-key switching between sessions.

SNA_Gate also supports remote BSC-to-SNA protocol conversion. In this application, SNA_Gate attaches to the communications controller via a modem, and through a daisychain port, other SNA devices can share the line to the host. SNA_Gate can also function as a remote concen-

trator in which up to 16 lines, including dial-up terminals, can attach to an SNA host. By using SNA_Gate to concentrate lines, users can conserve ports on a communications controller or front-end processor and eliminate the need to multiplex and demultiplex datastreams at the local site. In addition, several SNA_Gates can be multiplexed on the same line, creating the possibility of users' saving a scanner or frame on the control unit.

SNA_Gate connects to the host through an IBM 37X5 or compatible control unit running any version of IBM's Network Control Program (NCP). Connection to the control unit occurs either directly or through a modem. Netlink's Network Support Program (NSP) provides downline load and upline dumping capabilities for network control information and status displays. Users can configure operating parameters through macros in NSP, which runs under MVS and DOS operating systems. SNA_Gate also supports IMS, CICS, TSO, and RJE (JES2, JES, and POWER) and operates under IBM's network management products.

SNA_Gate supports five basic software modules for various types of emulation. The product supports a modular software structure that conforms to that of SNA. The asynchronous communications module allows ASCII devices to work as LU Type 0, Type 1, or Type 2 equipment in an SNA network. This module also supports access to RJE packages, and a "swap-on-bind" command allows a user to log on to a Type 2 device and then switch to a Type 1 device and reverse the process. An RJE Station Facility allows SNA_Gate to act as a multiple logic unit (MLU) RJE station. A bisynchronous communications module maps BSC protocols to SNA and allows IBM 2770, 2780, 3275, 3780, 3741, 3271, 3274, 3275, and 3276 devices to access an SNA host. An optional Burroughs Poll Select module allows Burroughs TD 830 terminals to emulate LU Type 2 devices with TD 830 limitations and TC 4000 printers to emulate LU Type 1 units. This module also provides a Burroughs terminal-to-host upstream passthrough capability that allows the user to log on to either an IBM or Burroughs host.

SNA_Gate's Software-based operation adapts to asynchronous protocols and a variety of BSC implementations, particularly older ones for which there are few conversion products. Many BSC devices operate differently from the IBM standard and, therefore, do not implement all functions. Because SNA_Gate is software driven, it is possible to overcome idiosyncrasies in the BSC protocol that can affect operation in the SNA network.

This most recent release of SNA_Gate supports twice the number of BSC lines than the previous release and also doubles line speeds. According to Netlink, new programming techniques have effected this change. When SNA_Gate connects to the host via a 9600 bps, half-duplex SDLC line, connectivity capabilities support the following: two 9600 bps, half-duplex downstream BSC lines, or

Netlink SNA_Gate

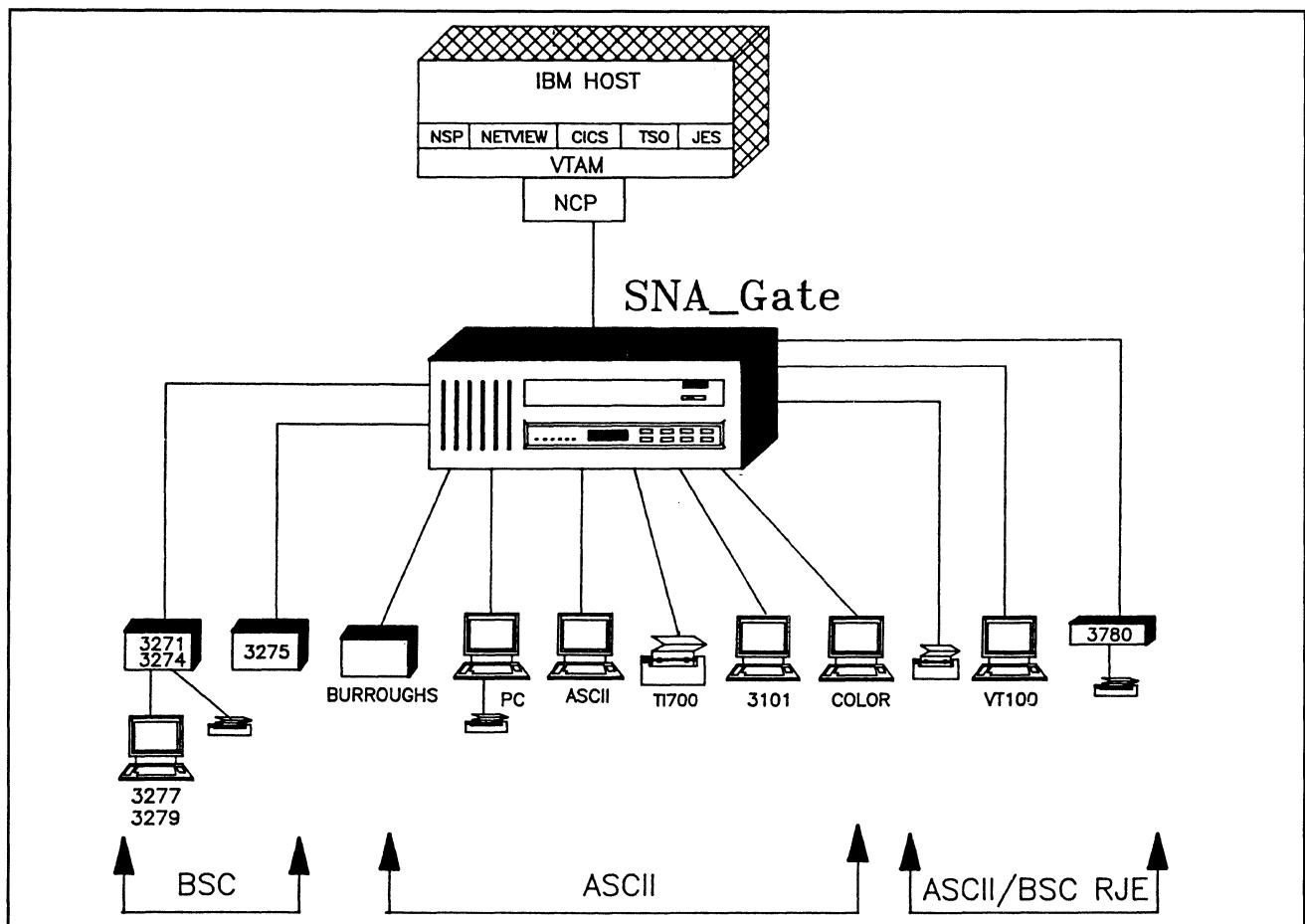


Figure 1. SNA_Gate operating as a PU.22 cluster controller provides a gateway to the IBM environment for a variety of devices using asynchronous ASCII and BSC protocols.

five 4800 bps, half-duplex downstream BSC lines, or twelve 2400 bps, half-duplex downstream BSC lines, or sixteen 1200 bps, half-duplex downstream BSC lines.

