NCR Comten 5600 Communications Processors

In this report:

Product Summary

Editor's Note

NCR Comten is no longer actively marketing the 3695 and 5660 Communications Processors. The company is now focusing on the 5600 family, which offers a wide range of performance levels.

Description

The 5600 family includes the entry-level 5620XP, which supports up to 2 hosts and 64 lines; the 5655 midrange, which supports up to 8 hosts and 512 lines; the 5665, which supports up to 8 hosts and 1,024 lines; and the 5675, which supports up to 16 hosts and 1,024 lines.

The 5675, the highest performance SNA-compatible processor in the industry, offers eight to nine times the performance power of the 5620XP. The main storage capacity of the 5665 is 4 to 8 megabytes; of the 5665, 4 to 16 megabytes; and of the 5675, 8 to 16 megabytes.

The 5600 processors support SNA and multivendor environments. Connectivity options support the direct termination of up to 24 T1 lines. The Comten Overview, an intelligent network console facility, centrally controls multiple NCR Comten processors. SNA compatibility enables the processors to send information to the host-based NetView console.

Strengths

The processors accommodate flexible configurations for redundancy and backup. Hardware and software compatibility preserves users' investments. The machines can support up to 64 token-ring LANs.

Limitations

The 5600 family is limited only by the constraints of the technology employed.

Competition

Amdahl 4745, IBM 3745.

Vendor

NCR Comten
2700 Snelling Avenue N.
St. Paul, MN 55113
(612) 638-7777

Price

$122,100 to $254,000.

Analysis

Product Strategy

NCR Comten has streamlined its communications processor line into the 5600 family. The modularly designed machines include the 5620XP entry-level, 5655 midrange, 5665 high-end, and 5675 high-end, high-volume models. NCR based these processors on the architecture of the popular Comten 5660. Hardware and software compatibility runs through the family, as well as to the 5660 and 369X, which are no longer actively marketed.

Although communications processor technology dates back to the early '70s, NCR Comten has endowed its 5600 machines with features of the '90s. The 5675 can support up to 24 T1 interfaces and up to 64 token-ring LANs. Protocols supported include SDLC/SNA, LU6.2, BSC, X.25, and X.21.

Decision Points

The Comten 5600 processors enhance network reliability through a variety of features that support redundancy and backup. The company offers options of one standby processor for each active processor, a method that delivers 100 percent redundancy. For greater cost-effectiveness, one standby processor can backup many active processors. This method allows the backup processor to shoulder the load of one of the processors it backs up.

The modular design of the 5600 processors offers many advantages. Users can adjust to network growth requirements by initiating on-site upgrades and on-site attachments expansion. Modularity allows users to add line, channel, T1, or token-ring connections when needed. The bottom line of modular design is the freedom it conveys to users to invest in equipment only when necessary.

System upgrades, performed at the customer's site, usually require less than four hours for completion. In addition, upgrades do not necessitate modifications in network software or configurations. Upgrading a machine does not require the addition of a second CPU. In Comten 5600 processors, the performance of the CPU is upgraded. This method eliminates the lengthy process of reconfiguring the network to decide which CPU will support lines, LANs, or interfaces.

The Comten Universal Communications Adapter (UCA) eliminates many network headaches. UCA creates up to two active and two backup data paths between the processor and the communications modules. Users can determine the degree of backup or availability required by each network node. Through the UCA, users can back up all segments of their processors and the attached lines. The device enables users to switch among multiple communications processors.

Acting as an automated control facility for NCR Comten processors in a network, the Comten Overview operates in the PC-based system console. Comten Overview operators can create and store often-used command sequences in the system to be automatically activated in response to predefined conditions. Automating commands reduces the possibility of operator errors.

The number of components in the 56X5 family is 40 percent less than previous models. The technology incorporated into the design of the processors is based on application-specific integrated circuitry, which reduces floor space, power, and cooling requirements.

Each Comten 56X5 processor supports up to 64 token-ring interfaces. Support for this large amount of token-ring traffic occurs in an efficient manner because NCR Comten has incorporated intelligence into the processors' token-ring interface modules.

Competitive Position

For 18 years, NCR Comten has been developing, manufacturing, marketing, and servicing data communications systems and networking software. Second to IBM in the market, NCR Comten is the leading vendor of communications processors for the IBM environment. For many years, NCR based its marketing strategy on the concept of making it easy for an IBM user to install an NCR Comten communications processor in an SNA network.

Company Profile
NCR Comten

Corporate Headquarters
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Officers
President: A. Daniel Pigott

Company Background
NCR Comten, a subsidiary of NCR Corporation since 1979, designs, manufactures, services, and markets a variety of data communications equipment, including data communications processors and networking software. The company has specialized in data communications systems since 1968 and ranks second to IBM in offering communications processors for the IBM mainframe environment. In 1972, the company delivered its first IBM-compatible communications processor.

In July 1989, NCR Corporation structured NCR Comten as the Network Products Division within its newly formed General Purpose Products Group (GPPG) and appointed NCR Comten president, A. Daniel Pigott, to head the new division. Primarily, GPPG develops and produces platform products for the corporation.

Acting as the Network Products Division, NCR Comten's charter calls for it to serve as NCR's principal source of goods and services in domestic and international markets for computer networks. In essence, the charter assigns NCR Comten responsibility for the intercommunication of all NCR products, such as LANs, workstations, mainframes, terminals, or geographically dispersed networks.

NCR Comten's responsibilities include developing overall networking strategies and architectures for the NCR Corporation; publishing and formulating network interconnect standards; developing and producing products for chartered offerings; providing network design, integration, and implementation services; providing direct sales and support; and establishing strategic alliances.

In October 1989, the company entered a new area of communications by introducing the NCR 5480 series of packet-switching processors. The NCR 5480 allow users to establish X.25 standards-based wide area networks to attain multivendor connectivity while preserving their SNA investments. NCR Comten's direct sales force markets the 5480.

This year, NCR Comten announced the Bridgeport series of token-ring bridges and related peripherals. Available in three models, the bridges are the 7404, 7604, and 7412. The Bridgeport family enables users to integrate token-ring LANs into wide area networks.

In February 1989, NCR Comten extended an agreement with Alcatel Business Systems Limited, U.K., in which Alcatel continues to receive the rights to market NCR Comten data communications systems. The agreement, entered into in 1977 and extending until 1994, authorizes Alcatel to market, install, and service NCR Comten data communications systems and software in 14 Western European countries.

In recent years, however, NCR has focused on support for multivendor communications and evolving standards. To remain competitive, the company has looked beyond IBM and begun to produce products that interconnect to OSI and ISDN systems. NCR Comten accomplished this goal through the 5600 Communications Processors. In October 1989, NCR Comten announced Comten TCP/IP, which provides multivendor interoperability among devices in SNA and TCP/IP networks.

When configured as a front-end processor, the 5620XP competes against the IBM 3720 processor. When configured as a remote concentrator, however, the 5620XP competes against sophisticated high-end statistical multiplexers from AT&T, Codex, DCA, Infotron, and Timeplex. The 5655, 5665, and 5675 go up against IBM's 3725 and 3745 processors. According to NCR Comten, the high-end 5675 offers up to 2½ times the performance of an IBM 3745.

Characteristics

Overview

The 5600 family includes the entry-level 5620XP, which supports up to 2 hosts and 64 lines; the 5655 midrange, which supports up to 8 hosts and 512 lines; the 5665, which supports up to 8 hosts and 1,024 lines; and the 5675, which supports up to 16 hosts and 1,024 lines.

The processors offer a range of redundancy options, including one standby processor for each active processor to provide 100 percent redundancy. In addition, one standby processor backs up multiple active processors for greater cost-effectiveness. The machines are compatible with SNA architectures, and they can access multivendor equipment. A common software set runs on all 5600 Comten processors.

Universal Communications Adapter (UCA)

The Comten Universal Communications Adapter (UCA) provides up to two active and two back-up data paths between the processor and the communications modules. Through the UCA, users have as an option the capability of backing up all portions of their communications processors and their attached communications lines. The UCA allows users to switch among multiple communications processors, thereby attaining full use of all their processors. When backup occurs, users can switch network traffic off the designated system to other active systems.

The UCA operates by concentrating data from NCR Comten communications line terminal equipment and routing it through the input/output channels of one or more attached NCR Comten processors. For maximum network availability, each Comten UCA implements data routing through two online and two backup channel connections, increasing users' options for data routing during routine or emergency maintenance and for load balancing during peak traffic periods. UCA provides an aggregate throughput of 512K characters per second.

5620XP Processor

The Comten 5620XP supports up to two host processors and can support up to 64 full-duplex or half-duplex lines in any of three configurations: as a front-end processor, as a remote concentrator, or as a front-end processor and remote concentrator.

The NCR Comten 5620XP Communications Processor is hardware/software compatible with IBM host processors and with the Comten 3600 Series. The 5620XP functions as a direct replacement for an IBM 370X or 270X Communications Controller. It uses IBM Virtual Telecommunications Access Method (VTAM), Telecommunications Access Method (TCAM), Advanced Communication Function/Telecommunications Access Method (ACF/TCAM), and ACF/VTAM and provides an IBM 270X/370X-compatible interface through a channel interface adapter.

The 5620XP can handle switching, polling, routing, error recovery, automated dialing, multiplexing, and data concentration. Since the 5620XP does not require special computer room conditions, users can install the unit in an office environment. The system runs all of NCR Comten's networking products and supports various terminals and protocols.

Configuration

A fully configured 5620XP has a CPU, four communications subsystems, a fixed disk drive, and a channel interface adapter for host connections. Each communications subsystem handles up to 16 communications lines. With four communications subsystems, the 5620XP can support up to 64 full- or half-duplex lines and one or two host computers. The Comten 5620XP channel interface adapter unit supports IBM, IBM-compatible, or NCR hosts and asynchronous, bisynchronous, SDLC, and X.25 line protocols. The fixed disk drive supports rapid restart and recovery capabilities and allows virtually unattended remote operation.

The 5620XP's modular architecture employs very large-scale integration (VLSI) technology that provides greater reliability, lowers power consumption, and requires less space (smaller footprint).

Users can replace one or two of the 5620XP's four subsystems with a Comten Integrated Protocol Converter (IPC), which converts asynchronous protocol to bisynchronous protocol for accessing IBM 3270 applications from an asynchronous terminal. Comten IPCs also pass through data from asynchronous terminals without protocol conversion so that the terminals can access both bisynchronous and asynchronous applications without additional hardware or software changes. On the older 5620, the IPC option provided 32 additional lines, allowing the system to support up to 64 lines. On the 5620XP, the addition of IPCs increases maximum system capacity to 96 lines.

56X5 Processors

Based on the architecture of the Comten 5660, the 56X5 processors, which include the 5655, 5665, and 5675 models, can function as channel-attached or remote processors, or perform both functions simultaneously. The processors feature 64K bytes of cache memory and an 80-megabyte hard disk. Separate line termination modules increase network availability through flexible line switching and backup options. To facilitate servicing, each communications base module, connecting up to 16 lines, can be serviced individually without disrupting the remaining active lines.

Table 1. Processor Comparison Chart

	Comten 5620XP	Comten 5655	Comten 5665	Comten 5675
Relative Performance*	0.25	1.0	1.5	2.25
Channel-Connected Hosts	Up to 2	Up to 8	Up to 8	Up to 16
Lines	Up to 64	Up to 512	Up to 1.024	Up to 1,024
T1 Links	NA	Up to 16	Up to 16	Up to 24
Token-Ring LANs	Up to 2	Up to 64	Up to 64	Up to 64
Main Storage (min./max.) (M bytes)	1/4	4/8	4/16	8/16
Fixed Disk Capacity (M bytes)	20	80	80	80
System Console	Yes (optional)	Intelligent	Intelligent	Intelligent

**These figures compare the ability of NCR Comten processors to handle real interactive data communications, not an artificial test environment. The Comten 5655 is used as the baseline for this comparison.*
NA—Not applicable.

Standard with the 56X5 family, the NCR Comten intelligent system console, equipped with Comten Overview, supplies automated responses to user-defined network events. Overview provides help screens and menu interfaces to assist personnel.

Comten 56X5 processors promote token-ring connectivity. They handle token-ring traffic via the intelligence in the processor's token-ring interface module. Each Comten 56X5 processor supports up to 64 token-ring interfaces.

Users can network Comten 56X5 processors with Comten 369X and 56X0 processors, as well as with IBM 3745 and 372X systems. Comten Communications Operating System 2 (COS2) Release 4 runs on the 56X5 processors and on the 369X and 56X0 machines. The 5600 processors offer SNA compatibility and enable SNA networks to communicate with multivendor environments without requiring SNA network changes. As a result of their SNA compatibility, processors can also send information to the host-based NetView console.

The 56X5 processors share line termination equipment with the 369X and 5660 processors, such as 16-Line Communications Bases (CBs), Data Link Control-Modem Interface Modules (DLC-MIMS), High-Speed Link Control (HLC) MIMs, and Integrated Protocol Converters (IPCs).

Configuration

See Table 1.

Transmission Specifications

For line speeds up to 56K/64K bps, Comten Communications Bases effect termination for up to eight lines. For speeds up to 256K bps, the Comten HLC-MIM supplies termination for up to four lines. For speeds up to 1.544M/2.048M bps (T1/E1), Comten T1 Interface Modules provide the termination. The communications processors support up to 24 T1 interfaces.

Software

Comten Advanced Communications Function/Network Control Program (ACF/NCP) Version 5 supports distributed peer-to-peer sessions over wide area SNA networks with minimal host intervention. The program allows Node Type (NT) 2.1 devices to use the Logical Unit (LU) 6.2 protocol to conduct peer-to-peer sessions over wide area SNA networks. This version produces host-independent network statistics not available through the IBM communications processor. Users can initiate and collect these statistics through the NCR Comten console, the Comten Support Facility, or NetView.

ACF/NCP Version 5 resides in a Comten 5620 or in the Comten 56X5 family of communications processors. It is compatible with earlier processor models. Version 5 is functionally compatible with, and provides features found in, IBM's ACF/NCP Version 5 Releases 1 and 2. Capabilities provided by NCR's ACF/NCP Version 5 not found in IBM's version include usage statistics for network tuning, multiple ACF/NCP environments in a single Comten communications processor, and a feature that allows switched-line bisynchronous devices, such as PCs, to access applications in SNA mainframes.

Comten TCP/IP and Comten Ethernet LAN Interface foster interoperability among devices in SNA and TCP/IP networks, allowing users to share resources such as communications lines and to interoperate among various software applications in the network. These products assist users with SNA networks and Ethernet LANs running TCP/IP at local SNA mainframe sites and remote sites.

The TCP/IP/SNA network opens up two-way interoperability among Ethernet LANs using TCP/IP and SNA devices. Devices in the SNA network can interoperate with SNA applications and applications on Ethernet LANs. Similarly, Ethernet LAN devices using TCP/IP

can interoperate with SNA applications, such as file transfer, electronic mail, and remote terminal logon.

In addition, the products enable Ethernet LAN users to interoperate with other local Ethernet devices and remote Ethernet devices without taxing the mainframe. NCR Comten processors can connect up to 48 Ethernet LANs running TCP/IP. Comten TCP/IP can coexist with Simple Network Management Protocol (SNMP) operating in a TCP/IP network. For users who create a centralized system, TCP/IP is included among the products for which NCR Comten offers NetView support. Through the Comten Support Facility (CSF), the NetView operator can issue commands and receive responses to manage NCR Comten products. The operator can also gather statistics on network usage and performance.

Comten OSI/CP. Comten Open Systems Interconnection/Communications Processor (OSI/CP), running in an NCR Comten communications processor, lets OSI end systems interoperate over a single multipurpose wide area network, independent of the mainframe. This direct data path allows end systems to exchange files or electronic mail while freeing applications processing cycles that would otherwise be used for data routing.

The system provides interoperability among OSI end systems located on Ethernet LANs or X.25 networks. In addition, Comten OSI/CP allows these users to access OSI applications on the mainframe. As a network-based solution for integrating OSI, TCP/IP, and SNA networking environments, Comten OSI/CP allows the wide area network infrastructure to be shared by multiple environments.