Users of BSC 3270 terminals attached to SNA_Gate can improve response times by upgrading the line speed from the controller to SNA_Gate. In addition, customers with data collection applications on remote minicomputers that support BSC 2780/3780 protocols can achieve significant reductions in the time required to transfer data into host computers.

Centrally controlled and loaded, SNA_Gate operates under IBM's network management programs. Since the unit accommodates multiple protocols downstream, users can achieve a pure SNA backbone in the network. A unique characteristic is its capability to allow a user to log on to an application through SNA_Gate as an LU Type 2 device and switch to an LU Type 1 device. This feature allows interleaving operation in both interactive and batch modes.

SNA_Gate offers several advantages to the user in a typical IBM environment. Moving BSC processing to an SNA_Gate frees a significant number of 37X5 cycles for SNA processing, thereby making more efficient use of existing equipment. In applications in which incompatible terminals, such as an interactive 3270-type device and a remote RJE, perform input and high-speed output functions, SNA_Gate does not require incompatible datastreams from these devices to share a band-splitting or channelized modem. By converting both streams to SNA, SNA_Gate eliminates the need for an Emulator Program and a byte-multiplex channel and reduces the number of ports needed on the control unit.

SNA_Gate also allows personal computers to dial into an SNA_Gate port and perform interactive and batch applications concurrently through a "swap-on-bind" command that supports switching back and forth from LU Type 2 to LU Type 1 operation. By accommodating MLUs through a single port, SNA_Gate enables the personal computer to be in session with TSO while JES is transmitting output data to a printer or disk file. In this application, the personal computer user logs on to TSO, CICS, or IMS as a

Netlink SNA_Gate

3270 display screen and then logs on to JES to emulate an IBM 3777/3/4 terminal with MLUs.

Recently, Netlink has enhanced support for PC-to-host file transfer by allowing PC users to transfer files into host applications such as TSO or CICS through popular PC-based file transfer programs. PC users can also transfer data directly into JES by emulating an RJE reader device.

Most protocol converters use an 8-bit, Z-80 microprocessor, but SNA_Gate uses Intel's 8086, a 16-bit processor, for faster performance. On the asynchronous side, this increased processor power supports input from sixteen PCs at 1200 bps in file transfer mode via an LU1 flow or input from eight 2400 bps PCs transferring data in an LU1 flow. On the bisynchronous side, the processor can accommodate two 9600 bps lines, four 4800 bps lines, or up to twelve lines at 2400 bps.

By incorporating support for the Baudot Code into the product, Netlink has addressed the needs of customers who require only low-volume access to an SNA host. Without acquiring any more terminals, these users can now exchange messages with an IBM host by using their telex machines and inexpensive asynchronous modems.

Customers who select the V.35 interface card can multi-drop SNA gates with other SNA devices, such as an IBM 3174, to a single, high-speed data facility, thereby attaining greater price/performance from these links without investing in more equipment. In countries in which the telecommunications providers offer the 64K bps service over an X.21 interface, Netlink recommends that customers install a V.35-to-X.21 interface converter module.

Netlink has incorporated graphics support into the latest version of its product. SNA_Gate allows asynchronous terminals to access host-based graphics applications over a full-screen (LU T2) session or a line-by-line LU T1 session. Netlink based the graphics support on the requirements of the SAS/Graph program, but other graphics packages such as Tektronix Plot 10 can also use the new

SNA_Gate feature. Devices supported include Tektronix 4010 terminals and 46XX plotters, HP 2600 display terminals, or any PC executing the SAS/RTERM terminal emulation program.

MARKET POSITION

Netlink's customers include end users who need gateway service to the SNA network and manufacturers that want to incorporate their products into the SNA market. SNA_Gate competes with the IBM 3710 in the area of bisync-to-SNA conversion. Both units support multiple downstream protocols including BSC RJE and asynchronous ASCII. However, SNA_Gate supports BSC 3275 devices, and the 3710 cannot.

In the area of async-to-SNA conversion, IBM's 3174 resembles SNA_Gate, but with one major difference: the 3174 supports about 21 different terminals. If a user has a terminal that is not on the 3174 list, that terminal cannot connect to the SNA environment. SNA_Gate supports *all* asynchronous devices.

Through software assistance, IBM's 3708, another competitor, can be expanded to include any asynchronous device but, like the 3174, this unit cannot effect concurrent conversion of multiple protocols to SNA.

Unlike some other competitors, SNA_Gate supports remote softloading and EC/Release level changes over the SNA network, as well as a 3777 RJE facility with multiple LUs.

Netlink has earned a successful reputation abroad and is attaining a reputation domestically as a responsible company with reliable devices, but the struggle for dominance in the SNA environment has become tougher since IBM has such a strong market presence in the U.S. End users with a mixed bag of protocols who have chosen SNA_Gate, however, are quick to recommend the device.

SPECIFICATIONS

MODELS: 3703-1 (multifunction SNA_Gate); 3703-1A (asynchronous-only version); and 3703-1B (bisynchronous-only model).

DATE OF FIRST ANNOUNCEMENT: 1986.

DATE OF FIRST DELIVERY: 1986.

NUMBER INSTALLED TO DATE: Over 1,000.

SERVICED BY: Netlink, Inc.

MODELS

SNA_Gate is a cluster controller that can connect up to 255 non-SNA devices to SNA networks. Bisynchronous and asynchronous terminals can connect directly to SNA_Gate or indirectly through modems. The unit provides a 3270 emulator that acts like a 3274 51C control unit to which 3278 display stations can be attached.

Netlink offers the product in three versions:

Netlink SNA_Gate

- *3703-1*: Multifunction SNA_Gate, supports concurrent async/BSC conversion to and from SNA
- *3703-1A*: Asynchronous SNA_Gate, converts async devices to SNA
- *3703-1B*: Bisynchronous SNA_Gate, interfaces bisync 3270, 3780/2780, and other bisync devices to SNA

CONFIGURATION

The basic SNA_Gate consists of the following: an Intel 8086, 16-bit microprocessor running at 8MHz with 64K bytes of ROM for diagnostics and loading from the host, as well as 512K bytes of RAM, some of which is reserved for the downline-loaded programs and the rest for data buffers; one SDLC daisychain communications port using Direct Memory Access (DMA); and asynchronous or synchronous communications port cards for a maximum of 16 ports. The unit also incorporates an industry-standard Multibus backplane for the insertion of additional circuit cards.

Users can now configure SNA_Gate to extend network management and SNA session integrity down to the BSC device level. SNA_Gate can supply a secure mapping of SNA services into a BSC subnetwork.

The RJE Station Facility enables inexpensive asynchronous or BSC terminals to appear as RJE workstation devices to an IBM JES host, capable of inputting card-image data or receiving print data at a remote location. In this environment, SNA_Gate appears to the host as an IBM 3770 single or multiple logical unit remote RJE workstation. Netlink has introduced new session initiation and session recovery features into Release 1.7 as well as added flexibility in selecting attached devices to receive JES datastreams.

Configuration options enable SNA_Gate to recognize that file transfer is occurring and to change its mode of operation to support maximum data throughput. According to Netlink, a time reduction of 50 percent took place in a test involving the inbound transfer of 100,000 alphanumeric characters. Among some of the programs supported are IBM's PC/HOST File Transfer and Terminal Emulator Program (FTTERM), VTERM II from Coefficient Systems, and Relay Gold from RELAY Communications. Netlink also announced support for PC file transfer directly into the IBM JES programs.

TRANSMISSION SPECIFICATIONS

SNA_Gate houses all the hardware required to support up to 16 ASCII and/or bisync lines in any combination. The device acts as a multifunction IBM Physical Unit Type 2 (PU.T2) cluster controller that concurrently maps multi-

ple protocols from attached devices to IBM Logical Unit (LU) 0, 1, and 2. SNA_Gate supports the following conversions: ASCII to SNA; BSC 3271 and 3275 to SNA; and RJE to SNA. The unit connects to an SNA host directly or remotely via a modem through an IBM 37X5 or compatible communications controller running any version of IBM's Network Control Program (NCP). A host-resident VTAM application, called the Network Support Program (NSP), sends SNA_Gate its operating configuration and receives memory dumps and diagnostics. SNA_Gate does not support a direct channel attachment to the host, but it can interface with the host through an Integrated Control Adapter (ICA), an Integrated Communications Processor (ICP), or a 37XX Communications Controller.

The latest release of SNA_Gate allows an asynchronous printer to participate in an IBM Logical Unit Type 3 with a host application. IBM's Logical Unit Type 3 enables intelligent printers to interpret and execute 3270 buffer commands and orders, typically sent on an LU T2 session. In this environment, SNA_Gate performs command interpretation and data management for the printer.

The NSP also furnishes downline load and upline dumping capabilities for network control information and status displays. Macros in NSP provide the means to configure SNA_Gate ports for ASCII or BSC operation. NSP works under the MVS and DOS operating systems. SNA_Gate interfaces with IBM host database subsystems, including IMS, CICS, TSO, and RJE (JES2, JES3, and POWER). In addition, SNA_Gate responds to commands from IBM's network management products.

SNA_Gate supports a 64K bps, SDLC data link on the host side and 300 to 9600 bps links to data devices on the terminal side. The unit connects to the host through multidrop, dial up, or leased lines. Through an integral modem-sharing facility, SNA_Gate can be daisy-chained so that other SNA devices can share the same line. In this type of application, SNA_Gate appears as a multidropped PU.T2 in the network.

SNA_Gate's SDLC port, which serves as the link to the host, supports the following: an RS-232-C connector; internal or external clocking; synchronous or asynchronous transmission; 110 to 19.2K bps transmission speed; half- or full-duplex operation; and NRZI or non-NRZI coding. An optional V.35 interface card supports SDLC speeds to 64K bps. Users can configure the SDLC port for any eight-bit SDLC polling address.

A digital splitter on the SDLC port drives the daisychain port, which appears as a multidrop on the SDLC link. This port has an RS-232-C interface and can take or supply clocking. It has passthrough signals on pins 2 through 8, 15, 17, 20, and 24.

Devices attach to the SNA_Gate through terminal ports that support the RS-232-C interface, internal or external

Netlink SNA_Gate

clocking, full EIA pinout, DTE or DCE operation, synchronous or asynchronous transmission, full-duplex operation, and 300 to 9600 bps transmission speeds.

The latest release of SNA_Gate supports the five-bit CCITT alphabet No. 2, also known as the Baudot Code. This enhancement enables telex machines to communicate over an SNA network through an LU T1 session.

DEVICE CONTROL

The installation of SNA_Gate resembles the installation of any other SNA-type controller. SNA_Gate must be accurately identified to VTAM, NCP, and host subsystems, and all devices attached to SNA_Gate must be defined through SNA_Gate configuration macros. To generate an SNA_Gate configuration, users must assemble macros defining the characteristics of each SNA_Gate attachment and execute a configuration generator program to format internal tables for devices attached to the SNA_Gate. The system incorporates supermacros that define the characteristics of commonly used terminals. Error indications show up on an alphanumeric display, and LEDs monitor system status and line activity. ASCII and BSC port parameters, configured via a host-resident Network Support Program, are downline loaded to SNA_Gate.

If necessary, a user can extend supermacros and retain configurations and executable code in a host-resident library. ASCII and BSC port parameters, configured via the host-resident Network Support Program, are downloaded to SNA_Gate. (The NSP controls SNA_Gate when it is attached to the network.)

SNA_Gate's operating program includes commands used to communicate with the host and the NSP that resides within it. These commands send a message from the SNA_Gate to the host, establish a local session between SNA_Gate and another attached device, establish a session with SNA_Gate's Network Processor Control Point, display SNA_Gate status, send an SNA command, send a message on behalf of another attached device, or end a local session. A user can enter the SNA_Gate commands from any attached device that supports a keyboard.

After power-on or reset, SNA_Gate runs a series of diagnostics for ROM checksum, RAM nondestructive and destructive tests, an SDLC line test, a timer test, and a test of power supplies. After successful completion of the diagnostic tests, a bootstrap program logs on to the host-resident NSP and identifies itself by sending a logon from the Network Processor Control Point, which provides network services such as loading, dumping, and status. Logon requests repeat automatically every two minutes until a session is bound with NSP. When a session is bound, the SNA_Gate either dumps or loads its memory. After the operating program, configuration, and any

patches are loaded into SNA_Gate, NSP is unbound. No further communication occurs between SNA_Gate and NSP until another downline load or upline dump is required or an operator sends a command through NSP to the SNA_Gate Network Processor Control Point.

Users can monitor and control the activity of NSP through a Network Support Console, which can be any configuration-authorized LU Type 1 or Type 2 device located anywhere in the network. While logged on, the console receives messages about NSP activities. To access these messages, users enter a predefined terminal logon sequence and a valid password. After logon through a Network Support Console, an operator can command a printer to log all NSP message traffic. Through a series of NSP commands entered through the console, operators can perform a variety of functions, such as starting or stopping a log of NSP activity, adding an SNA_Gate definition to those defined in the start-up procedure, re-loading the SNA_Gate from the host, and communicating with the Network Processor Control Point about SNA_Gate control.