The host prerequisites for Comten OSI/CP are an IBM or IBM-compatible host processor operating in the OS/MVS, DOS/VSE, or VM environments and running VTAM Version 3 Release 2 or higher. The NCR Comten prerequisites for running OSI/CP are Comten 369X or 5600 communications processors; Comten Communications Operating System (COS2) Release 5 or higher; ACF/NCP Version 4.2 or higher, Comten Network Support Services (NSS2) Release 2 or higher; Comten Language Support System (CLSS1) Release 4 or higher; and Comten Enhanced Generation (EGEN) Release 3 or higher.

In addition, the following products support specific features and capabilities as noted:

- Comten Network Interface Adapter (NIA) with appropriate Ethernet features for the direct attachment of Ethernet LANs to the communications processor, and
- Comten X.25 Version 2 Release 2, including these separately licensed features: NCP Packet Switching Interface (NPSI), Comten Networking System 3 (CNS3) Release 3E or higher, Comten Support Facility Release 1 or higher for NetView support, and Comten TCP/IP Release 1 or higher for TCP/IP support and host applications.

Pricing and Support

The base configuration for the Comten 5655 is $122,100; for the Comten 5665, $187,000; for the Comten 5675, $254,000.

Equipment Prices

		Purchase Price ($)
Comten 5655	Processor, 80MB hard disk, 4MB main storage, remote expansion cabinet, UCA, two 16-Line Communications Bases, 8 RS-232-C Line Interface Features	122,100
Comten 5665	Processor, 80MB hard disk, 4MB main storage, remote expansion cabinet, UCA, two 16-Line Communications Bases, 8 RS-232-C Line Interface Features	187,000
Comten 5675	Processor, 80MB hard disk, 8MB main storage, remote expansion cabinet, UCA, two 16-Line Communications Bases, 8 RS-232-C Line Interface Features	254,000

Software Prices

		Monthly License Fee ($)	Annual License Fee ($)
ACF/NCP V 5	Comten 5620	395	4,345
ACF/NCP V 5	Comten 5655	895	9,845
ACF/NCP V 5	Comten 5665	1,365	15,015
ACF/NCP V 5	Comten 5675	1,575	17,325

Ethernet LAN Interface

		Purchase Price ($)	Monthly Maint.
Ethernet	Interface	8,000	83
Ethernet	Additional interfaces	3,000	50

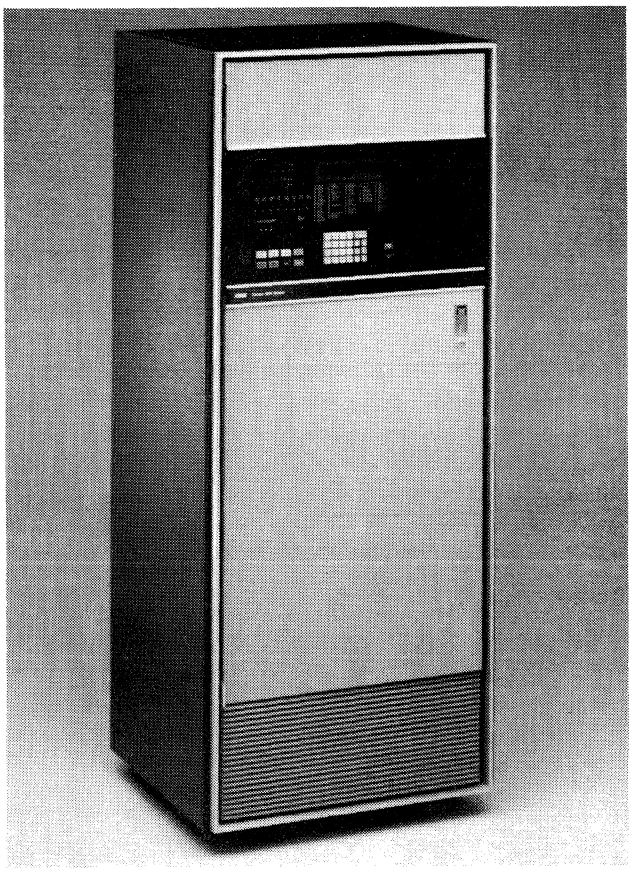
TC/IP Software

		Initial License Fee ($)	Monthly License Fee ($)	Yearly License Fee ($)
Basic	Communications processor TCP/IP software	10,000	200	2,200
SNA mainframe	Support for file transfer and electronic mail applications (SNA mainframe resident)	12,000	300	3,300
Telnet Client	Communications processor-resident TCP/IP to SNA software	4,000	100	1,100

NCR Comten 3695 Communications Processor

datapro ANALYSIS

UPDATE: *To achieve higher productivity and to maintain its competitive edge in the communications market, NCR Comten, over the past year, tightened up its product line to focus on its communications processors—an area it considers its "mainline" business. To this end, the 3600 Series is now the 3695, which along with the Comten 5620XP and the Comten 5660 make up NCR Comten's communications processors product line. This year, the company also withdrew from the modem and the private X.25 network equipment market.*



The Comten 3695 is the middle model in the company's communications processor line. It operates in medium-to-large communications networks.

VENDOR: NCR Comten, Inc., 2700 Snelling Avenue North, St. Paul, Minnesota 55113. Telephone (612) 638-7777.
MODEL: 3695.
FUNCTION: Front-end or remote full-service communications processors with message switching available in some configurations.
HOST COMPUTERS SUPPORTED: IBM and compatible mainframes; NCR mainframes.
ARCHITECTURE SUPPORTED: SNA; proprietary trunk protocol.
OPERATING SOFTWARE: SCS/63; Communications Operating System 2 (COS2).
COMPETITION: IBM 3720, 3725, and 3745; Amdahl 4705; CCI CC8, CC80, and CC85; Memorex 1270.
PRICE: Prices range from $124,000 to $771,000 depending upon configuration.

REPORT HIGHLIGHTS: **PAGE**

NCR Comten, a subsidiary of NCR Corporation, has been in the IBM-compatible business for over 20 years. It follows IBM as the leading vendor of communications processors for the IBM-mainframe environment. NCR Comten has over 100 sales and service facilities in the United States and Canada. The company also markets its products in Western Europe, the Far East, the Middle East, Africa, South America, and Australia.

Over the last several years, the 3600 Series communications processors have undergone a major overhaul. In 1984, NCR Comten removed the 3670 from manufacturing and began offering it on a limited basis from stock. Also, in 1983 and 1984, the company introduced new lines of its 3650 and 3690 models featuring a streamlined, internal architecture. Just last year, however, NCR Comten ceased marketing its 3650 and 3690 models. In 1986, the Comten 3695, now the lone model in the 3600 line, was added to the 3600 Series product line. Other changes include new networking software, Communications Operating System 2 (COS2), to replace the old operating system, and the CAM3 access method, which is a language for writing applications to run independently of the host processor.

NCR Comten 3695 Communications Processor

The other major NCR Comten communications processor product line is the 5600 Series, which includes the 5620XP and the 5660 communications processors. (For complete details on the 5620XP and the 5660 models, see Reports C13-656-151 and C13-656-301, respectively.) Both the 3695 and the 5600 Series products are compatible with IBM equipment and major common-carrier services. They are, in fact, IBM's major competition in the communications processor market.

The Comten 3695, the middle model in the Comten communications processor line, operates in medium-to-large communications networks and is fully compatible with all NCR Comten communications products, using the full range of NCR Comten network communications hardware and software. Through new packaging technology and space-saving components, the Comten 3695 offers a very small footprint that frees up floor space in the data center.

The 3695 operates as a front-end processor, a remote communications processor, or a combination of both. It supports up to eight mainframes, 4M bytes of main memory, and up to 512 communications lines. The 3695 hardware configuration uses a hierarchical architecture common among communications processors. On the network side, it uses a two-level attachment, with Modem Interface Modules (MIMs) connecting physical-level Line Interface Features to the central processor. Four basic types of MIMs are available: an asynchronous unit, a BSC-MIM, a programmable DLC-MIM, and a programmable HLC-MIM.

The 3695 processors run Comten-developed programs compatible with IBM software for 270X emulation and SNA network control. The NCR Comten programs are named similarly to their IBM counterparts: EP, ACF/NCP, PEP, etc. For connectivity to non-IBM mainframes, NCR Comten offers MAP/RHO software. In addition, the 3695 supports an X.25 interface that runs under the Communications Access Method 3 (CAM3). CAM3 is a telecommunications access method residing in the communications processor. It supports communications application programs such as VIM and IBM Host Interfaces (HIFs). CAM3 is the basis for user-customized communications applications, as well as a central point for controlling network activities. It works with ACF/NCP to set up and control communications sessions, activate and deactivate network components, and do automatic error recovery functions.

The Comten Integrated Protocol Converter (IPC) offers network users entry to 3270 host application programs through asynchronous terminals and personal computers. The modular Comten IPC, which fits in a Data Link Control-Modem Interface Module (DLC-MIM slot), can be installed in a local or remote Comten 3600 communications processor. The Comten IPC appears to the host computer as a 3274 cluster controller, permitting terminals to emulate 3278 display stations. Asynchronous ASCII protocol is converted to appear as BSC protocol, allowing users with non-SNA terminals and personal computers to access SNA and BSC host applications. The unit detects the transmission rate of incoming data automatically and supports line speeds from 300 bps to 9600 bps, X-on/X-off flow control, and up to 32 terminals simultaneously on one IPC.

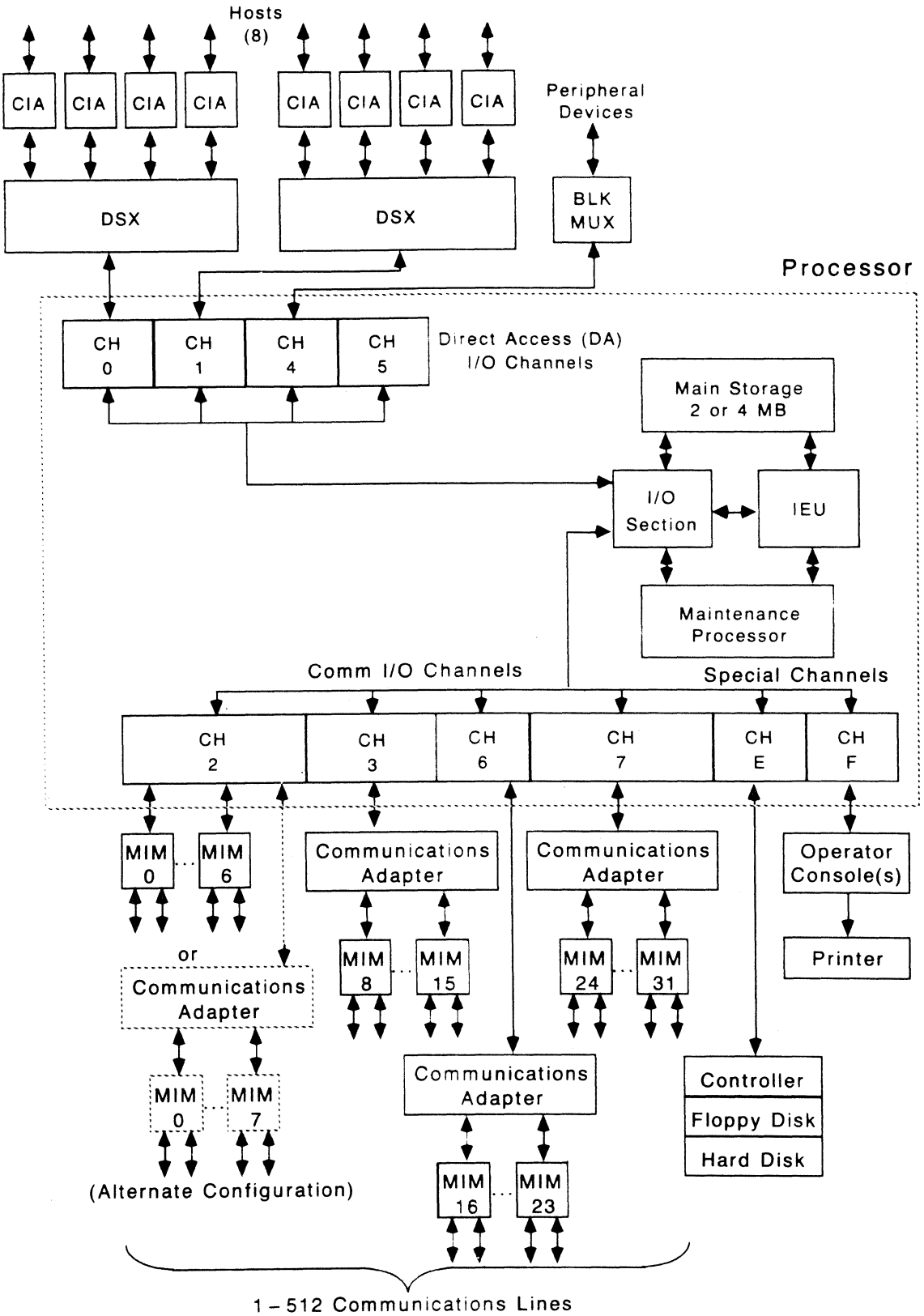
NCR Comten's integrated disk, the Comten T-7362, stores system software load modules and memory dumps in the Comten 3695. The disk is an intelligent storage subsystem with a 29-megabyte fixed disk drive that can be installed in a Comten 3690 cabinet. The disk lets users perform loading and dumping operations at high rates of speed; it can also be set to capture system dumps automatically for analysis following system failure. The user can create load modules at the host processor and then send them to the Comten T-7362 Disk to be saved for later use. The disk saves system dumps and then sends them to the host for printing during a low traffic time. The Comten T-7362 supports the following commands issued from the console: display disk file records, format a disk, display a disk table of contents, delete any file from a disk, and inspect disk sectors. The disk is used in connection with the regular load diskette and functions with the Comten Network Support Services 1 (NSS1) software under the COS2/90.

PRODUCT EVALUATION

The 3695 competes directly with IBM's 37XX processor line. Since the withdrawal of the IBM 3705-II, NCR Comten's main thrust has been against the 3720 and 3725. It will also compete against the recently introduced IBM 3745. The 3695 has several advantages over the 3725: it has more main memory, runs vendor- or user-developed applications software, and supports twice as many communications lines as the 3725. Both the Comten 3695 and the IBM 3725 communications processors offer X.25 capabilities, however. For the non-IBM world, Comten has software that connects to non-IBM hosts.

The NCR Comten processors' restrictions are common to all IBM-compatible equipment. The vendor is constantly one step behind IBM in product development, and is, therefore, always "catching up." But among the IBM-compatible vendors of communications processors, Comten has always been the most aggressive in trying to best IBM in technology. Comten's 3695 is a high performer, and its software is making strides. The CAM3 access method provides a whole new avenue for boosting product value, allowing applications processing in the communications processor. Another advantage of the 3695 processor is its support of local peripheral devices, such as disk drives.

NCR Comten 3695 Communications Processor



Note: MIMS can be replaced with IPCs. See text.

Figure 1. The Comten 3695 Communications Block Diagram.

NCR Comten 3695 Communications Processor

MARKET POSITION

The 3695 leads a small pack that trails IBM by a wide margin in the communications processor market. IBM has a comfortable 85 percent share of the market for communications processors compatible with Big Blue mainframes. Among those trailing NCR Comten in the remaining 15 percent are Amdahl Corporation, with its 4705; Computer Communications, Inc. (CCI), the manufacturer of the CC8, CC80, and CC85 processors; and Memorex' 1270. NCR Comten has sold nearly twice as many communications processors as its nearest rival, CCI, and has been much more aggressive in developing a competitive product for the 1980s.

NCR Comten's marketing strategy is to make it easy for a typical IBM user to install an NCR Comten communications processor in an SNA network. The company also offers value-added features, such as better handling of bisync terminals, that are not found in the most recent IBM releases.