To implement emulation, SNA_Gate supports software modules, which include SNA PU.T2, Asynchronous Communications, RJE Station Facility, and Bisynchronous Communications. The modules provide the following basic functions:

- SNA PU.T2—provides a modular software structure with well-defined interfaces between layers that conform to the structure of SNA. Discrete layered support includes Data Link Control, Path Control, Transmission Control, Data Flow Control, Network Addressable Unit Services, up to 255 Logical Units, SNA Capabilities, and Communications Network Management.
- Asynchronous Communications—allows asynchronous ASCII devices (TTY compatible) to work as LU Type 0, Type 1, or Type 2 devices in an SNA network. Additional support enables an ASCII device to look like the datastream from an IBM 3767 or 3776 with an extension supporting outbound Function Management Headers. This feature allows access to RJE packages, TSO, CICS, and IMS. ASCII devices that operate with SNA_Gate include keyboard printers, terminals, visual display units (VDUs), microcomputers, minicomputers, output-only devices, letter-quality printers, plotters, and optical character readers. The asynchronous module supports IBM 3767 screens in line-by-line or full-screen emulation of IBM 3278 Models 2, 3, 4, 5, and 3279 four-color devices. This feature allows asynchronous ASCII VDUs to be functionally compatible with IBM 3278 VDUs. The module provides code and configuration parameters that take advantage of functions similar to those of an IBM 3278, commonly available on ASCII screens. An ASCII module "swap-on-bind" command allows a user to log on to SNA_Gate as an LU Type 2 device and then switch to an LU Type 1 device and

Netlink SNA_Gate

reverse the process. Another command authorizes the placement of multiple logical units on a single ASCII port.

- **RJE Station Facility**—allows SNA_Gate to act as a multiple logical unit (MLU) RJE station. The RJE Station Facility consists of a series of up to eight LUs that can log on to JES2 or JES3 automatically when SNA_Gate is loaded or from any device attached to SNA_Gate. To achieve this capability, the user must define additional LUs—end of sessions that run on the logical line defined in JES2 rather than on physical devices in SNA_Gate. LU Type 1 devices that establish local sessions with the RJE Station Facility identify themselves as readers, printers, punches, exchange disks, or consoles.
- **Bisynchronous Communications**—maps BSC protocols to SNA. This capability allows IBM 2770, 2780, 3780, 3741, polled 3780 or 3270 devices, as well as RJE and data-entry terminals, minicomputers, microcomputers, or mainframes using the BSC protocol, to access a host operating under SNA. The mapping performed for BSC preserves the end-to-end nature of SNA.

As an option, users can equip SNA_Gate with a Burroughs Poll Select Emulator module so that Burroughs TD

830 terminals can emulate LU Type 2 devices with limitations and TC 4000 printers can emulate LU Type 1 units. This module also offers the following capabilities: upstream passthrough for Burroughs terminals to a Burroughs 6700, 6800 CPU; the ability to log on to either an IBM or Burroughs host and switch between the two on a session basis; support, through configuration macros, for configuring Burroughs terminals; and LU Type 0 emulation.

PHYSICAL SPECIFICATIONS

SNA_Gate is 7.08 inches high, 17.44 inches wide, 19.125 inches deep, and weighs approximately 30 pounds. Power requirements are as follows: 120 V AC or 240 V AC; 140 W; and 50 to 60 Hz.

PRICING

The async/bisync 3703-1 ranges in price from \$6,000 to \$9,500; the 3703-1A, asynchronous-only model ranges from \$4,000 to \$8,000; and the 3703-1B, bisynchronous-only model costs between \$4,500 and \$6,000. Netlink offers quantity discounts. □

Netlink SNA_Gate

MANAGEMENT SUMMARY

The SNA_Gate is Netlink's answer to environments in which bisynchronous and asynchronous devices exist within an SNA network. Although called a gate, the unit is not a gateway between networks. Rather, the SNA_Gate is actually an IBM Physical Unit Type 2 (PU.2) cluster controller and multifunction protocol converter in one device. The unit connects non-SNA devices to SNA networks. The specific devices supported include bisync 3270 and 3780/2780 devices, bisync hosts and minicomputers, and all asynchronous devices. The product has its own Intel 8086 microprocessor and memory, and functions as a software-based system, allowing for the accommodation of a number of different protocols in the SNA network.

The device is basically an upgraded version of Netlink's 3703 Network Processor. While the 3703 had 12 ports, the SNA_Gate supports 16 non-SNA lines over an SNA/SDLC host link. The 3703 could handle 9600 bps upstream, but the SNA_Gate is able to handle up to 64K bps. The memory of the new product has been greatly expanded to either 512K or 704K bytes, whereas the 3703 Network Processor had a 384K-byte memory capacity. The 3703 also was available in two models only: one supported both bisynchronous- and asynchronous-to-SNA conversions, and the other supported asynchronous-to-SNA conversions only. Netlink has taken the SNA_Gate one step further, by creating a third version that supports bisynchronous-only conversion. Netlink has also made the price of the SNA_Gate more attractive than its predecessor's cost. The 3703 async/bisync version began at \$8,700 for four ports, while the newer model costs \$2,700 less.

The SNA_Gate supports direct, leased, multidrop, and dial-up lines. The unit eliminates separate communications lines and host front-end ports for non-SNA devices. It also eliminates host/front-end processor support facilities like EP and NTO for non-SNA devices. The major attraction of this product is that it can be softloaded and centrally managed. At this time, no other product on the market has this capability. Because the SNA_Gate is softloaded, a user

The Netlink, Inc. SNA_Gate is more than just a protocol converter. The product can function as a cluster controller, a line concentrator, and a remote job entry station facility. The unit provides multiple protocol conversions, including concurrent asynchronous and bisynchronous to Systems Network Architecture (SNA). The SNA_Gate emulates an IBM Physical Unit Type 2 cluster controller, providing a gateway to the IBM SNA/SDLC environment.

MODELS: 3703-1 (multifunction SNA_Gate); 3703-1A (asynchronous-only version); and 3703-1B (bisynchronous-only model).

CONVERSION: ASCII to SNA; BSC 3270, 3780/2780, and other bisync devices to SNA; and RJE to SNA.

TRANSMISSION RATES: 64K bps on host link; 300 to 9600 bps on terminal links.

COMPETITION: IBM 3708, 3710, and 3274 51C control unit.

PRICE: 3703-1 ranges from \$6,000 to \$9,500; 3703-1A ranges from \$4,000 to \$6,000; and 3703-1B ranges from \$4,500 to \$6,000. Quantity discounts are available.

CHARACTERISTICS

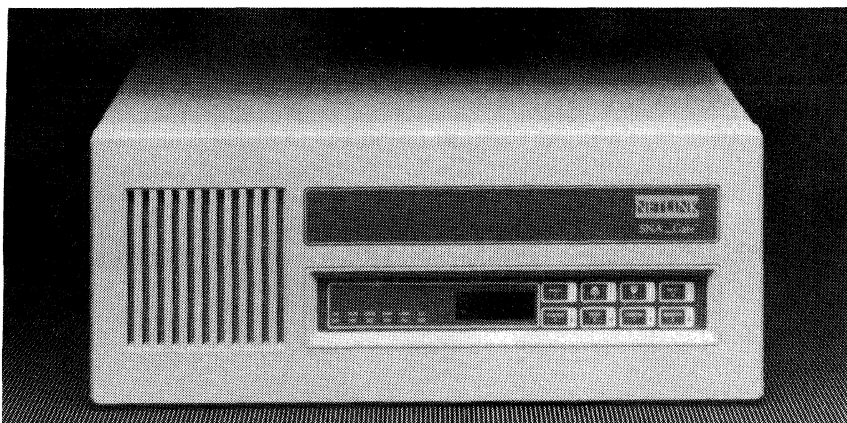
VENDOR: Netlink, Inc., 3214 Spring Forest Road, Raleigh, North Carolina 27604. Telephone (919) 878-8612.

DATE OF FIRST ANNOUNCEMENT: 1986.

DATE OF FIRST DELIVERY: 1986.

NUMBER INSTALLED TO DATE: Over 1,000.

SERVICED BY: Netlink, Inc.



Netlink's SNA_Gate allows asynchronous and bisynchronous devices to access Systems Network Architecture (SNA).

Netlink SNA_Gate

▶ can configure and reconfigure downstream resources without affecting VTAM and NCP.

One of the major differences between the SNA_Gate and many other protocol converters on the market is its ability to handle a number of protocols at once. Many conversion products handle one type of protocol conversion, ASCII to SDLC for example, at one time. Users needing more than one type of conversion in a network must purchase separate units for each type desired. The SNA_Gate offers all of the following conversions in one product: asynchronous (ASCII) to SNA; BSC 3271 and 3275 to SNA; and RJE to SNA.

The product can be used in various applications. For example, the unit provides an SNA gateway for ASCII terminals. In this configuration, the SNA_Gate connects to a 3705 communications controller and acts as a local concentrator in the network. Terminals may attach directly or via a modem on a dial-up or leased line. The SNA_Gate also provides remote BSC-to-SNA protocol conversion. In this application, the SNA_Gate attaches to the communications controller via a modem, and through a daisy-chain port, other SNA devices may share the line to the host. The SNA_Gate may also be used as a remote concentrator in which up to 16 lines, including dial-up terminals, may attach to an SNA host. By using the SNA_Gate to concentrate lines, users can conserve ports on a communications controller or front-end processor and eliminate the need to multiplex and demultiplex datastreams at the local site. In addition, several SNA_Gates can be multidropped on the same line, and users may be able to save a scanner or frame on the control unit as a result.

The SNA_Gate connects to the host through an IBM 37X5 or compatible control unit running any version of IBM's Network Control Program (NCP). Connection to the control unit is either direct or through a modem. Netlink's Network Support Program (NSP) provides downline load and upline dumping capabilities for network control information and status displays. Macros in NSP provide the means to configure operating parameters. NSP works under MVS and DOS operating systems. The SNA_Gate also supports IMS, CICS, TSO, and RJE (JES2, JES, and POWER), and operates under IBM's network management products.

The SNA_Gate also supports five basic software modules for various types of emulation. The product provides a modular software structure that conforms to that of SNA. The asynchronous communications module allows ASCII devices to work as LU Type 0, Type 1, or Type 2 equipment in an SNA network. Access to RJE packages is also supported through this module, and a "swap-on-bind" command allows a user to log on to a Type 2 device and then switch to a Type 1 device, and vice versa. An RJE Station Facility allows the SNA_Gate to act as a multiple logic unit (MLU) RJE station. A bisynchronous communications module maps BSC protocols to SNA and allows IBM 2770, 2780, 3275, 3780, 3741, 3271, 3274, 3275, and 3276 devices to access an SNA host. An optional Burroughs Poll Select

▶ MODELS

The SNA_Gate is a cluster controller that can connect up to 255 non-SNA devices to SNA networks. Bisynchronous and asynchronous terminals can be connected directly to the SNA_Gate or indirectly, through modems. The unit provides a 3270 emulator that acts like a 3274 51C control unit to which 3278 display stations can be attached.

Netlink's product is available in three versions:

- 3703-1: Multifunction SNA_Gate, supports concurrent async/BSC conversion to and from SNA
- 3703-1A: Asynchronous SNA_Gate, converts async devices to SNA
- 3703-1B: Bisynchronous SNA_Gate, interfaces bisync 3270, 3780/2780, and other bisync devices to SNA

CONFIGURATION

The basic SNA_Gate consists of the following: an Intel 8086, 16-bit microprocessor running at 8MHz with 64K bytes of ROM for diagnostics and loading from the host, as well as 512K bytes of RAM, some of which is reserved for the downline-loaded programs and the rest for data buffers; one SDLC daisy-chain communications port using Direct Memory Access (DMA); and asynchronous or synchronous communications port cards for a maximum of 16 ports. The unit also incorporates an industry-standard Multibus backplane, which allows the insertion of additional circuit cards.

TRANSMISSION SPECIFICATIONS

All of the hardware necessary to support up to 16 ASCII and/or bisync lines in any combination is housed in the SNA_Gate. The device acts as a multifunction IBM Physical Unit Type 2 (PU.T2) cluster controller that concurrently maps multiple protocols from attached devices to IBM Logical Unit (LU) 0, 1, and 2 types. The SNA_Gate supports the following conversions: ASCII to SNA; BSC 3271 and 3275 to SNA; and RJE to SNA. As mentioned earlier, the unit connects to an SNA host either directly or remotely via a modem through an IBM 37X5 or compatible communications controller running any version of IBM's Network Control Program (NCP). A host-resident VTAM application, called the Network Support Program (NSP) sends the SNA_Gate its operating configuration, receiving the memory dumps and diagnostics. The SNA_Gate does not support a direct channel attachment to the host, but may interface with the host through an Integrated Control Adapter (ICA) or Integrated Communications Processor (ICP) or 37XX Communications Controller.

The NSP also provides downline load and upline dumping capabilities for network control information and status displays, and macros in NSP provide the means to configure SNA_Gate ports for ASCII or BSC operation. NSP works under MVS and DOS operating systems. The SNA_Gate will interface with all IBM host database subsystems, including IMS, CICS, TSO, and RJE (JES2, JES3, and POWER). In addition, the SNA_Gate responds to commands from IBM's network management products.

The SNA_Gate supports a 64K bps, SDLC data link on the host side and 300 to 9600 bps links to data devices on the terminal side. The unit connects to the host through multidrop, dial-up, or leased lines. The SNA_Gate can also be daisy chained through an integral modem-sharing facility so that other SNA devices can share the same line. In this application, the SNA_Gate appears as a multidropped PU.T2 in the network.