IBM mainframe users are often hesitant to go with another vendor's processor, because they want quick access to software updates. The use of any non-IBM processor means at least a one-release delay. A few years ago, it took NCR Comten between 18 and 24 months to offer compatible software. Now, to maintain compatibility with IBM's software releases, such as Advanced Communications Function/Network Control Program (ACF/NCP), NCR Comten offers a version that is within one release of the IBM version. A Comten spokesperson feels that the one-release difference is not a major problem, since "IBM has to make some concessions to the users and not migrate them very fast. You can't expect every user to migrate everything at once. So VTAM and NCP will be typically forward and backward compatible with each other." If users are willing to put up with this delay, the Comten processors offer the advantages of greater networking flexibility, multivendor support, better prices, and network management between front ends, independent of the host.

NCR Comten's product offerings are reputable—users expect solid, dependable, and easily expanded systems. The Comten 3695 follows that tradition. Currently, NCR Comten communications processors interconnect over 400,000 terminals and host computers in geographically dispersed private and public data communications networks throughout the world.

NCR Comten realizes that to remain competitive, it will have to look beyond the IBM arena, and the company is making plans to support multivendor communications and evolving industry standards. As one NCR Comten official put it, "Our point of emphasis in the future is our role as a general communications processor vendor, supporting a variety of hosts. You can expect to see products from us that allow you to interconnect to ISDN and OSI. We are now actively participating with other companies on both developments. Both are important parts of our future direction." Examples of these future directions are plans for new, enhanced software support for X.25 and Comten's active involvement in ISDN testing.

SPECIFICATIONS

DATE ANNOUNCED: 3695—1986.

DATE FIRST INSTALLED: 3695—1986.

NUMBER INSTALLED: Information not available.

DISTRIBUTION: NCR Comten.

HARDWARE SPECIFICATIONS

3695

The basic 3695 comes in a two-cabinet (Processor Bay and Module Controller Bay) configuration with a printer and operator console(s). Functions directly related to processing are found in the Processor Bay cabinet. The Module Controller Bay expansion cabinets, suited for additional channel-associated or communications-associated modules, have a capacity of eight full rows.

PROCESSOR BAY

The Processor Bay contains the main storage and space for two modules, such as Channel Interface Adapters (CIAs), Modem Interface Modules (MIMs), and Integrated Protocol Converters (IPCs). It also contains the Instruction Execution Unit (IEU), a maintenance processor, a 5.25-inch diskette device, an optional hard disk, and an input/output (I/O) section that contains Direct Access (DA) I/O channels and Communications I/O channels. Through software direction, the IEU controls the 3695's actions. It fetches, manipulates, and stores information through the execution of instructions. The IEU contains the Arithmetic Logic Unit (ALU), general registers, and control registers.

Main storage consists of two banks of storage and a storage controller, accessed by either the IEU or the I/O section. The storage banks each support one storage card, which must be of the same size and used in both banks. The cards are available in 1-megabyte and 2-megabyte sizes.

The microprocessor-controlled Maintenance Processor provides both the operator and service personnel with

NCR Comten 3695 Communications Processor

TABLE 1. COMMUNICATIONS LINE INTERFACES AND MODEM INTERFACE MODULES

TYPE OF INTERFACE	SPEED (bps)	TIMING	MODE	FEATURE NUMBER	LINES PER I/F	EQUIPMENT USED ON	MAX I/F PER
RS-232-C	Up to 1800	Async	NA	F-2072	2	T-2016 or T-2027	8
	Up to 19.2K (1800 SS, 9.6 Extended SS)	Async/Sync	HD/FD	F-2226-A1	2	T-3650-S1	*7
				F-2083-C1	2	T-2020	*8
			HD/FD	F-2155-A1	2	T-2031	*8
			HD/FD	F-2239-A8	4	T-3650-S8, -R8	*3
				F-2226-A1	2	T-3670-M85	*8
	Up to 19.2K	Sync	HD	F-2053-A1	2	T-2018	* †
			FD	F-2053	1	T-2018	†8
	Up to 9600	ECA	HD	F-2053-C1	2	T-2018	†8
	1200	EIA Sync Clock		F-2095	2	T-2018	†8
RS-449	Up to 19.2K	Async/Sync	HD/FD	F-2154-A1	2	T-2031	*8
	Up to 64K	Sync	HD/FD	F-2161	1	T-2031	*2
Wideband (Bell 300 Class)	Up to 50K	Sync	HD	F-2064-A1	1	T-2018	†4
			FD	F-2064-B1	1	T-2018	†2
			HD/FD	F-2227-A1	1	T-3650-S1	*2
			HD/FD	F-2084	1	T-2020	*2
			HD/FD	F-2156-A1	1	T-2031	*2
			HD/FD	F-2227-A1	1	T-3670-M85	*2
	130K-230K	Sync	HD/FD	F-2026	1	T-2017	4
DDS	Up to 9600	Sync	HD	F-2053-A1	2	T-2018	†8
			FD	F-2053-B1	1	T-2018	†8
			HD/FD	F-2226-A1	2	T-3650-S1	*7
			HD/FD	F-2083-C1	2	T-2020	*8
			HD/FD	F-2226-A1	2	T-3670-M85	*8
	56K	Sync	HD	F-2092-A1	2	T-2018	†2
			FD	F-2092-B1, -C1	1	T-2018	†2
			HD/FD	F-2228-A1	1	T-3650-S1	*2
			HD/FD	F-2085	1	T-2020	*2
			HD/FD	F-2157-A1	1	T-2031	*2
			HD/FD	F-2228-A1	1	T-3670-M85	*2
			HD/FD	F-2321-A2	1	T-2028-B1	4
TTY 20- or 60-ma DC Loop		Async	HD	F-2074	2	T-2016	8
Auto Dialing RS-366				F-2033	1	T-2014	16

**Actual line attachability is based on throughput—refer to MIM charts for details.*
†Actual line attachability is based on line speeds—refer to MIM charts for details.

operating and maintenance data and assistance. Data is accessed from the keypad display on the operator/maintenance panel or through the local or remote operator console. Maintenance assistance includes operator-initiated diagnostics for the CPU during power-up, storage diagnostics at power-up, integral hard disk diagnostics, Program Event Recordings (PERs), and initialization of program history.

The 5.25-inch diskette drive is used in the operation and maintenance of the 3695 for the following applications: as an Initial Program Load (IPL) source, to load test software for system maintenance, and to receive a memory dump. The disk resides in the Processor Bay and is accessed through the operator/maintenance panel. It shares a common controller unit with a hard disk drive, which is used only when the 3695 operates in a COS2-based environment. Features supported by the hard disk include automatic system load, automatic system dump, load module control, automatic system reload, and dump module control.

Input/Output (I/O) Section

The Input/Output (I/O) section does I/O transfers between main storage and devices connected to the Direct Access I/O channels, the disk device, the operator console, and the devices connected to the Communications I/O channels. Direct Access I/O channels attach to the I/O section as do the Communications I/O channels. Four Direct Access I/O channels are available: the IBM Channel Interface Adapter (IBM-CIA), NCR Channel Interface Adapter (NCR-CIA), Direct Storage Multiplexer (DSX), and Block Multiplexer.

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- IBM-CIA—logically connects the 3695 to an IBM or IBM-compatible host for sending data to and receiving data from the host. It provides the Comten 3695 with an interface to an IBM S/370 byte or block multiplexer channel. The IBM-CIA makes the 3695 appear as an IBM peripheral device on an IBM host subchannel. It connects directly to a Direct Access I/O channel or to a direct storage multiplexer. The IBM-CIA supports IBM 360/370, 303X, 309X, 43XX, or other compatible host processors.

- NCR-CIA—logically connects the Comten 3695 to an NCR host for sending and receiving data from the host. It provides the 3695 with an interface to an NCR 85XX/86XX VRX TAM host. The NCR-CIA connects to the NCR bit serial link.

- Direct Storage Multiplexer (DSX)—allows four CIAs to be attached to one Direct Access I/O channel. It is housed in the module space of either the Module Controller Bay or the Processor Bay. The CIAs attached to the DSX must be identical.

- Block Multiplexer—attaches to Direct Access I/O channels providing the interface to up to eight IBM or IBM-compatible control units attached to mass storage devices.

Communications I/O Channels

The Comten 3695 features six communications I/O channels. Four of the channels are used by MIMs or IPCs for connection of communications lines to the Comten 3695. The Modem Interface Modules (MIMs) are Comten hardware devices that send incoming and outgoing data between a Communications I/O channel and the modem. The 3695 accommodates BSC-MIMs, A-MIMs, HLC-MIMs, and DLC-MIMs. One of the channels is used by the disk subsystem, and the other channel is used for the operator console. Devices that connect to the Communications I/O channels include the following:

- Data Link Control Modem Interface Module (DLC-MIM)—is located between the communications processor and the modem or locally attached device. The DLC-MIM has two main functions: it provides control and error checking facilities for data input/output operations between the comm processor and communications lines, and it performs the serial-to-parallel conversion of data bytes from the communications line and parallel-to-serial conversion of data sent out over the line.

- High-speed Link Control Modem Interface Module (HLC-MIM)—has many of the same features and functions of the DLC-MIM, but it can support up to four communications lines and has a maximum line speed of 256K bps. The HLC-MIM is designed specifically for network applications requiring high speed, such as trunks between nodes, high-speed terminal connections, or dedicated X.21 connections to packet switched data networks.

- IPC—permits users' non-SNA terminals and PCs to access BSC and SNA host applications. The IPC attaches up to 32 asynchronous lines, with or without modems, to a Communications I/O channel. For configurations up to 16 lines or less, the IPC uses a single MIM port on Communications I/O Channel 2 or on a communications adapter. For a configuration of more than 16 lines, two ports are used. It appears to the host as an IBM 3274 cluster controller, permitting terminals to emulate 3278 display stations. Other functions include providing terminal operators with commonly used 3270 functions, converting asynchronous ASCII protocol to appear as BSC protocol. An IPC automatically detects the baud rate of incoming data and supports line speeds from 300 to 9600 bps.

- Communications Adapters—allow the connection of eight MIMS or four/eight IPCs to a Communications I/O channel. It is located in the module space of the Processor Bay or in the Module Controller Bay. A communications adapter allows the connection of MIMs and IPCs to Communications I/O Channels 2, 3, 6, and 7.

- Auto Call Adapters (ACAs)—permit auto call functions to be done for up to 16 switched communications lines attached to the MIM interfaces. ACAs attach to a Bell System 801C, 301C-L1/2, or equivalent Auto Call Unit (ACU). An ACA can be located in any module space.

MODULE CONTROLLER BAY

The Module Controller Bay cabinets have space for six to eight modules each, including Communications I/O channel and Direct Access I/O channel modules. The four center positions are fitted with DLC-MIMs, and the additional spaces are for modules associated with the Direct Access I/O channels or the Communications I/O channels. The bottom two module spaces are for IBM-CIAs, DSXs, or communications adapters.

PROCESSING COMPONENTS

The 3695's Central Processing Unit (CPU) has a 36-bit word length and an 18-bit data path between the processor and main memory. The 3695 uses a set of 101 IBM-formatted instructions.

CONNECTION TO HOST AND PERIPHERALS

Front-end processors connect to the byte or block multiplexer or selector channel of an IBM host through an IBM Channel Interface Adapter (CIA) that uses one control position on the IBM channel, supporting from 1 to 256

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subchannel addresses. Front-end processors must include an IBM Channel Program Loader, an initial load program contained in 2048 bytes of read-only memory that performs a CPU start-up test and loads a bootstrap-channel program loader into main storage. The 3695 may also attach to an NCR V-8000 host through an NCR Bit Serial Link Channel Interface Adapter.

Remote communications processors connect to the host through a Remote Initial Load feature, similar to the Channel Program Loader, that attaches to a DLC-MIM. Remote Initial Load is also available on a BSC-MIM for 3690 models. The processors support locally attached peripheral devices, such as IBM-compatible disk drives, through their Channel Interface Adapters.

CONNECTION TO THE NETWORK

The basic unit of network connectivity for the 3695 is one of four general types of MIM: the Asynchronous MIM (or A-MIM), the BSC-MIM, the DLC-MIM, and the HLC-MIM. Each MIM can attach up to 16 communications lines. The 3695 processors also use a variety of special wideband interfaces that plug into MIMs. Table 1 lists the communications performed by the 3695 and the specific communications hardware that supports them. The async and BSC-MIMs are nonprogrammable devices, while the DLC-MIM is a programmable interface that can handle a variety of bit-oriented, synchronous protocols (such as SDLC, ADCCP, and HDLC).

A communications adapter occupies the highest MIM position in a given base cabinet or module controller. The communications adapter houses up to eight MIMs. In the 3695 configuration that supports the communications adapter, the user loses one direct MIM attachment but gains eight attachments through the adapter. There is no difference in performance between directly attached MIMs and MIMs attached through an adapter.

OPERATOR INTERFACE

The 3695 features an on-board maintenance panel, which uses either the keyboard/printer or a CRT-based console. The operator console sends and receives data to and from the Comten 3695. The 4034 Operator Console is available in two models; both have an 80-character by 24-line CRT with a detachable keyboard. The more complete model comes with an 80-column dot matrix impact printer, a printer stand, and a paper catcher. The other model includes only the CRT. The console connects to a special Communications I/O channel.

The printer is a bidirectional, impact printer that prints 150 characters per second (cps) and has 9-by-9 dot matrix character information with true descenders. It connects to an RS-232 auxiliary connector on the operator console.

TRANSMISSION SPECIFICATIONS

The Comten 3695 handles synchronous or asynchronous communications at data rates from 300 bps to 256K bps, depending upon the MIM or IPC. It uses async codes or BSC, SDLC, or Comten's own CNS trunk protocol. With special software, the 3600 processors can also handle packet-level X.25 communications. The processors support a number of physical interfaces, each through a specific line interface feature. See Table 1 for a complete list of NCR Comten-supported communications.

PHYSICAL SPECIFICATIONS

Cabinet dimensions of the Processor and Module Controller Bays are 74.75 inches high, 30.5 inches wide, and 27.0 inches deep. When fully configured, a cabinet weighs 800 pounds.

A CRT operator console enclosure is 14.12 inches high, 14.50 inches wide, and 14.12 inches deep with a weight of 30 pounds. The Keyboard dimensions are 2.63 inches high, 16.75 inches wide, and 7.25 inches deep. The printer is 5.0 inches high, 16.2 inches wide, and 13.0 inches deep and weighs 15 pounds.

SOFTWARE

Comten software products offer a variety of networking capabilities in both SNA and non-SNA environments, as well as providing a migration path from non-SNA environments to SNA. Software-provided services include application switching, polling, activating and deactivating network components, automatic dialing, code conversion, automatic error recovery, diagnostics and utilities, and network addressing and routing. Other services include setting up, controlling, and terminating communications sessions between network resources and controlling data flow.

Comten's Operating System Version 2 (COS2) is a group of system control programs used in all of NCR Comten's communications processors. Software supported under COS2 includes *Emulation Processing*, which allows the 3600 Series processor to operate as an IBM 37XX Communications Controller emulating an IBM 270X hardwired controller. The Comten version of EP includes several features not found in the IBM version. These include the following:

- Terminal-Initiated Line Switching, a feature that allows users at terminals to switch from one host application to another through the communications processor.
- Automatic Baud Rate Detection, which allows asynchronous terminals with different line speeds and line codes to share the same line to a 3600 processor.

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- Site-Initiated Line Switching, which allows the 3600 console operator to switch a terminal from one host application to another.

- Automated Dialing, which allows the host to initiate sessions automatically with dial-up terminals.

Advanced Communications Function/Network Control Program (ACF/NCP)—NCR Comten's version of IBM's operating software for the IBM 3705 or 3725 in an SNA network. Comten's ACF/NCP includes the Multisystem Networking feature of later versions of IBM's ACF/NCP. It works in conjunction with either ACF/TCAM or ACF/VTAM in the IBM host.

Partitioned Emulation Programming—allows concurrent operation of EP and ACF/NCP in the same 3600 processor.

Multiple Access Facility—allows terminal-initiated line switching for IBM 3270 terminals and relieves the host of the polling function for such devices.

Communications Networking System (CNS)—NCR Comten's trunking protocol, used most often in communications between a 3695 processor serving as a remote concentrator and a 3695 processor serving as a front end. CNS is a Transport-layer protocol.

Statistics and Extended Access Control—NCR Comten's facility for recording session statistics and for multilevel access control.