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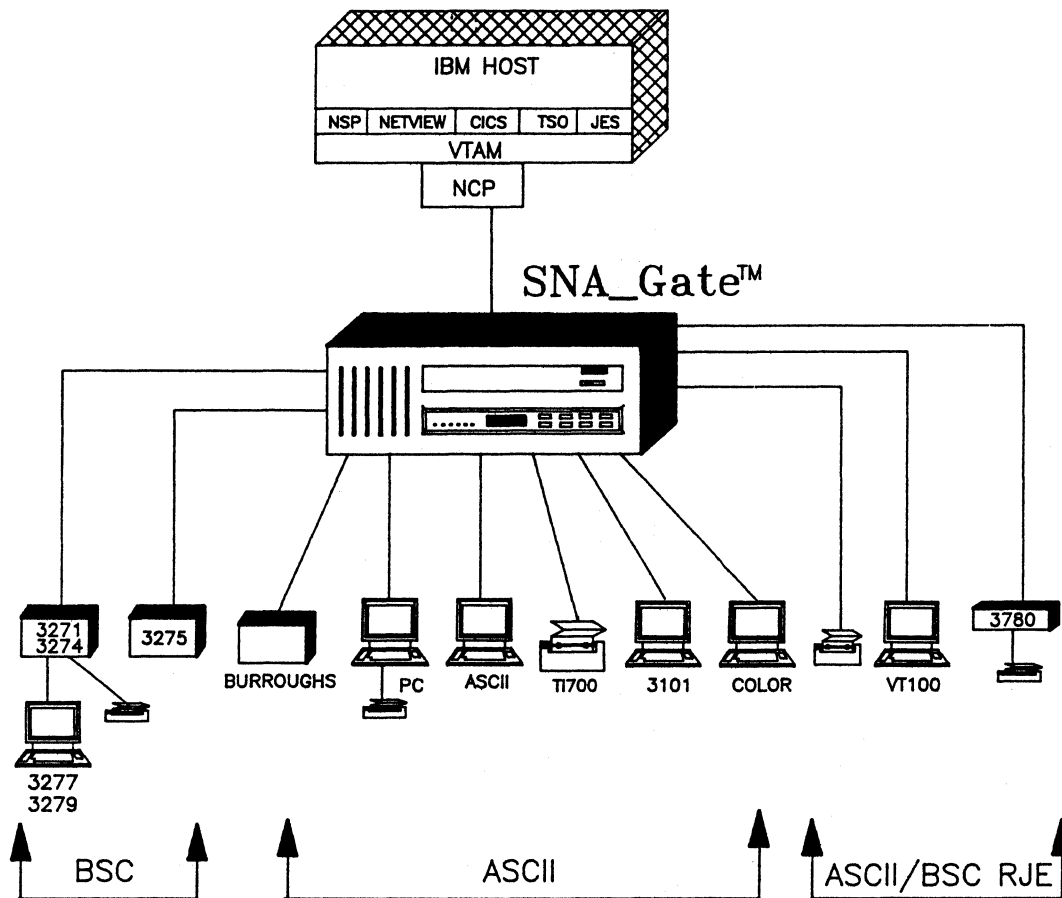


Figure 1. The SNA_Gate operating as a PU.22 cluster controller provides a gateway to the IBM environment for a variety of devices using asynchronous ASCII and BSC protocols.

► module allows Burroughs TD 830 terminals to emulate LU Type 2 devices with TD 830 limitations, and TC 4000 printers to emulate LU Type 1 units. Also available through this module is a Burroughs terminal-to-host upstream passthrough capability that allows the user to log on to either an IBM or Burroughs host.

The history of Netlink began nine years ago in Australia when a former employee of IBM, Paul Wood, established a company called Systems Technology Pty, Ltd. In 1982, Wood introduced the company's first product, the 3703 Network Processor. That product was so successful that European, as well as American distributors like Codex, signed agreements to market 3703 technology. (Codex sells and services the SNA_Gate under the name 4255 SNA Gateway.) Due to the success of the first product, Wood established Netlink, Inc. in 1984 to further develop SNA technology in the United States. Netlink now manufactures the SNA_Gate in Raleigh, North Carolina. The company also recently introduced the SNA_Hub network concentrator that is Netlink's alternative to a remote IBM 3720.

COMPETITIVE POSITION

Netlink's customers include end users who need gateway service to the SNA network and manufacturers who want

► The SNA_Gate's SDLC port provides the link to the host. It supports an RS-232-C connector, internal or external clocking, synchronous or asynchronous transmission, a 110 to 19.2K bps transmission speed, half- or full-duplex operation, and NRZI or non-NRZI coding. An optional V.35 interface card is available that supports SDLC speeds to 64K bps. Users can configure the SDLC port for any eight-bit SDLC polling address.

A digital splitter on the SDLC port drives the daisy-chain port, which appears as a multidrop on the SDLC link. This port has an RS-232-C interface and can take or supply clocking. It has passthrough signals on pins 2 through 8, 15, 17, 20, and 24.

Devices attach to the SNA_Gate through terminal ports, which support the RS-232-C interface, internal or external clocking, full EIA pinout, DTE or DCE operation, synchronous or asynchronous transmission, full-duplex operation, and a 300 to 9600 bps transmission speed.

DEVICE CONTROL

Installing an SNA_Gate is similar to installing any other SNA-type controller. The SNA_Gate must be accurately identified to VTAM, NCP, and host subsystems, and all devices attached to the SNA_Gate must be defined through SNA_Gate configuration macros. To generate an SNA_Gate configuration, users must assemble macros defining the characteristics of each SNA_Gate attachment and execute a configuration generator program to format internal

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▷ to incorporate their products into the SNA market. The SNA_Gate competes with the IBM 3710 in the area of bisync-to-SNA conversion. Both units support multiple downstream protocols including BSC RJE, and asynchronous ASCII. But Netlink has an edge over the IBM model since the basic IBM 3710 with one adapter costs about \$20,000, while Netlink's *most* expensive model costs \$9,500. Also, the SNA_Gate supports BSC 3275 devices, whereas the 3710 cannot support such devices.

In the area of async-to-SNA conversion, IBM's 3174 is also comparable to the SNA_Gate, but there is one major difference. The 3174 supports about 21 different terminals. If a user has a terminal that is not on the 3174 list, that terminal cannot be connected to the SNA environment. With the SNA_Gate, however, all asynchronous devices are supported. The 3174 Model 51R costs \$8,200.

IBM's 3708, another competitor, can be expanded to include any asynchronous device (through the help of software), but, like the 3174, this unit is also incapable of concurrent conversion of multiple protocols to SNA. The 3708 costs \$4,500 for a single unit.

Unlike all the competition, the SNA_Gate is capable of remote softloading and EC/Release level changes over the SNA network, and the unit also supports a 3777 RJE facility with multiple LUs.

Netlink has a successful reputation abroad and, domestically, is earning a reputation as a responsible company with reliable devices, but the struggle for dominance in the SNA environment will be tougher here since IBM has such a strong market presence in the U.S. End users with a mixed bag of protocols who have chosen the SNA_Gate, however, are quick to recommend the device. If Netlink continues to produce products on the level of the SNA_Gate and to provide outstanding customer support, the company will grow to have a healthy share of the SNA-product marketplace.

ADVANTAGES AND RESTRICTIONS

The SNA_Gate offers several important advantages in SNA network environments. The major advantage is that the product is softloaded and centrally managed. Because it is softloaded, a user can configure or reconfigure remote boxes from a central site. Users can also trigger passwords downline using a VTAM CLIST. The SNA_Gate's software-based operation permits adaptation to both asynchronous protocols and a variety of BSC implementations, particularly older ones for which there are few conversion products available. (Many BSC devices operate differently from the IBM standard and, therefore, do not implement all functions. Because the SNA_Gate is software driven, it is possible to overcome idiosyncrasies in the BSC protocol that may affect operation in the SNA network.)

The SNA_Gate is centrally controlled and loaded and operates under IBM's network management programs. Also, the unit accommodates multiple protocols down-

▷ tables for devices attached to the SNA_Gate. Supermacros defining the characteristics of commonly used terminals are provided with the system. Error indications are shown on an alphanumeric display, and LEDs monitor system status and line activity. ASCII and BSC port parameters are configured via a host-resident Network Support Program and downline loaded to the SNA_Gate.

A user may extend supermacros if necessary. The configurations and any executable code are stored in a host-resident library. ASCII and BSC port parameters are configured via the host-resident Network Support Program and downloaded to the SNA_Gate. (The NSP controls the SNA_Gate while it is attached to the network.)

The SNA_Gate's operating program includes commands that are used to communicate with the host itself and the NSP that resides within it. These commands are used to send a message from the SNA_Gate to the host, establish a local session between the SNA_Gate and another attached device, establish a session with the SNA_Gate's Network Processor Control Point, display SNA_Gate status, send an SNA command, send a message on behalf of another attached device, or end a local session. A user may enter the SNA_Gate commands from any attached device that supports a keyboard.

When the SNA_Gate is powered on or reset, it first runs a series of diagnostics, including ROM checksum, RAM non-destructive and destructive tests, an SDLC line test, a timer test, and a test of power supplies. If the diagnostic tests are completed successfully, a bootstrap program logs onto the host-resident NSP and identifies itself by sending a logon from the Network Processor Control Point, which provides network services such as loading, dumping, and status. Logon requests are repeated automatically every two minutes until a session is bound with NSP. When a session is bound, the SNA_Gate either dumps or loads its memory. After the operating program, configuration, and any patches are loaded into the SNA_Gate, the NSP is unbound, and there is no further communication between the SNA_Gate and the NSP until another downline load or upline dump is required, or an operator sends a command, through NSP, to the SNA_Gate Network Processor Control Point.

Users can monitor and control the activity of the NSP through a Network Support Console, which is any configuration-authorized LU Type 1 or Type 2 device anywhere in the network. While logged on, the console receives messages about NSP activities. Users wishing to access these messages may do so by entering a predefined terminal logon sequence and entering a valid password. Once logged on through a Network Support Console, an operator may issue a command to initiate a printer to act as a logging device for all NSP message traffic. Through a series of NSP commands entered through the console, operators may perform a variety of functions, e.g., start or stop a log of NSP activity, add an SNA_Gate definition to those defined in the start-up procedure, reload the SNA_Gate from the host, communicate with the Network Processor Control Point regarding SNA_Gate control, and so forth.

The SNA_Gate supports software modules through which the various types of emulation are implemented. These modules include an SNA PU.T2 module, an asynchronous communications module, an RJE station facility module, and a bisynchronous communications module. The modules provide the following basic functions:

- SNA PU.T2 module—provides a modular software structure with well-defined interfaces between layers that conforms to the structure of SNA. Discrete layered support includes Data Link Control, Path Control, Transmission Control, Data Flow Control, Network Addressable Unit

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stream and allows the user of the product to achieve a pure SNA backbone in the network. A unique characteristic is its ability to allow a user to log on to an application through the SNA_Gate as an LU Type 2 device and switch to an LU Type 1 device. This feature allows interleaving operation in both interactive and batch modes.

The SNA_Gate offers several advantages to the user in a typical IBM environment. By moving BSC processing to an SNA_Gate, a significant number of 37X5 cycles will be free for SNA processing, and this might delay the need for the purchase of another 37X5 or an upgrade to a 3705. In applications where incompatible terminals, such as an interactive 3270-type device and a remote RJE, are used for input and high-speed output functions, the SNA_Gate eliminates the need to have the incompatible datastreams from these devices share a band-splitting or channelized modem. By converting both streams to SNA, the SNA_Gate eliminates the need for an Emulator Program and a byte multiplex channel and reduces the number of ports needed on the control unit. The SNA_Gate also allows personal computers to dial into an SNA_Gate port and perform interactive and batch applications concurrently through a "swap-on-bind" command that allows switching back and forth from LU Type 2 to LU Type 1 operation. By allowing MLUs through a single port, the SNA_Gate allows the personal computer to be in session with TSO while JES is transmitting output data to a printer or disk file. In this application, the personal computer user logs onto TSO, CICS, or IMS as a 3270 display screen and then logs onto JES to emulate an IBM 3777/3/4 terminal with MLUs.

While most protocol converters use an 8-bit, Z-80 micro-processor, the SNA_Gate uses Intel's 8086, a 16-bit processor, thus providing faster performance. On the asynchronous side, this increased processor resulted in the ability to process input from 16 PCs at 1200 bps in file transfer mode using an LU1 flow or 8 2400 bps PCs transferring data using an LU1 flow. On the bisynchronous side, the processor can accommodate two 9600 bps or four 4800 bps bisynchronous lines or up to 12 at 2400 bps.

There are a number of operating constraints associated with the SNA_Gate. An ASCII VDU being used for 3274 emulation must have cursor positioning string in order to operate with the SNA_Gate. In addition, keys which do not send a character sequence to the SNA_Gate cannot be used for 3274 emulation because, although these keys have a local effect, the SNA_Gate will not note any changes.

Operating restrictions, specific to certain terminals, also exist. A VT100, for example, defines attribute sequences for intensity, underscore, blink, and reverse video; however, without an Advanced Video Option, only underscore and reverse video will have any effect. Additionally, the VT100 status line will consist of only four LEDs.

USER REACTION

We spoke with three SNA_Gate users whose names were provided by Netlink. Each of the users had responsibility for systems management in IBM environments of large

Services, up to 255 Logical Units, SNA Capabilities, and Communications Network Management.