Comten X.25 Interface—a series of packet-level X.25 interface programs designed to connect the 3695 Series processor to public packet-switching networks. Separate versions are available for GTE Telenet, Tymnet, and Uninet in the United States; Datapac in Canada; Transpac in France; and Datex-P in West Germany. It is also certified by DDN, DDX, DNI, Infonet, Itapac, ITT Worldnet, Luxpac, and UKPSS.

Communications Alerting Facility (CAF1)—a network management and control product that provides users with realtime status and configuration data on communications lines terminated by a Comten communications processor. Network operators have dynamic control over the alarm, logging, and display parameters for their networks. Users can set up performance thresholds and parameters for individual lines or groups of lines. Comten CAF1 consists of a software module, a keyboard/CRT display, and an optional line printer.

Multiple Access Facility with Remote Host Option (MAF/RHO)—used to extend communications capabilities for both SNA and BSC 3270 terminals to non-IBM host computers. Comten MAF/RHO allows Comten communications processors to be attached by a communications line to any host computer that can support a BSC 3270 cluster controller. Functions that were part of earlier versions of MAF are still provided. These include polling and adressing of terminals, terminal control of a 3270 cluster controller, and error recovery capabilities.

Network Terminal Option—operates with Comten's ACF/NCP3 to permit selected pre-SNA start/stop (SS) and binary synchronous communications (BSC) devices to appear to the host access method as SNA devices. These selected start/stop and BSC devices can participate in single-domain and cross-domain sessions and share network resources with existing SNA devices.

Subarea Routing Manager (SRM)—operates in conjunction with Comten's ACF/NCP. SRM resides in a Comten communications processor where it does switching functions that permit BSC and SNA 3270 devices to communicate selectively with any of up to 31 different host access methods. Using SRM, terminal operators can log on to a variety of application programs that are controlled by multiple access methods whether in the local node or adjacent nodes. SRM-supported access methods include ACF/TCAM and ACF/VTAM. When Comten's MAF is added, it extends SRM support to emulation mode access methods.

NCR Comten software that runs only under COS2 includes:

Communications Access Method 3 (CAM3)—a 3695-based applications interface that allows certain application programs to run in a locally or remotely attached 3695 processor without involving the host. CAM3 operates independently of the host access method and allows the running of both Comten-provided and user-generated applications. It runs concurrently with such programs as ACF/NCP. Recent improvements in memory capacity are designed primarily to support CAM3.

Comten Network Gateway (CNG)—provides communications between two or more independent SNA networks. The independent SNA networks retain their own network addressing scheme, thus permitting additions and deletions of resources within to have minimal effect on the other interconnected networks. CNG translates addresses and accepts, processes, and translates SNA commands to set up and terminate sessions between SNA networks.

Advanced Communications System for NCR hosts (NCR/ACS) *Release 1*—a family of NCR Comten network connectivity products that allows NCR host-resident, VRX/TAM-based application programs to initiate and control communications through the NCR Comten communications processor. NCR/ACS takes over some of the host's tasks such as dynamic buffering, polling, code translation, activating and deactivating network components, sharing network resources between host applications, and more.

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PRICING

The NCR Comten processors can be purchased or leased. All systems software is included in the equipment price. Software is purchased on a monthly or annual license fee basis. A license fee is charged for each processor on which the software is installed. A separate monthly maintenance contract is available.

NCR Comten also offers complete documentation, training courses, and support agreements. Software support programs include both central support and local support.

EQUIPMENT PRICES

MODEL		Purchase Price ($)	Monthly Maint. ($)	3-Year Lease ($)	Monthly Lease ($)
3695	Minimum configuration: a CPU, 2M bytes of storage, four Comten DLC-MIMs, expansion cabinet, one line interface feature, system console.	124,420	473	5,136	6,176

SOFTWARE PRICES

PRODUCTS		Initial License Fee ($)	Monthly Contin. Fee ($)	Annual Contin. Fee ($)
—	ACF/NCP3 R2E	1,305	234	2,574
—	ACF/NCP V2 R1E	1,305	261	2,871
—	ACF/NCP V4.0	1,344	448	4,928
—	Extended Network Addressing (ENA)	576	192	2,112
—	CAF1 R1E	0	164	1,804
—	CAM3 R2E	3,025	550	6,050
—	CNG R2E	2,200	400	4,400
—	CNS3 R1E	0	144	1,584
—	CPAL V2 (OS/MVS)	0	100	1,100
—	CPAL V2 (VM)	0	100	1,100
—	DSM R1	0	300	3,300
—	MPAD R5E	0	36	396
—	SDA5 R5E	0	36	396
—	SS1 R5E	0	89	979
—	MAF3 R3E	0	114	1,254
—	NTO2 R1E	660	206	2,366
—	NTO2 R2E	660	206	2,266
—	SEAC3 R1E	0	53	583
—	SRM1 R4E	0	175	1,925
—	VLIST (OS/MVS)	180	60	660
—	VLIST (VM)	180	60	660
—	VLIST (DOS/VSE)	180	60	660
—	X.25 I/F R6E	0	300	3,300
—	PA1 R1E	0	160	1,760
—	PA2 R1E	0	300	3,300
—	PA3 R1E	0	300	3,300
—	PA4A R1E	0	200	2,200
—	PA5A R1E	0	200	2,200
—	PA5D R1E	0	200	2,200
—	PA5DSP R1E	0	200	2,200
—	NPSI	0	95	1,045
—	XSWX R2E	0	320	3,520
—	PCNS R1E	0	150	1,650
—	TIA1 R1E	0	300	3,300
—	DATAPAC R1E	0	48	528
—	Telenet R1E	0	48	528
—	Tymnet R1E	0	48	528
—	Transpac R1E	0	48	528
—	Datex P R1E	0	48	528
—	UKPSS R1E	0	48	528
—	Uninet R1E	0	48	528
—	DNI R1E	0	48	528
—	Luxpac R1E	0	48	528
—	Infonet R1E	0	48	528
—	ITAPAC R1E	0	48	528
—	DDX R1E	0	48	528
—	ADMIN PROFILES R1E	0	84	924
—	DDN R1E	0	48	528
—	ITT WorldNet R1E	0	48	528 □

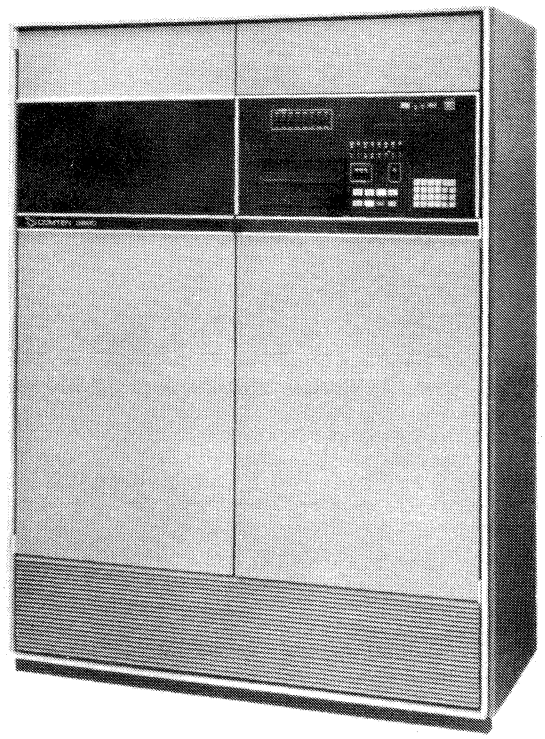
NCR Comten 3600 Series Communications Processors

MANAGEMENT SUMMARY

UPDATE: *This report is being updated to show changes that have been made to the NCR Comten 3600 Series of communications processors since the last update. NCR Comten has introduced new software products for use with the 3600 Series and has made some price changes. The 1985 user ratings for the Comten processors are also given in this report.*

NCR Comten, a subsidiary of NCR Corporation, follows IBM as the leading vendor of communications processors for the IBM-mainframe environment. A communications processor specialist, NCR Comten has been in the IBM compatible business since 1968. Their 3600 Series of communications processors connect over 400,000 terminals and host computers in public and private data communications networks throughout the world. NCR Comten has over 60 sales and service facilities in the United States and Canada. The company also markets their products in Western Europe, the Far East, the Middle East, Africa, South America, and Australia.

Over the last several years the 3600 Series of communications processors has undergone a major overhaul. In 1984, NCR Comten removed the 3670 from manufacturing, and began offering it on a limited basis from stock. The compa- ➢



NCR Comten's 3690 communications processor can be configured as a front end, standalone message switch, or remote communications processor. The 3690 models compete directly with IBM's 3725 processors.

The 3600 Series of communications processors from NCR Comten offers the 3650 and the 3690. The Comten 3650 is an entry-level series of front-end and remote-communications processors. The 3690 offers a high-performance series of front-end, standalone, and remote processors. The NCR Comten 3600 Series is one of the main contenders in the IBM compatible communications processor marketplace.

FUNCTION: Front-end or remote full-service communications processors with message switching available in some configurations.
HOST COMPUTERS SUPPORTED: IBM and compatible mainframes; NCR mainframes.
ARCHITECTURE SUPPORTED: SNA; proprietary trunk protocol.
OPERATING SOFTWARE: SCS/63; Communications Operating System 2 (COS2).
COMPETITION: IBM 3705 and 3725; Amdahl 4705; CCI CC8, CC80, and CC85; Memorex 1270.
PRICE: Prices for 3650 models start at $41,000 for an entry-level front-end or remote processor with console, able to support four communications lines. Prices for 3690 models base systems start at $65,900 for the "packaged" Model T-8, and range up to $155,750 for Model K8.

CHARACTERISTICS

VENDOR: NCR Comten, Inc., 2700 Snelling Avenue North, St. Paul, MN 55113. Telephone (612) 638-7777.

DATE OF ANNOUNCEMENT: 3650—March 1976; 3650 Models G9-K9, R9, and S9—October 1983; 3690—July 1977; 3690 Models A8-K8 and T8—February 1984.

DATE OF FIRST DELIVERY: 3650—June 1976; 3650 Models G9-K9, R9, and S9—February 1984; 3690—June 1978; 3690 Models A8-K8 and T8—February 1984.

NUMBER DELIVERED TO DATE: 3650—1,560; 3690—1,130.

SERVICED BY: NCR Comten.

MODELS

Active models in the NCR Comten 3600 family belong to the 3650 and 3690 Series; the original 3600 processor, the 3670, is no longer in production, and is available on a limited basis from stock. The capabilities of the lower end of the 3690 Series have expanded downward to fill the 3670's market niche.

The 3650 is currently available in six models. Models G9, H9, J9, K9, S9, and R9 have 1M byte of memory. Models S9, G9, and H9 are entry-level, small-, and medium-sized ➢

NCR Comten 3600 Series Communications Processors

TABLE 1. COMMUNICATIONS LINE INTERFACES AND MODEM INTERFACE MODULES

TYPE OF INTERFACE	SPEED	TIMING	MODE	FEATURE NUMBER	LINES PER I/F	EQUIPMENT USED ON	MAX I/F PER
RS-232-C	Up to 1800	Async	N/A	F-2072	2	T-2016 or T-2027	8
	Up to 19.2K (1800 SS, 9.6 Extended SS)	Async/Sync	HD/FD	F-2226-A1	2	T-3650-S1	7 *
				F-2083-C1	2	T-2020	8 *
			HD/FD	F-2155-A1	2	T-2031	8 *
			HD/FD	F-2239-A8	4	T-3650-S8,-R8	3 *
				F-2226-A1	2	T-3670-M85	8 *
	Up to 19.DK	Sync	HD	F-2053-A1	2	T-2018	* +
			FD	F-2053	1	T-2018	8+
	Up to 9600	ECA	HD	F-2053-C1	2	T-2018	8 +
	1200	EIA Sync Clock		F-2095	2	T-2018	8 +
RS-449	Up to 19.2K bps	Async/Sync	HD/FD	F-2154-A1	2	T-2031	8 *
	Up to 64K bps	Sync	HD/FD	F-2161	1	T-2031	2 *
Wideband (Bell 300 Class)	Up to 50K	Sync	HD	F-2064-A1	1	T-2018	4 +
			FD	F-2064-B1	1	T-2018	2 +
			HD/FD	F-2227-A1	1	T-3650-S1	2 *
			HD/FD	F-2084	1	T-2020	2 *
			HD/FD	F-2156-A1	1	T-2031	2 *
			HD/FD	F-2227-A1	1	T-3670-M85	2 *
	130K-230K	Sync	HD/FD	F-2026	1	T-2017	4
DDS	Up to 9600	Sync	HD	F-2053-A1	2	T-2018	8 +
			FD	F-2053-B1	1	T-2018	8 +
			HD/FD	F-2226-A1	2	T-3650-S1	7 *
			HD/FD	F-2083-C1	2	T-2020	8 *
			HD/FD	F-2226-A1	2	T-3670-M85	8 *
	56K	Sync	HD	F-2092-A1	2	T-2018	2 +
			FD	F-2092-B1, -C1	1	T-2018	2 +
			HD/FD	F-2228-A1	1	T-3650-S1	2 *
			HD/FD	F-2085	1	T-2020	2 *
			HD/FD	F-2157-A1	1	T-2031	2 *
			HD/FD	F-2228-A1	1	T-3670-M85	2 *
			HD/FD	F-2321-A2	1	T-2028-B1	4
TTY 20 or 60 ma DC Loop		Async	HD	F-2074	2	T-2016	8
Auto Dialing RS-366				F-2033	1	T-2014	16

* Actual line attachability is based on throughput—refer to MIM charts for details.
\+ Actual line attachability is based on line speeds—refer to MIM charts for details.

Many introduced new lines of its 3650 and 3690 models. These new lines feature a streamlined internal architecture that allows the attachment of more communications lines in less space than its predecessor. NCR Comten also replaced their old operating system, SCS/63, with new networking software, the COS2 operating system. The CAM3 access method was also introduced. CAM3 is a language for writing applications to run, independently of the host processor, in the 3600 communications processor.

The 3600 family currently has two branches: the low-end 3650 models, and the high-performance 3690s. The 3650s come in front-end and remote configurations with 512K or 1M bytes of main memory. The smallest configurations support up to 16 communications lines, while the largest support up to 128.

front-end processors, respectively; Models R9, J9, and K9 are entry-level, small-, and medium-sized remote communications processors, respectively.

The 3690 is currently available in 11 models. All, except the T8 model, come with 512K bytes of main memory, expandable to 4M bytes in 256K or 1M-byte increments. The T8 model is expandable to 1M. Model A8 is a standalone message processor; Model B8 is a remote communications processor; Models C8, D8, and E8 are front-end processors with the ability to attach to two, four, and eight host computers, respectively. All have the capacity, initially, to support up to eight Modem Interface Modules (MIMs).

Models F8 through K8 correspond in sequence to Models A8 through E8, except that they can initially support up to seven directly attached MIMs, or via a communications adapter, can support up to eight MIMs.

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The 3690s can be configured as front ends, remote communications processors, or standalone message switches. They support up to 4M bytes of main memory and up to 512 communications lines.

All active members of both families are relatively new. The latest 3650s were announced in October 1983, while the 3690s were announced in February 1984. Also in February 1984, NCR Comten doubled the available main memory on the newer 3650 models.

In hardware, the 3600 models use a hierarchical architecture common among communications processors. On the network side, they use a two-level attachment, with Modem Interface Modules (MIMs) connecting physical-level Line Interface Features to the central processor. NCR Comten offers four basic types of MIM: an asynchronous unit, a BSC MIM, a programmable DLC MIM, and a programmable HLC MIM.

In software, the 3600 processors run Comten-developed programs compatible with equivalent IBM software for 270X emulation and SNA network control. The NCR Comten programs are named similarly to their IBM counterparts: EP, ACF/NCP, PEP, etc. In addition, the 3600 processors support an X.25 interface and a message-switching application that runs under the new CAM3 access method.

The Comten Integrated Protocol Converter (IPC) offers network users entry to 3270 host application programs through asynchronous terminals and personal computers. The Comten IPC is modular and can be installed in a local or remote Comten 3600 communications processor. The unit fits in a Data Link Control-Modem Interface Module (DLC-MIM) slot. When an IPC is installed in a remote 3600 communications processor, it can provide protocol conversion to remote sites. The Comten IPC appears to the host computer as a 3274 cluster controller and permits terminals to emulate 3278 display stations. Asynchronous ASCII protocol is converted to appear as BSC protocol which permits users with non-SNA terminals and personal computers to access SNA and SBC host applications. The unit can detect the baud rate of incoming data automatically, support line speeds from 300 bps to 9600 bps, support X-on/X-off flow control, and can simultaneously support up to 32 terminals on one IPC.

NCR Comten's integrated disk for the Comten 3690 communications processor, the Comten T-7362, has the capability to store system software load modules and memory dumps in the Comten 3690. The disk is an intelligent storage subsystem with a 29-megabyte fixed disk drive that can be installed in a Comten 3690 cabinet. The disk lets users perform loading and dumping operations at high rates of speed; it can also be set to capture system dumps automatically for analysis following system failure. Load modules can be created by the user at the host processor and then sent to the Comten T-7362 Disk to be saved until the user needs them. The disk can save system dumps and then send them to the host for printing during a low traffic time. Commands issued from the console that are support-

Model T8 is an entry-level 3690 system that can be configured either as a front-end processor or as a remote communications processor. As a front end, it can support up to two host computers. In either configuration, it can support up to eight MIMs initially and up to 1M byte memory, expandable in 128K increments.

CONFIGURATION

3650 Models

The entry-level, "packaged" 3650 models, R9 and S9, are single-cabinet units that come with a CPU, 256K bytes of main storage upgradable to 512K bytes in a single increment of 256K bytes, and a single, built-in MIM. Both come with a Comten console (30-cps, 132-column keyboard/printer) as standard equipment. The Model S9 front-end processor comes with a built-in host channel interface.

Models G9 and J9 are also single-cabinet units. The base cabinet houses the CPU, main memory (1M byte maximum), an integral program loading device, and a communications interface for the attachment of eight MIMs. The front-end configurations include an integral channel adapter for attachment to the host. The remote configurations include an integral DLC MIM (a MIM that supports such bit-oriented, synchronous protocols as SDLC and HDLC) for remote initial program loading. These models support the Comten console, but do not include it as standard equipment.

Models H9 and K9 are two-cabinet systems with the same base cabinet configuration as Models G9, and J9, along with an additional cabinet that can contain up to six MIMs. These models also support the Comten console as an optional piece of equipment.

3690 Models

All models of the 3690 come in a two-cabinet base configuration, with the base cabinet of all models containing the CPU, main memory, the maintenance panel, and space for the MIMs, channel adapters, or both, as appropriate to the individual model. Model A8 is a standalone message switching system with a block multiplexer channel for the attachment of up to eight peripheral storage devices, and a communications interface for the attachment of eight MIMs. Model B8 is a remote communications processor with a single, integral DLC MIM for remote initial loading, and space for the attachment of five MIMs.

Model C8 is a front-end processor that can support up to two channel-attached hosts (or one host and one channel-attached peripheral). It comes with one IBM channel adapter as standard equipment, and has space in the base cabinet for the attachment of five MIMs.

Model D8 is a front-end processor that can support up to four host computers and one channel-attached peripheral device. It comes with a direct memory attachment base (DSX) equipped with one IBM channel adapter, and with space in the base cabinet for the attachment of four MIMs.

Model E8 is a front-end processor that can support up to eight host computers. It comes with two DSXs, one IBM channel adapter, and space in the base cabinet for the attachment of seven MIMs.

Models F8 through K8 correspond in sequence to Models A8 through E8, except that they can initially support only seven MIMs. The eighth MIM is replaced by a communictions interface for the attachment of a communications adapter which can connect up to eight MIMs.

Model T8 is an entry-level 3690 system that can be configured as a front-end or remote communications processor. As

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ed by the Comten T-7362 include the following: display disk file records, format a disk, display a disk table of contents, delete any file from a disk, and inspect disk sectors. The disk is used in connection with the regular load diskette and functions with the Comten Network Support Services 1 (NSS1) software under the COS2/90.

COMPETITIVE POSITION

The 3600 Series leads a small pack that trails IBM by a wide margin in the communications processor market. IBM has a comfortable 90 percent share of the market for communications processors compatible with Big Blue mainframes. Among those trailing NCR Comten in the remaining 10 percent are Amdahl Corporation, with its 4705; Computer Communications, Inc. (CCI), the manufacturer of the CC8, CC80, and CC85 processors; and Memorex's 1270. NCR Comten has sold nearly twice as many communications processors as its nearest rival, CCI, and has been much more aggressive in developing a competitive product for the 1980s.

ADVANTAGES AND RESTRICTIONS

When compared to IBM's communications processors, the NCR Comten products are clear winners. The 3650 Series competes head-to-head with IBM's low-end 3705-80 line, and exceeds the IBM models in main memory capacity, processor speed (by nearly a factor of two), and operability. The 3650 processors support a locally attached operator's console for error logging and diagnostics: the IBM models rely on the host's console.

The 3690 models compete directly with IBM's 3725 processor. The 3690 models also competed against the 3705-II, but as the IBM 3705-II is being withdrawn from the market, NCR Comten's main thrust will be against the 3725. The 3690's advantages over the 3725 are that it has twice the main memory of the IBM product, and can run vendor- or user-developed applications software. The 3690 can support twice as many communications lines as the 3725.

The NCR Comten processors' restrictions are common to all IBM-compatible equipment. The vendor is constantly one step behind IBM in product development, and must always try to catch up. Among the IBM-compatible vendors of communications processors, Comten has always been the most aggressive in trying to lead IBM in technology. Comten's 3600s clearly outperform anything on the market, and its software is beginning to leap forward. If it catches on with the users, the new CAM3 access method will provide a whole new avenue for adding value to the product: applications processing in the communications processor.

Another advantage of the 3600 processor is its support of local peripheral devices, such as disk drives. While this feature is most useful now in message-switching configurations, it may become more useful as CAM3 applications take hold.

a front end, it can support up to two hosts. It features a communications interface for attachment of eight MIMs.

Beyond the capacities of their base cabinets, 3690 processors can be expanded through the addition of Model 3692 Module Controllers (expansion cabinets). Each Module Controller has space for 7 to 21 MIMs. Two communications adapters take the space of one MIM. NCR Comten offers three kinds of Module Controllers: one for local attachment, one for extended distance attachment (up to 100 cable feet from the base cabinet), and one that can be shared by two 3690 CPUs in different base cabinets. The third type of module controller is useful in fault-tolerant configurations, where one processor can take over the line attachments in the Module Controller should the other processor fail.

PROCESSING COMPONENTS

All models of the 3600 Series use a CPU with a 36-bit word length and an 18-bit data path between the processor and main memory. Main memory on the 3650 models has a cycle time of 650 nanoseconds; main memory on the 3690 models has a cycle time of 520 nanoseconds. The 3650 CPU uses a set of 62 instructions, 54 of which are in IBM format; the 3690 uses a set of 101 instructions, all of which are in IBM format.

CONNECTION TO HOST AND PERIPHERALS

Front-end processors in both the 3650 and 3690 Series connect to the byte or block multiplexer or selector channel of an IBM host through an IBM Channel Interface Adapter (CIA) that uses one control position on the IBM channel, supporting from 1 to 256 subchannel addresses. Front-end processors must include an IBM Channel Program Loader, an initial load program contained in 2048 bytes of read-only memory, that performs a CPU start-up test and loads a bootstrap-channel program loader into main storage.

Front-end processors in the 3650 and 3690 Series may also attach to an NCR V-8000 host through an NCR Bit Serial Link Channel Interface Adapter.

Remote communications processors connect to the host through a Remote Initial Load feature, similar to the Channel Program Loader, that attaches to a DLC MIM. Remote Initial Load is also available on a BSC MIM for 3690 models.

All 3600 family processors are able to support locally attached peripheral devices, such as IBM-compatible disk drives. The processors support these devices through their channel interface adapters.

CONNECTION TO THE NETWORK

The 3650 and the 3690 models use essentially the same network-side equipment, but it is arranged differently in processors of each series. The basic unit of network connectivity for the 3600 Series is one of four general types of MIM: the Asynchronous MIM (or A-MIM), the BSC MIM, the DLC MIM, and the HLC MIM. Each MIM can attach up to 16 communications lines. The 3600 Series processors also use a variety of special wideband interfaces that plug into MIMs. Table 1 lists the communications performed by the 3600 processors, and the specific communications hardware that supports them. The async and BSC MIMs are nonprogrammable devices, while the DLC MIM is a programmable interface that can handle a variety of bit-oriented, synchronous protocols (such as SDLC, ADCCP, and HDLC).

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USER REACTION

In the 1985 Network Users Survey, 18 users of the Comten 3650 responded with an installed base of 69 machines; 38 users of the Comten 3690 responded with an installed base of 354 machines. Ten users of the Comten 3670 responded with an installed base of 35 machines, and there were 13 users with 45 unspecified models for a total of 79 users with an installed base of 503 machines. Because this report focuses on the 3650 and 3690 models, we will present only those user ratings here.

3650 Systems

	Excellent	Good	Fair	Poor	WA*
Overall satisfaction	9	8	1	0	3.4
Ease of installation	5	9	3	1	3.0
Ease of operation	4	13	1	0	3.2
Ease of expansion	5	8	3	2	2.9
Hardware reliability	9	8	1	0	3.4
Quality of vendor's software/firmware	5	7	2	3	2.8
Ease of programming	1	8	5	1	2.6
Quality of vendor's maintenance service	7	5	5	0	3.1
Quality of vendor's technical support	7	5	5	0	3.1

*Weighted Average based on a scale of 4.0 for Excellent.

3690 Systems

	Excellent	Good	Fair	Poor	WA*
Overall satisfaction	20	17	1	0	3.5
Ease of installation	12	22	4	1	3.1
Ease of operation	15	21	2	1	3.3
Ease of expansion	15	17	6	1	3.2
Hardware reliability	22	12	5	0	3.4
Quality of vendor's software/firmware	11	20	5	2	3.1
Ease of programming	7	14	8	2	2.8
Quality of vendor's maintenance service	11	19	8	1	3.0
Quality of vendor's technical support	11	19	8	1	3.0

*Weighted Average based on a scale of 4.0 for Excellent.

We also asked the users to list the primary functions performed by the communications processors that operated in their networks. The three major functions mentioned most often, by the NCR Comten communications processors users, were front-end processing, remote line concentration, and applications switching. Other functions performed by the Comten processors included terminal controller functions, message/packet switching, X.25 PAD or gateway functions, distributed processing node functions, and standalone network processing. □

In the 3650 models and the 3690 models A8 through E8, the MIMs and other logic modules attach directly to the processor. In the 3690 models F8 through K8, some MIMs attach directly, while others attach through a special logic module called a communications adapter. A communications adapter occupies the highest MIM position in a given base cabinet or module controller. The communications adapter houses up to eight MIMs. In the 3690 configurations that support the communications adapter, the user loses one direct MIM attachment, but gains eight attachments through the adapter. There is no difference in performance between directly attached MIMs and MIMs attached through an adapter.

TRANSMISSION SPECIFICATIONS

The 3600 Series processors can handle synchronous or asynchronous communications at data rates from 75 bps to 56K bps, using async codes or BSC, SDLC or Comten's own CNS trunk protocol. With special software, the 3600 processors can also handle packet-level X.25 communications. The processors support a number of physical interfaces, each through a specific line interface feature. See Table 1 for a complete list of NCR Comten-supported communications.

OPERATOR INTERFACE

Both the 3650 and the 3690 feature an onboard maintenance panel. The 3650 supports a 30-cps, 132-column keyboard/printer as an operator's console. The 3690 uses either the keyboard/printer or a newer, CRT-based console. The 4034 Operator Console is available in two models; both have an 80-character by 24-line CRT with a detachable keyboard. The more complete model comes with an 80-column dot-matrix impact printer, a printer stand, and paper catcher. The other model includes only the CRT.

SOFTWARE

The older 3600 Series operating system, SCX/63, is on its way out as the vendor has introduced its newer and more broadly capable Communications Operating System 2 (COS2). COS2 is available in two versions: COS2/50 for the 3650 and the obsolescent 3670, and COS2/90, for the 3690. This system is backwards-compatible with SCS/63 programs, but includes a feature unique to any IBM-compatible communications processor: a communications processor-based access method that allows users to run communications applications, such as message switching, entirely in the communications processor without involving the host.

Software developed under SCS that is now supported under COS2 includes *Emulation Processing,* which allows the 3600 Series processor to operate as an IBM 37XX Communications Controller emulating an IBM 270X hardwired controller. The Comten version of EP includes several features not found in the IBM version. These include:

- **Terminal-Initiated Line Switching, a feature that allows users at terminals to switch from one host application to another through the communications processor.**
- **Automatic Baud Rate Detection, which allows asynchronous terminals with different line speeds and line codes to share the same line to a 3600 processor.**
- **Site-Initiated Line Switching, which allows the 3600 console operator to switch a terminal from one host application to another.**
- **Automated Dialing, which allows the host to initiate sessions automatically with dial-up terminals.**

***Advanced Communications Function/Network Control Program (ACF/NCP)*—NCR Comten's version of IBM's operating software for the IBM 3705 or 3725 in an SNA network. Comten's ACF/NCP includes the Multisystem Networking feature of later versions of IBM's ACF/NCP. It works in conjunction with either ACF/TCAM or ACF/VTAM in the IBM host.**

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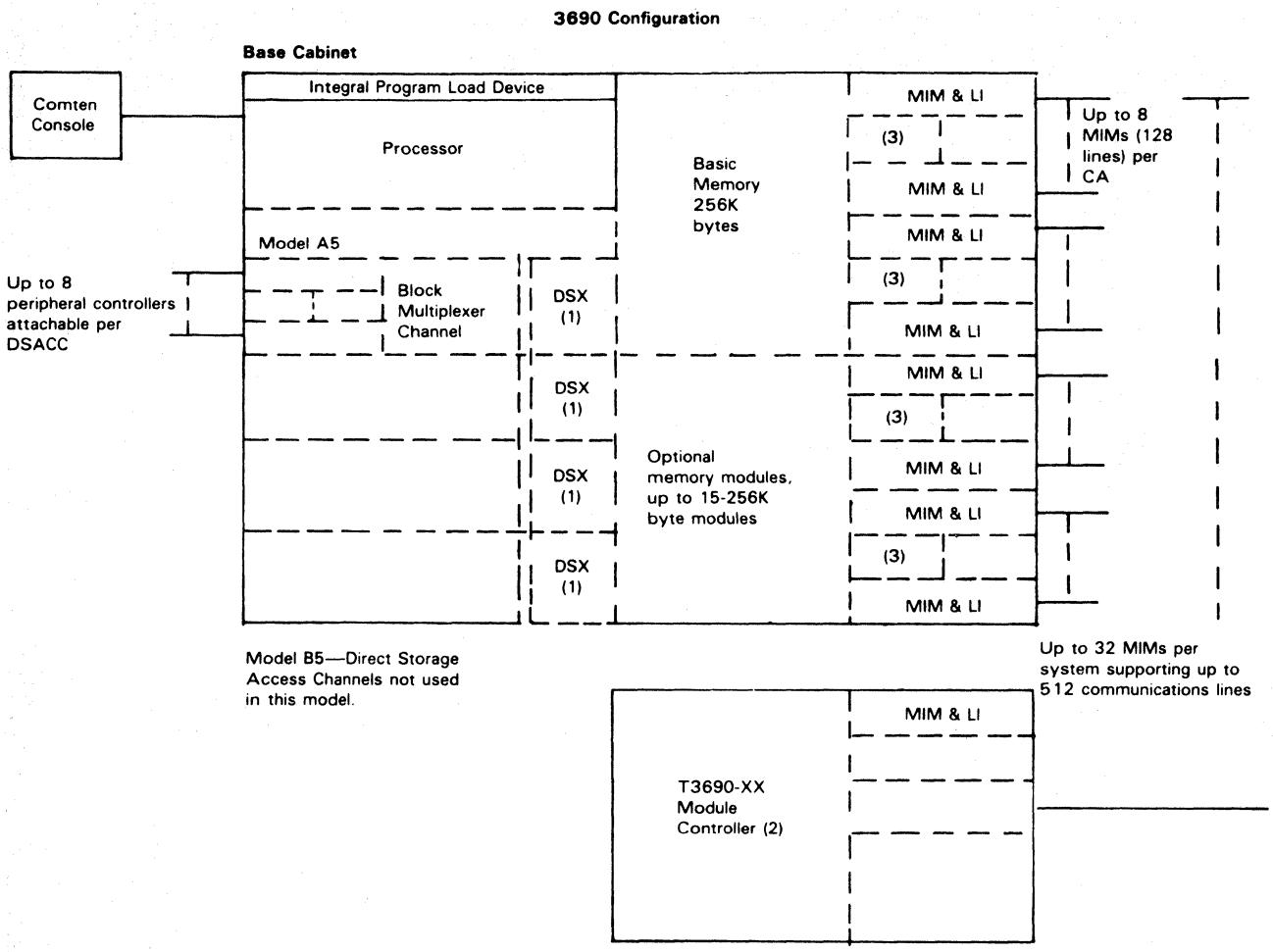

(1) Direct Storage Access Channel Controller available for attachment of a Channel Interface Adapter, a Block Multiplexer Channel, or an Integrated File Adapter.