- **Asynchronous communications**—allows asynchronous ASCII devices (TTY compatible) to work as LU Type 0, Type 1, or Type 2 devices in an SNA network. Additional support is provided to allow an ASCII device to look like the datastream from an IBM 3767 or 3776 with an extension supporting outbound Function Management Headers. This allows access to RJE packages, TSO, CICS, and IMS. ASCII devices that will operate with the SNA_Gate include keyboard printers, terminals, visual display units (VDUs), microcomputers, minicomputers, output-only devices, letter-quality printers, plotters, and optical character readers. The asynchronous module supports IBM 3767 screens in line-by-line or full-screen emulation of IBM 3278 Models 2, 3, 4, 5, and 3279 four-color devices. This allows asynchronous ASCII VDUs to be functionally compatible with IBM 3278 VDUs. The module provides code and configuration parameters that take advantage of functions similar to an IBM 3278, commonly available on ASCII screens. An ASCII module "swap-on-bind" command allows a user to log on to the SNA_Gate as an LU Type 2 device and then switch to an LU Type 1 device, and vice versa. Another command permits multiple logical units on a single ASCII port.
- **RJE Station Facility**—allows the SNA_Gate to act as a multiple logical unit (MLU) RJE station. The RJE Station Facility is a series of up to eight LUs that can log on to JES2 or JES3 automatically when the SNA_Gate is loaded, or from any device attached to the SNA_Gate. To achieve this capability, the user must define additional LUs, end of sessions that run on the logical line defined in JES2 rather than physical devices in the SNA_Gate. LU Type 1 devices that establish local sessions with the RJE Station Facility identify themselves as readers, printers, punches, exchange disks, or consoles.
- **Bisynchronous communications module**—maps BSC protocols to SNA. This capability allows IBM 2770, 2780, 3780, 3741, polled 3780 or 3270 devices, as well as RJE and data-entry terminals, minicomputers, microcomputers, or mainframes using the BSC protocol, to access a host operating under SNA. The mapping performed for BSC preserves the end-to-end nature of SNA.

As an option, the SNA_Gate may be equipped with a Burroughs Poll Select emulator module, which allows Burroughs TD 830 terminals to emulate LU Type 2 devices with limitations and TC 4000 printers to emulate LU Type 1 units. Also available through this module is upstream passthrough capability for Burroughs terminals to a Burroughs 6700, 6800 CPU; the ability to log on to either an IBM or Burroughs host and switch between the two on a session basis; support, through configuration macros, for configuring Burroughs terminals; and LU Type 0 emulation.

PHYSICAL SPECIFICATIONS

The SNA_Gate is 7.08 inches high, 17.44 inches wide, 19.125 inches deep, and weighs approximately 30 pounds. Power requirements are as follows: 120 VAC or 240 VAC; 140 W; and 50 to 60 Hz.

PRICING

The async/bisync 3703-1 ranges in price from \$6,000 to \$9,500; the 3703-1A, asynchronous-only model ranges from \$4,000 to \$8,000; and the 3703-1B, bisynchronous-only model costs between \$4,500 and \$6,000. Quantity discounts are available. ■

companies. Overall, all the users were quite pleased with Netlink's product and would recommend it to potential buyers.

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▷ The first user has had the Multifunction SNA_Gate for over 1½ years. The unit connects 10 to 12 asynchronous RJE stations and bisync devices to the SNA 3090 host. In the area of bisynchronous conversion, the user said that "no other box does what the SNA_Gate does." The user rated the ease of operation, hardware reliability, and ease of installation excellent. He uses the third-party maintenance policy offered by Netlink and rated it fair. Overall, however, he gave the SNA_Gate a rating of good.

A second user we interviewed gave the SNA_Gate top marks in all areas. Her company, a medical school and hospital, wanted to modernize its network, which had several asynchronous and bisynchronous lines. The company wanted to clear up its 3275 communications controller and use a protocol converter for faster response time. However, it had a handful of different devices and needed a converter that would convert all sorts of protocols to SNA to run with its IBM 3081 host. Several peers in shops that use SNA_Gates recommended the product. So 1½ years ago, the company had one installed.

The company now attaches seven devices to the SNA_Gate and has had no problems at all. The user was especially impressed by the sophistication of the product which, she said, "has a lot of power." Her operations department, in fact, doesn't have to do much with the SNA_Gate. They've only had to reload it a few times, but otherwise can forget about it. The user emphasized the excellence of the maintenance service and technical support. "The amount of time they've spent with us has been great," she told us. Two people were sent to her company to help install the SNA_Gate initially. They connected the async and bisync devices to the unit, and she has experienced no problems with the product for the subsequent 1½ years.

The major advantage she found was the flexibility of the SNA_Gate. "It can be tailored to fit all sorts of devices. If you have an unusual situation, Netlink will write a program for it." She also liked the fact that a user can set up his/her own parameters in a software library. She concluded her evaluation by rating ease of operation, hardware reliability, maintenance service, and ease of installation excellent. "We're very satisfied."

The third user works for a payroll processing company that has 6,800 clients who transfer data from PCs to the company's mainframe. The company originally had a 3703 Network Processor (SNA_Gate's predecessor), but swapped it for the Netlink SNA_Gate. While the user was quite happy with the 3703, he is even more pleased with the new product. He uses the multifunction model of the SNA_Gate (Model 3701-1) for async-to-SNA and bisync-to-SNA conversion. He found that the product has a faster chip,

more memory, a nicer chassis design, and a lower price than the 3703.

According to the user, the file transfer application is one of the most difficult applications in which a cluster controller can perform. "We couldn't find an IBM controller that worked in file transfer mode. We couldn't find *any* that worked in a peer-to-peer SNA network." His company uses six to eight ports at one time and no device other than the SNA_Gate could support that need. One of the features he likes on the SNA_Gate is that it can be software uploaded or downloaded. A person can be at the central site and reset a device in a remote area.

The user said his network works in this way: the company gives its clients payroll-oriented software to run on their PCs. When all the data has been input, a client will send asynchronous data on a dial-up basis. At that point, the data hits the SNA_Gate, and then it is sent to the IBM 4381 host. The company has about 40 data centers around the country. Since the SNA_Gate was installed, the user said that it not only has saved his company money, but it is making money in the file transfer application.

The user initially experienced some problems in the hardware reliability department, but it was the packaging of the product that was at fault. One out of ten boxes was not functional because the vertically mounted cards were unseated, but Netlink immediately replaced the products. (Netlink later addressed that problem with a modification that prevents the unseating of the cards. The modification has since been done on all subsequent models.) The user rated the reliability of the hardware very good. He has experienced problems with the product, but he said the vendor worked very well with his department. "You couldn't ask for better support."

Like the second user we interviewed, this user was quite impressed with Netlink's support crew. "They work very closely with us to tune that software to work with the application and to maximize throughput." The user said he's had no problems with the product because it is centrally supported.

He also commented that the SNA_Gate is extremely flexible. "It can handle different protocols on every port of the device. And the fact that it is software programmable is even better."

To conclude, the user said that his company evaluated several protocol conversion products about a year ago, including IBM's 7426, 7171, 3708, and some Avatar, Case, and Wall Data products, "but for what we do, file transfer, this is the best box" on the market. □