(2) Module Controllers are available to accommodate 6, 12, 18, 24, 30, or 36 Logic Modules. Each size has a version that permits dual processor access; i.e., two 3690s can have access to the controller.

(3) Up to eight Modem Interface Modules (MIM) plus associated Line Interfaces (see Table 1) per Communications Interface Module. Requirement for Module Controllers (expansion housing for MIMs) is dependent on the MIMs selected and the space available in base cabinet; space available is expressed in Logic Modules. The 3690-A5, B5, C5, and D5 each have three Modules. The 3690-E5 has nine Logic Modules.

Figure 1. Direct Storage Access Channel Controller available for attachment of a Channel Interface Adapter, a Block Multiplexer Channel, or an Integrated File Adapter.

***Partitioned Emulation Programming*—which allows concurrent operation of EP and ACF/NCP in the same 3600 processor.**

***Multiple Access Facility*—which allows terminal initiated line switching for IBM 3270 terminals, and relieves the host of the polling function for such devices.**

***Communications Networking System (CNS)*—NCR Comten's 3600-to-3600 trunking protocol, used most often in communications between a 3600 processor serving as a remote concentrator and a 3600 processor serving as a front-end. CNS is a Transport-layer protocol.**

***Statistics and Extended Access Control*—NCR Comten's facility for recording sessin statistics and for multilevel access control.**

***Comten X.25 Interface*—a series of packet-level X.25 interface programs designed to connect the 3600 Series processor to public packet-switching networks. Separate versions are available for GTE Telenet, Tymnet, and Uninet in the United States; Datapac in Canada; Transpac in France; and Datex-P in West Germany. It is also certified by DDN, DDX, DNI, Infonet, Itapac, ITT Worldnet, Luxpac, and UKPSS.**

***Communications Alerting Facility (CAF1)*—a network management and control product that provides users with realtime status and configuration data on communications lines terminated by a Comten 3600 communications processor. Network operators have dynamic control over the alarm, logging, and display parameters for their networks. Users can set up performance thresholds and parameters for individual lines or groups of lines. Comten CAF1 consists of a software module, a keyboard/CRT display, and an optional line printer.**

***Multiple Access Facility with Remote Host Option (MAF/RHO)*—is used to extend communications capabilities for both SNA and BSC 3270 terminals to non-IBM host computers. Comten MAF/RHO allows Comten communications processors to be attached by a communications line to any host computer that can support a BSC 3270 cluster controller. Functions, which were part of earlier versions of MAF, are still provided. These include polling and adressing of terminals, terminal contol of a 3270 cluster controller, and error recovery capabilities.**

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Network Terminal Option—operates with Comten's ACF/NCP3 to permit selected pre-SNA start/stop (SS) and binary synchronous communications (BSC) devices to appear to the host access method as SNA devices. These selected start/stop and BSC devices can participate in single-domain and cross-domain sessions and share network resources with existing SNA devices.

Subarea Routing Manager (SRM)—operates in conjunction with Comten's ACF/NCP. SRM resides in a Comten communications processor where it does switching functions that permit BSC and SNA 3270 devices to communicate selectively with any of up to 31 different host access methods. Using SRM, terminal operators can log on to a variety of application programs that are controlled by multiple access methods whether in the local node or adjacent nodes. Access methods supported by SRM include ACF/TCAM and ACF/VTAM. When Comten's MAF is added, it extends SRM support to emulation mode access methods.

NCR Comten software that runs only under COS2 includes:

Communications Access Method 3 (CAM3)—a 3600-based applications interface that allows certain application programs to run in a locally or remotely attached 3600 Series processor without involving the host. CAM3 runs independently of the host access method, and allows the running of both Comten-provided and user-generated applications. It runs concurrently with such programs as ACF/NCP. Recent improvements in memory capacity on 3650 and 3690 processors are designed primarily to support CAM3.

Automatic Message Switch (AMS)—the first CAM3-based application, AMS is the newer of Comten's two store-and-forward switching programs. It supports TTY, IBM Correspondence, 3270 BSC and SNA, 2780/3780 BSC, and 3767 SNA terminals.

Comten Network Gateway (CNG)—provides communications between two or more independent SNA networks. The independent SNA networks retain their own network addressing scheme, thus permitting additions and deletions of resources within to have minimal effect on the other interconnected networks. CNG translates addresses and accepts, processes, and translates SNA commands to set up and terminate sessions between SNA networks.

Advanced Communications System for NCR hosts (NCR/ACS) Release 1—a family of NCR Comten network connectivity products that allow NCR host-resident VRX/TAM-based application programs to initiate and control communications through the NCR Comten communications processor. NCR/ACS takes over some of the host's tasks such as dynamic buffering; polling; code translation, activating and deactivating network components; sharing network resources between host applications; and more.

PRICING

The NCR Comten processors are available for purchase or on a 30-day, 2-year, 3-year, or 4-year lease. The prices shown in the following chart do not list the 4-year lease prices. For information on those prices, contact the vendor. All systems software is included in the price of the equipment. Software is purchased on a monthly or annual license fee basis. A license fee is charged for each processor on which the software is installed. A separate monthly maintenance contract is available.

EQUIPMENT PRICES

			Monthly Charges			
		Purchase Price ($)	Monthly Maintenance ($)	Month-to-Month Rental ($)	2-Year Lease ($)	3-Year Lease ($)
3650 Systems						
T-3650-G9	FEP, 512KB to 1MB, 4 LM	43,900	363	2,004	1,713	1,542
T-3650-H9	FEP, 512KB to 1MB, 12 LM	54,400	383	2,387	2,040	1,836
T-3650-J9	RCP, 512KB to 1MB, 4 LM	46,100	381	2,100	1,795	1,616
T-3650-K9	RCP, 512KB to 1MB, 12 LM	56,600	401	2,492	2,130	1,917
T-3650-S9	FEP, 256KB to 1MB, 2 LM, 4 to 16 lines	41,000	261	1,463	1,250	1,125
T-3650-R9	RCP, 256KB to 1MB, 3LM, 4 to 16 lines	41,000	261	1,463	1,250	1,125
F-3609-A8	128KB Storage Expansion	4,700	18	164	140	126
F-3613-A9	Storage Expansion, 512K	14,100	72	491	420	378
F-1034-A8	IBM Channel Program Loader	1,075	14	47	40	36
F-2200-A8	Remote Initial Load	565	6	25	21	19
F-2207-A8	Remote Initial Load (DLC-MIM)	735	6	33	26	23
T-4008	Comten Console	3,500	26	146	125	113
T-3029-A8	IBM Channel Interface Adapter	8,000	16	341	273	246
T-3030-B8	NCR Bit Serial Channel Interface Adapter	8,000	16	341	273	246
F-1044-A8	Peripheral Power Sequencer	1,500	9	54	46	42
F-2205-A8	3650 Extended Distance Interface Adapter	100	2	4	3	3
F-2239-A8	EIA RS-232-C/CCITT V.24/DDS Interface, 4 lines	3,000	10	175	140	126
T-3651-A8	Module Controller, 6 LM	10,500	20	380	325	310
T-3651-A9	Module Controller, 6LM, 2 CPUs	12,000	43	435	370	355
T-3651-B8	Module Controller, 12 LM	20,600	40	745	635	605
T-3651-B9	Module Controller, 12 LM, 2 CPUs	23,600	86	855	730	695

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EQUIPMENT PRICES

		Purchase Price ($)	Monthly Charges: Monthly Maintenance ($)	Month-to-Month Rental ($)	2-Year Lease ($)	3-Year Lease ($)
OPTIONS FOR ALL T-3650s EXCEPT T-3650-x8s AND 0-x9s						
F-3602-A1	Storage Expansion, 64KB	9,250	50	290	250	226
F-3603-A1	Storage Expansion, 64KB	9,250	50	290	250	226
F-3605-A1	Storage Expansion, 128KB	13,875	75	439	375	338
F-3609-A1	Storage Expansion, 128KB	9,375	75	328	280	252
F-1034-A1	IBM Channel Program Loader	1,265	14	47	40	36
F-2200	Remote Initial Load	665	6	25	21	19
F-2207-A1	Remote Initial Load (DLC-MIM)	865	6	33	26	23
T-4008	Comten Console	3,500	26	146	125	113
T-3029-A1	IBM Channel I/F Adapter	8,620	47	341	273	246
F-1044-A1	Peripheral Power Sequencer	1,800	9	54	46	42
F-2205-A1	3650 Extended Distance I/F Adapter	100	2	4	3	3
F-2233	Measurement I/F Facility	800	4	32	26	24
**F-2226-A1	EIA RS-232-C/CCITT V.24/DDS (9600) I/F, 2 Line	700	5	37	32	30
**F-2227-A1	Wideband I/F, 1 Line	825	6	41	36	34
**F-2228-A1	Wideband DDS, CCITT V.35 I/F, 1 Line	800	6	39	34	32
**F-2229-A1	Protocol Support Expansion	1,500	6	47	41	39
**F-2230-AX	MIL 188-100 Interface, 2 Line	815	7	70	61	58
**F-2231-AX	Wideband MIL 188-100 I/F, 1 Line	1,290	10	112	97	92
T-3651-A1	Module Controller, 6-LM	10,500	46	380	325	310
T-3651-A2	Module Controller, 6-LM, 2 CPU	12,000	69	435	370	355
T-3651-B1	Module Controller, 12-LM	20,600	92	745	635	605
T-3651-B2	Module Controller, 12-LM, 2-CPU	23,600	138	855	730	695
3690 Systems						
T-3690-A8	Standalone comm. processor, 512KB, 5-LM	116,080	590	5,000	4,000	3,600
T-3690-B8	RCP, 512KB, 5-LM	105,450	442	4,500	3,600	3,240
T-3690-C8	FEP, 512KB, 5-LM	105,000	415	4,565	3,652	3,287
T-3690-D8	FEP, 512KB, 4-LM	124,625	465	5,428	4,342	3,908
T-3690-E8	FEP, 512KB, 11-LM	155,750	517	6,772	5,418	4,876
T-3690-F8	Standalone comm. processor, 512KB, 5-LM	116,080	509	5,000	4,000	3,600
T-3690-G8	RCP, 512KB, 5-LM	105,450	442	4,500	3,600	3,240
T-3690-H8	FEP, 512KB, 5-LM	105,000	415	4,565	3,652	3,287
T-3690-J8	FEP, 512KB, 4-LM	124,625	465	5,428	4,342	3,908
T-3690-K8	FEP, 512KB, 11-LM	155,750	517	6,772	5,418	4,876
T-3690-T8	FEP or RCP, 512K, 3 DMA	65,900	366	2,821	2,257	2,032
F-3608-A8	Add-on memory, 256KB	9,400	36	328	280	252
F-3611-A8	Add-on memory, 128KB	4,700	18	164	140	126
F-3604-A1	Storage Expansion, 128KB	18,500	75	580	500	452
F-3614-A8	Storage Expansion, 1 Meg	28,200	144	983	840	756
F-2207-A8	Remote initial load (DLC MIM)	735	6	33	26	23
F-2207-B8	Remote initial load (BSC MIM)	735	6	33	26	23
F-1049-A8	IBM channel program loader	440	4	18	14	13
T-3209-A8	IBM channel interface adapter	8,000	16	341	273	246
T-3030-A8	NCR bit serial channel interface adapter	8,000	16	341	273	246
T-2023-A8	Communications Adapter	4,900	15	220	176	158
T-2023-B8	Extended Distance Communications Adapter	6,600	27	296	237	213
T-2023-C8	Extended Distance Communications Adapter, 2-CPU	9,350	46	416	333	300
T-4034-A6	Console, CRT with Printer	3,650	28	152	130	117
T-4034-B6	Monitor Console, CRT	1,645	6	69	59	53
F-4040-A5	Buffer Memory	265	2	10	8	7
F-1044-D8	Peripheral Power Sequence	1,500	9	54	46	42
T-3691-A8	Module Controller, 6-LM	12,000	20	450	360	324
T-3691-A9	Module Controller, 6-LM, 2-CPU	13,800	43	518	414	373
T-3692-A8	Module Controller, 7-LM, Adjacent	11,500	20	431	345	311
T-3691-B8	Module Controller, 12-LM	23,500	40	883	706	635
T-3691-B9	Module Controller, 12-LM, 2-CPU	27,100	86	1,018	814	733
T-3692-B8	Module Controller, 14-LM, Adjacent	22,500	40	845	676	608
T-3691-C8	Module Controller, 18-LM	35,00	60	1,314	1,051	946
T-3691-C9	Module Controller, 18-LM, 2-CPU	40,400	129	1,516	1,213	1,092
T-3692-C8	Module Controller, 21-LM, Adjacent	33,500	60	1,258	1,006	905
T-3691-D8	Module Controller, 24-LM	46,500	80	1,745	1,396	1,256
T-3691-D9	Module Controller, 24-LM, 2-CPU	53,700	172	2,016	1,613	1,452
T-3691-E8	Module Controller, 30-LM	58,000	100	2,178	1,742	1,568
T-3691-E9	Module controller, 30-LM, 2-CPU	67,000	215	2,515	2,012	1,811
T-3691-F8	Module controller, 36-LM	69,500	120	2,609	2,087	1,878

**T-3650-S1 features only.

NCR Comten 3600 Series Communications Processors

EQUIPMENT PRICES

		Purchase Price ($)	Monthly Charges: Monthly Maintenance ($)	Monthly Charges: Month-to-Month Rental ($)	Monthly Charges: 2-Year Lease ($)	Monthly Charges: 3-Year Lease ($)
3690 Systems (Continued)						
T-3691-F9	Module controller, 36-LM, 2-CPU	80,300	258	3,014	2,411	2,170
F-3607-A1	Storage Expansion, 256KB	27,750	150	878	750	676
F-3608-A1	Storage Expansion, 256KB	18,750	150	656	560	504
F-3611-A1	Storage Expansion, 128KB	9,375	75	328	280	252
F-3614-A8	Storage Expansion, 1 Meg	28,200	144	983	840	756
F-2207-A1	Remote Initial Load—DLC-MIM	865	6	33	26	23
F-2207-A2	Remote Initial Load—BSC-MIM	865	6	33	26	23
F-1049-A1	IBM Channel Program Loader	520	4	18	14	13
T-3018	IBM Channel I/F Adapter	7,420	42	275	235	212
T-3029-A1	IBM Channel I/F Adapter	8,620	47	341	273	246
T-2023-A1	Communications Adapter	5,800	33	220	176	158
T-2023-B1	Extended Distance Communications Adapter	7,800	45	296	237	213
T-2023-C1	Extended Distance Communications Adapter, 2-CPU	11,000	64	416	333	300
T-4009	Comten Console	3,500	26	146	125	113
F-1044-A4	Peripheral Power Sequencer	1,800	9	54	46	42
T-3691-A1	Module Controller, 6-LM	12,000	52	450	360	324
T-3691-A2	Module Controller, 6-LM, 2-CPU	13,800	78	518	414	373
T-3691-A3	Module Controller, 6-LM, Adjacent	11,500	51	431	345	311
T-3691-B1	Module Controller, 12-LM	23,500	104	883	706	635
T-3691-B2	Module Controller, 12-LM, 2-CPU	27,100	156	1,018	814	733
T-3691-B3	Module Controller, 12-LM, Adjacent	22,500	102	845	676	608
T-3691-C1	Module Controller, 18-LM	35,000	156	1,314	1,045	946
T-3691-C2	Module Controller, 18-LM, 2-CPU	40,400	234	1,516	1,213	1,092
T-3691-C3	Module Controller, 18-LM, Adjacent	33,500	153	1,258	1,006	905
T-3691-D1	Module Controller, 24-LM	46,500	208	1,745	1,396	1,256
T-3691-D2	Module Controller, 24-LM, 2-CPU	53,700	312	2,016	1,613	1,452
T-3691-E1	Module Controller, 30-LM	58,000	260	2,178	1,742	1,568
T-3691-E2	Module Controller, 30-LM, 2-CPU	67,000	390	2,515	2,012	1,811
T-3691-F1	Module Controller, 36-LM	69,500	312	2,609	2,087	1,878
T-3691-F2	Module Controller, 36-LM, 2-CPU	80,300	468	3,014	2,411	2,170
3600 Communications Equipment						
T-2014-C1	Auto-Call Adapter	3,100	15	123	98	88
T-2014-D1	Auto-Call Adapter	3,100	15	123	98	88
F-2027-03	Multi-baud Rate (8)	295	3	11	9	8
F-2027-04	Multi-baud Rate (8)	295	3	11	9	8
F-2027-05	Multi-baud Rate (8)	295	3	11	9	8
F-2033-B1	Auto-Call Interface	175	2	7	6	5
T-2016-A2	16-Line Asynch. MIM	3,600	15	115	98	88
F-2068-01	Telegraph Interface	125	2	5	4	4
F-2072-A2	2-Line EIA RS-232-C I/F	190	3	7	6	5
F-2074	2-Line Telegraph Interface	190	3	7	6	5
F-2072-A1	2-Line RS-232-C Interface	190	3	7	6	5
T-2018-A2	16-Line BSC MIM	6,700	20	211	180	162
F-2053-A1	2-Line RS-232-C/V.24 Interface	345	5	18	14	13
F-2053-B1	2-Line RS-232-C/V.24 Interface	345	5	18	14	13
F-2053-C1	2-Line RS-232-C/V.24 Interface	345	5	18	14	13
F-2064-A1	1-Line Wideband Interface	630	5	26	21	19
F-2064-B1	1-Line Wideband Interface	630	5	26	21	19
F-2092-A1	2-Line Wideband DDS Interface	1,010	6	39	31	28
F-2092-B1	1-Line Wideband DDS Interface	580	4	23	18	16
F-2092-C1	Wideband DDS I/F, 1-Line	580	4	23	18	16
F-2095	BSC EIA Sync. Clock, 2-Line	815	6	33	26	23
T-2020-A2	16-Line DLC MIM	6,800	38	220	181	165
*T-2020-B4	Extended Distance I/F DLC-MIM	8,300	43	270	221	201
T-2020-C4	Extended Distance Dual I/F, DLC-MIM	10,800	57	352	287	260
*F-2223-A4	Storage Epansion, 2K inst.	700	1	25	18	15
*F-2297-A4	Operand Storage Expansion	500	1	18	11	9
**T-2020-A6	DLC-MIM	8,000	36	263	210	189
**T-2020-B6	Extended Distance I/F DLC-MIM	9,500	45	313	250	225
**T-2020-C6	Extended Distance Dual I/F, DLC-MIM	12,000	59	395	316	284
F-2083-C1	2-Line Low Speed DDS, RS-232-C/V.24 Int.	700	4	22	19	17
F-2084	1-Line Wideband Interface	825	6	27	23	21
F-2085	1-Line Wideband DDS/V.35 Interface	800	6	26	22	20

*Delivery of these products will be on an as available bases

N/A Not available

**Not installable on 3650 systems.

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EQUIPMENT PRICES

		Purchase Price ($)	Monthly Charges: Monthly Maintenance ($)	Monthly Charges: Month-to-Month Rental ($)	Monthly Charges: 2-Year Lease ($)	Monthly Charges: 3-Year Lease ($)
3600 Communications Equipment (Continued)						
F-2220-AX	Mil Std. 188-100 I/F, 2-Line	815	5	46	39	35
F-2221-AX	Wideband Mil Std. 180-100 I/F, 1-Line	1,290	7	73	62	56
F-2088	Storage Expansion, 2K Inst.	1,500	6	48	41	37
F-2093-A1	Auto Dial (DLC-MIM)	150	2	NA	NA	NA
F-2097	Operand Storage Expansion	800	6	27	23	21
T-2031-A1	RS-449 DLC-MIM	10,500	44	453	362	337
T-2031-B1	RS-449 Extended Distance I/F DLC-MIM	12,000	50	518	414	385
T-2031-C1	RS-449 Extended Distance Dual I/F DLC-MIM	14,500	60	625	500	465
F-2154-A1	RS-449/423 CCITT V.36 I/F 2-Line	2,375	6	103	82	76
F-2161-A1	RS-449/422 High Speed I/F 1-Line	2,425	8	105	84	78
F-2155-A1	EIA/CCITT V.24, Low-Speed DDS (9600) I/F, 2-Line	700	4	22	19	17
F-2156-A1	Wideband I/F, 1-Line	825	6	27	23	21
F-2157	Wideband DDS, CCITT V.35 I/F, 1-Line	800	6	26	22	20
F-2220-AX	Mil Std. 188-100 I/F, 2-Line	815	5	46	39	35
F-2159-AX	Wideband Mil Std. 180-100 I/F, 1-Line	1,290	7	73	62	56
T-2029-B1	Integrated Protocol Converter	6,100	18	NA	296	NA
F-2329-A2	8-Line Expansion	2,750	6	NA	132	NA
F-2331-A2	CIM Interface	1,100	5	NA	54	NA
T-2028-B1	HLC-MIM	8,000	34	345	276	257
D-2321-A2	Dataphone Digital Service CCITT V.35 (One Line)	4,000	8	173	138	128

SOFTWARE PRICES

		Monthly License Fee ($)	Annual License Fee ($)	Initial License Fee ($)
SCS Based Products				
S-SY00.5	SCS63 R5	0	0	—
S-SY01.2	NSS1 R2 (OS/MVS)	0	0	—
S-SY11.2	NSS1 R2 (VM)	0	0	—
S-SY21.2	NSS1 R2 (DOS)	0	0	—
S-MS01.1	CAF1 R1	164	1,804	—
S-EM04.5	EP4 R5	0	0	—
S-EM14.5	MPAD R5	36	396	—
S-EM24.1	SEAC2 R1	53	583	—
S-EM34.5	SDA5 R5	36	396	—
S-EM44.5	SS1 R5	89	979	—
S-MF03.2	MAF3 R2	114	1,254	—
S-MF10.1	MAF/RHO R1	585	6,435	3,218
S-NC021.1	ACF/NCP2.1 R1	234	2,574	1,305
S-NC03.1	ACF/NCP3 R1	234	2,574	1,305
S-NC11.1	NT01 R1	206	2,266	660
S-NC12.1	NT02 R1	206	2,266	660
S-NC21.2	SRM1 R2	175	1,925	—
S-CN03.1	CNS3 R1	144	1,584	—
S-XN01.3	X.25 I/F R3	300	3,300	—
S-XN20.0	PA1	160	1,760	—
S-XNPA2.1	PA2	300	3,300	—
S-XNPA3.2	PA3	300	3,300	—
S-XNPA4A.1	PA4A	200	2,200	—
S-XNPA5A.1	PA5A	200	2,200	—
S-XNPA5D.1	PA5D	200	2,200	—
S-XNXSWX.2	XSWX R2	320	3,520	—
S-XNPCNS.1	PCNS	150	1,650	—
S-XNTIA1.1	TIA1	300	3,300	—
S-XN10.0	DATAPAC	48	528	—
S-XN11.0	TELENET	48	528	—
S-XN12.0	TYMNET	48	528	—
S-XN13.0	TRANSPAC	48	528	—
S-XN14.0	DATEX P	48	528	—
S-XN15.0	UKPSS	48	528	—
S-XN16.0	UNINET	48	528	—
S-XN17.0	DN1	48	528	—

NCR Comten 3600 Series Communications Processors

SOFTWARE PRICES

		Monthly License Fee ($)	Annual License Fee ($)	Initial License Fee ($)
Unbased Products				
S-LS01.2	CLSS1 R2 (OS/MVS)	0	0	—
S-LS11.2	CLSS1 R2 (VM)	0	0	—
S-LS21.2	CLSS1 R2 (DOS/VSE)	0	0	—
S-SY56.2	DLC6 R2	0	0	—
S-PL02.0	CPAL V2 (OS/MVS)	100	1,100	—
S-PL12.0	CPAL V2 (VM)	100	1,100	—

		First Year Fee ($)	Annual Renewal Fee ($)
Link Evaluation Software			
S-AB00.0	LEM BASIC	1,800	600
S-AB10.0	LEM BSC	600	200
S-AB20.0	LEM SDLC	1,200	400

		Monthly License Fee ($)	Annual License Fee ($)	Initial License Fee ($)
COS Based Products				
S-OS90.1E	COS2/90 R1	0	0	—
S-SY31.2E	NSS1 R2E	0	0	—
S-MS01.1E	CAF1 R1E	164	1,804	—
S-EM04.5E	EP4 R5E	0	0	—
S-EM14.5E	MPAD R5E	36	396	—
S-EM34.5E	SDA5 R5E	36	396	—
S-MF03.3E	MAF3 R3E	114	1,254	—
S-NC03.1E	ACF/NCP3 R1E	234	2,574	1,305
S-NC12.1E	NT02 R1E	206	2,266	660
S-NC21.4E	SRM1 R4E	175	1,925	—
S-CN03.1E	CNS3 R1E	144	1,584	—
S-XN01.5E	X.25 I/F R5E	300	3,300	—
S-XNPA2.1E	PA2 R1E	300	3,300	—
S-XNPA3.1E	PA3 R1E			
S-XNPA5A.1E	PA5A R1E	200	2,200	—
S-XNPA5D.1E	PA5D R1E	200	2,200	—
S-XNXSWX.2E	XSWX R2E	320	3,520	—
S-XN10.1E	DATAPAC R1E	48	528	—
S-XN11.1E	TELENET R1E	48	528	—
S-XN12.1E	TYMNET R1E	48	528	—
S-XN13.1E	TRANSPAC R1E	48	528	—
S-XN14.1E	DATEX P R1E	48	528	—
S-XN15.1E	UKPSS R1E	48	528	—
S-XN16.1E	UNINET R1E	48	528	—
S-XN17.1E	DNI R1E	48	528	—
S-XN18.1E	LUXPAC R1E	48	528	—
S-XN22.1E	DDX R1E	48	528	—
S-XN23.1E	ADMIN PROFILES R1E	84	924	—
S-XN20.0E	PA1 R1E	160	1,760	—

A license is required for each software product for each processor in which installed ■

NCR Comten 3600 Series Communications Processors

MANAGEMENT SUMMARY

UPDATE: *This report is being updated to show changes that have been made to the NCR Comten 3600 Series of communications processors since the last update. NCR Comten has introduced two new software products for use with the 3600 Series, as well as a new integrated disk and an integrated protocol converter. An enhancement to the Communications Networking System was also introduced. NCR Comten is no longer offering the Statistics and Extended Access Control software package. The past year also saw the vendor introduce COS2, replacing SCS/63, as the operating system. These additions, deletions, and changes are discussed in this updated report.*

NCR Comten, a subsidiary of NCR Corporation, has been specializing in data communications systems since 1968. Their 3600 Series of communications processors connect over 400,000 terminals and host computers in public and private data communications networks throughout the world. NCR Comten has over 60 sales and service facilities in the United States and Canada. The company also markets their products in Western Europe, the Far East, the Middle East, Africa, South America, and Australia.

Over the last year-and-a-half, the 3600 Series of communication processors has undergone a major overhaul. NCR Comten removed the 3670 from manufacturing, and planned to offer it on a limited basis from stock. The company introduced new lines of its 3650 and 3690 models. These new lines feature a streamlined internal architecture that allows the attachment of more communications lines in less space than its predecessor. NCR Comten also replaced their old operating system, SCS/63, with new networking software, the COS2 operating system. The CAM3 access method was also introduced. CAM3 is a language for writing applications to run, independently of the host processor, in the 3600 communications processor.

The 3600 family has two branches: the low-end 3650 models, and the high-performance 3690s. The 3650s come in front-end and remote configurations with 512K or 1M bytes of main memory. The smallest configurations support up to 16 communications lines, while the largest support up to 128.

The 3690s can be configured as front ends, remote communications processors, or standalone message switches. They support up to 4M bytes of main memory and up to 512 communications lines.

All active members of both families are relatively new. The latest 3650s were announced in October 1983, while the new 3690s were announced in February 1984. Also in February 1984, NCR Comten doubled the available main memory on the new 3650 models.

NCR Comten's 3600 Series of communications processors contains the 3650 and the 3690. The Comten 3650 is an entry-level series of front-end and remote-communications processors. The 3690 offers a high-performance series of front-end, standalone, and remote processors. The NCR Comten 3600 Series is one of the main contenders against IBM in the plug-compatible communications processor marketplace.

FUNCTION: Front-end or remote full-service communications processors with message switching available in some configurations.
HOST COMPUTERS SUPPORTED: IBM and compatible mainframes; NCR mainframes.
ARCHITECTURE SUPPORTED: SNA; proprietary trunk protocol.
OPERATING SOFTWARE: SCS/63; Communications Operating System 2 (COS2).
COMPETITION: IBM 3705 and 3725; Amdahl 4705; CCI CC8, CC80, and CC85; Memorex 1270.
PRICE: Prices for 3650 models start at $41,000 for an entry-level front-end or remote processor with console, able to support four communications lines. Prices for 3690 models base systems start at $65,900 for the "packaged" Model T-8, and range up to $155,750 for Model K8.

CHARACTERISTICS

VENDOR: NCR Comten, Inc., 2700 Snelling Avenue North, St. Paul, MN 55113. Telephone (612) 638-7777.

DATE OF ANNOUNCEMENT: 3650—March 1976; 3650 Models G8-K8, R8, and S8—October 1983; 3690—July 1977; 3690 Models A8-K8 and T8—February 1984.

DATE OF FIRST DELIVERY: 3650—June 1976; 3650 Models G8-K8, R8, and S8—February 1984; 3690—June 1978; 3690 Models A8-K8 and T8—February 1984.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: NCR Comten.

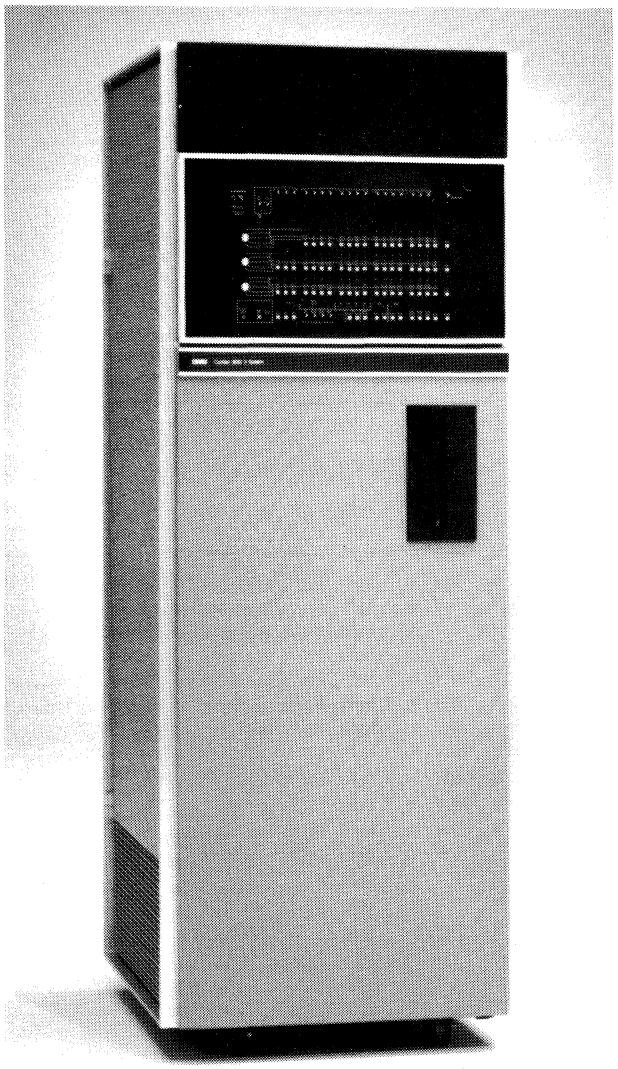
MODELS

The 3650 is currently available in 10 models. Models G8, H8, J8, and K8 have up to 512K bytes of memory; Models S8 and R8 have 256K bytes of memory upgradable to 512K bytes in a single 256K-byte increment. Models G9, H9, J9, and K9 have up to 1M bytes of memory. The memory increment between the two series has no effect on communications line capacity; it serves to support applications that will run under Comten's CAM3 access method. Models S8, G8, and H8 are entry-level, small-, and medium-sized front-end processors, respectively; Models R8, J8, and K8 are entry-level, small-, and medium-sized remote communica-

NCR Comten 3600 Series Communications Processors

In hardware, the 3600 models use a hierarchical architecture common among communications processors. On the network side, they use a two-level attachment, with Modem Interface Modules (MIMs) connecting physical-level Line Interface Features to the central processor. NCR Comten offers three basic types of MIM: an asynchronous unit, a BSC MIM, and a programmable DLC MIM. Use of the DLC MIM places some limits on line configuration because a single interface module occupies half each of two adjacent slots in the 3600 Series cabinet.

In software, the 3600 processors run Comten-developed programs compatible with equivalent IBM software for 270X Emulation and SNA network control. The NCR Comten programs are named similarly to their IBM counterparts: EP, ACF/NCP, PEP, etc. In addition, the 3600 processors support an X.25 interface and a message-switching application that runs under the new CAM3 access method.



NCR Comten's 3650 is available in 10 models. These models are the entry-level series of front-end and remote communications processors.

tions processors, respectively; Models G9, H9, J9, and K9 correspond to models G8, H8, J8, and K8, but have double the main memory capacity.

The 3690 is currently available in 11 models. All come with 512K bytes of main memory, expandable to 4M bytes in 256K or 512K-byte increments. Model A8 is a standalone message processor; Model B8 is a remote communications processor; Models C8, D8, and E8 are front-end processors with the ability to attach to two, four, and eight host computers, respectively. All have the capacity, initially, to support up to eight Modem Interface Modules (MIMs).

Models F8 through K8 correspond in sequence to Models A8 through E8, except that they can initially support up to seven MIMs and a communications adapter that itself can support up to eight additional MIMs.

Model T8 is an entry-level 3690 system that can be configured either as a front-end processor or as a remote communications processor. As a front end, it can support up to two host computers. In either configuration, it can support up to eight MIMs initially.

CONFIGURATION

3650 Models

The entry-level, "packaged" 3650 models, R8 and S8, are single-cabinet units that come with a CPU, 256K bytes of main storage upgradable to 512K bytes in a single increment of 256K bytes, and a single, built-in MIM. Both come with a Comten console (30-cps, 132-column keyboard/printer) as standard equipment. The Model S8 front-end processor comes with a built-in host channel interface.

Models G8, J8, G9, and J9 are single-cabinet units. The base cabinet houses the CPU, main memory (512K bytes for x8 models; 1M bytes for x9 models), an integral program loading device, and space for the attachment of eight MIMs. The front-end configurations include an integral channel adapter for attachment to the host. The remote configurations include an integral DLC MIM (a MIM that supports such bit-oriented, synchronous protocols as SDLC and HDLC) for remote initial program loading. These models support the Comten console, but do not include it as standard equipment.

Models H8, H9, K8, and K9 are two-cabinet systems with the same base cabinet configuration as Models G8, G9, J8, and J9, along with an additional cabinet that can contain up to eight MIMs. These models also support the Comten console as an optional piece of equipment.

3690 Models

All models of the 3690 come in a two-cabinet base configuration, with the base cabinet of all models containing the CPU, main memory, the maintenance panel, and space for the MIMs, channel adapters, or both, as appropriate to the individual model. Model A8 is a standalone message switching system with a block multiplexer channel for the attachment of up to eight peripheral storage devices, and space for the attachment of eight MIMs. Model B8 is a remote communications processor with a single, integral DLC MIM for remote initial loading, and space for the attachment of eight MIMs.

Model C8 is a front-end processor that can support up to two channel-attached hosts (or one host and one channel-attached peripheral). It comes with one IBM channel adapter as standard equipment, and has space in the base cabinet for the attachment of eight MIMs.

NCR Comten 3600 Series Communications Processors

This past year also saw the introduction of the Comten Integrated Protocol Converter (IPC) that offers network users entry to 3270 host application programs through asynchronous terminals and personal computers. The Comten IPC is modular and can be installed in a local or remote Comten 3600 communications processor. The unit fits in a Data Link Control-Modem Interface Module (DLC-MIM) slot. When an IPC is installed in a remote 3600 communications processor, it can provide protocol conversion to remote sites. The Comten IPC appears to the host computer as a 3274 cluster controller and permits terminals to emulate 3278 display stations. Asynchronous ASCII protocol is converted to appear as BSC protocol which permits users with non-SNA terminals and personal computers to access SNA and SBC host applications. The unit can detect the baud rate of incoming data automatically, supports line speeds from 300 bps to 9600 bps, supports X-on/X-off flow control, and can simultaneously support up to 32 terminals on one IPC.

NCR Comten also introduced an integrated disk for the Comten 3690 communications processor. This disk, the Comten T-7362, has the capability to store system software load modules and memory dumps in the Comten 3690. The disk is an intelligent storage subsystem with a 29-megabyte fixed disk drive that can be installed in a Comten 3690 cabinet. The disk lets users perform loading and dumping operations at high rates of speed; it can also be set to capture system dumps automatically for analysis following system failure. Load modules can be created by the user at the host processor and then sent to the Comten T-7362 Disk to be saved until the user needs them. The disk can save system dumps and then send them to the host for printing during a low traffic time. Commands issued from the console that are supported by the Comten T-7362 include the following: display disk file records, format a disk, display a disk table of contents, delete any file from a disk, and inspect disk sectors. The disk is used in connection with the regular load diskette and functions with the Comten Network Support Services 1 (NSS1) software under the COS2/90.

COMPETITIVE POSITION

The 3600 Series leads a small pack that trails IBM by a wide margin in the communications processor market. IBM has a comfortable 90 percent share of the market for communications processors compatible with Big Blue mainframes. Among those trailing NCR Comten in the remaining 10 percent are Amdahl Corporation, with its 4705; Computer Communications, Inc. (CCI), the manufacturer of the CC8, CC80, and CC85 processors; and Memorex's 1270. NCR Comten has sold nearly twice as many communications processors as its nearest rival, CCI, and has been much more aggressive in developing a competitive product for the 1980s.

ADVANTAGES AND RESTRICTIONS

When compared to IBM's communications processors, the NCR Comten products are clear winners. The 3650 Series competes head-to-head with IBM's low-end 3705-80 line,

Model D8 is a front-end processor that can support up to four host computers and one channel-attached peripheral device. It comes with a direct memory attachment base (DSX) equipped with one IBM channel adapter, and with space in the base cabinet for the attachment of eight MIMs.

Model E8 is a front-end processor that can support up to eight host computers. It comes with two DSXs, one IBM channel adapter, and space in the base cabinet for the attachment of eight MIMs.

Models F8 through K8 correspond in sequence to Models A8 through E8, except that they can initially support only seven MIMs. The eighth MIM is replaced by space for the attachment of a communications adapter, which itself can connect up to eight MIMs.

Model T8 is an entry-level 3690 system that can be configured as a front-end or remote communications processor. As a front end, it can support up to two hosts. It features space for up to eight MIMs in its base configuration.

Beyond the capacities of their base cabinets, 3690 processors can be expanded through the addition of Model 3692 Module Controllers (expansion cabinets). Each Module Controller has space for 6 to 36 MIMs and one communications adapter. NCR Comten offers three kinds of Module Controllers: one for local attachment, one for extended distance attachment (up to 100 cable feet from the base cabinet), and one that can be shared by two 3690 CPUs in different base cabinets. The third type of module controller is useful in fault-tolerant configurations, where one processor can take over the line attachments in the Module Controller should the other processor fail.

PROCESSING COMPONENTS

All models of the 3600 Series use a CPU with a 36-bit word length and an 18-bit data path between the processor and main memory. Main memory on the 3650 models has a cycle time of 650 nanoseconds; main memory on the 3690 models has a cycle time of 520 nanoseconds. The 3650 CPU uses a set of 62 instructions, 54 of which are in IBM format; the 3690 uses a set of 101 instructions, all of which are in IBM format.

CONNECTION TO HOST AND PERIPHERALS

Front-end processors in both the 3650 and 3690 Series connect to the byte or block multiplexer or selector channel of an IBM host through an IBM Channel Interface Adapter (CIA) that uses one control position on the IBM channel, supporting from 1 to 256 subchannel addresses. Front-end processors must include an IBM Channel Program Loader, an initial load program contained in 2048 bytes of read-only memory, that performs a CPU start-up test and loads a bootstrap-channel program loader into main storage.

Front-end processors in the 3650 Series may also attach to an NCR V-8000 host through an NCR Bit Serial Link Channel Interface Adapter.

Remote communications processors connect to the host through a Remote Initial Load feature, similar to the Channel Program Loader, that attaches to a dedicated DLC MIM. Remote Initial Load is also available on a BSC MIM for 3690 models.

All 3600 family processors are able to support locally attached peripheral devices, such as IBM-compatible disk drives. The processors support these devices through their channel interface adapters.

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TABLE 1. COMMUNICATIONS LINE INTERFACES & MODEM INTERFACE MODULES

Line Interface		Timing	Half- or Full-Duplex	Speed, bps	Line Interface Feature	Lines per Interface	No. of Interfaces per MIM	MIM Feature
EIA RS-232-C	Bell 113B, 103A, 202	Async	Half	Up to 1800	F2072	2	8	T2016-A2
	BSC	Sync	Half	Up to 19.2K	F2053-A1	2	8	T2018-A2
	CNS trunkline	Sync	Full	Up to 19.2K	F2053-B1	1	8	T2018-A2
	IBM 2848/2260, 2845/2265	External	Half	Up to 9600	F2053-C1	2	8	T2018-A2
	SDLC	Sync	Half or Full	Up to 20K	F2083-C1	2	8	T2020-A2
Current loop, 20 ma or 60 ma		Async	Half	Up to 75	F2074*	2	8	T2016-A2
Wideband	Bell 300 Series	Sync	Half	Up to 50K	F2064-A1	1	4	T2018-A2
	CNS trunkline	Sync	Full	Up to 50K	F2064-B1	1	2	T2018-A2
DDS	BSC	Sync	Half	Up to 56K	F2092-A1	2	2	T2018-A2
	CNS trunkline	Sync	Full	Up to 56K	F2092-B1	1	2	T2018-A2
	Bell System Data Service Unit	Sync	Half or full	Up to 56K	F2085	1	2 (HDX), 1 (FDX)	T2020-A2
Wideband	Bell 300 Series	Sync	Half or Full	Up to 50K	F2084	1	2 (HDX), 1 (FDX)	T2020-A2
Auto Call Adapter	#T2014	—	—	—	F2033-B1	1	16	T2016-A2

**Requires Telegraph Interface Base Feature #2068.*

and exceeds the IBM models in main memory capacity, processor speed (by nearly a factor of two), and operability. The 3650 processors support a locally attached operator's console for error logging and diagnostics: the IBM models rely on the host's console.

The 3690 models compete directly with IBM's obsolescent larger 3705s and the new 3725 processor. Against the 3705, the 3690 supports eight times the main memory, one third more processor speed, and 512 communications lines to the 3705's 324. The 3690's advantages over the 3725 are somewhat less: it has twice the main memory of the IBM product, and can run vendor- or user-developed applications software. The 3690 can support twice as many communications lines as the 3725. The 3725 has an operator's diagnostic console and a diskette-based diagnostic system, the latter missing from the 3690.

The NCR Comten processors' restrictions are common to all IBM-compatible equipment. The vendor is constantly one step behind IBM in product development, and must always try to catch up. Among the plug-compatible vendors of communications processors, Comten has always been the most aggressive in trying to lead IBM in technology. Their 3600s clearly outperform anything on the market, and their software is beginning to leap forward. If it catches on with the users, the new CAM3 access method will provide a whole new channel for adding value to the product: applications processing in the communications processor.

Another advantage of the 3600 processor is its support of local peripheral devices, such as disk drives. While this feature is most useful now in message-switching configurations, it may become more useful as CAM3 applications take hold.

CONNECTION TO THE NETWORK

The 3650 and the 3690 models use essentially the same network-side equipment, but it is arranged differently in processors of each series. The basic unit of network connectivity for the 3600 Series is one of three general types of MIM: the Asynchronous MIM (or A-MIM), the BSC MIM, and the DLC MIM. Each MIM can attach up to 16 communications lines. The 3600 Series processors also use a variety of special wideband interfaces that, like MIMs, occupy logic module slots in the processor or module controller cabinet. Table 1 lists the communications performed by the 3600 processors, and the specific communications hardware that supports them.

The async and BSC MIMs are nonprogrammable devices, while the DLC MIM is a programmable interface that can handle a variety of bit-oriented, synchronous protocols (such as SDLC, ADCCP, and HDLC). The use of the DLC MIM creates some problems in configuration. While other logic modules use one attachment slot, the DLC MIM uses half each of two adjacent slots. Thus, a 3600 Series processor configured with DLC MIMs cannot be loaded to its full line capacity. In the new models, main storage modules and block multiplexer peripheral attachment channels share this feature with the DLC MIM, thus allowing a larger number of options for configuration although limiting full capacity on the system.

In the 3650 models, the MIMs and other logic modules attach directly to the processor. In the 3690 models F8 through K8, some MIMs attach directly, while others attach through a special logic module called a communications adapter. A communications adapter occupies the highest MIM position in a given base cabinet or module controller. The communications adapter houses up to eight MIMs. In the 3690 configurations that support the communications adapter, the user loses one direct MIM attachment, but gains eight attachments through the adapter. There is no difference in performance between directly attached MIMs and MIMs attached through an adapter.

TRANSMISSION SPECIFICATIONS

The 3600 Series processors can handle synchronous or asynchronous communications at data rates from 75 bps to

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A final restriction is the awkward placement of the DLC MIM in the 3600 Series cabinet. While having a single interface module occupy half each of two adjacent slots is a minor flaw in one of the simpler processor configurations on the market, NCR Comten should have amended it while redesigning the processor for its latest models.

USER REACTION

Datapro recently conducted its 1985 Network Users Survey and while final results are not yet available, preliminary results for the NCR Comten 3650 and 3690 communications processors were available. These results are from 14 users of the NCR Comten 3600 Series of communications processors. Of the users responding, four had the Comten 3650, five had the Comten 3690, three had both the 3650 and the 3690, and two did not specify the model. There was a total installed base of 70 machines; 38 were 3650s, 30 were 3690s, and 2 were unspecified. We have listed their reactions below.

3650 Systems	Excellent	Good	Fair	Poor	WA*
Overall satisfaction	4	3	0	0	3.6
Ease of installation	2	3	1	1	3.0
Ease of operation	2	5	0	0	3.3
Ease of expansion	3	2	1	1	3.0
Hardware reliability	2	4	1	0	3.1
Quality of vendor's software/firmware	3	1	1	1	3.0
Ease of programming	2	2	2	0	3.0
Quality of vendor's maintenance service	3	2	2	0	3.1
Quality of vendor's technical support	4	1	2	0	3.3

*Weighted Average based on a scale of 4.0 for Excellent.

3690 Systems	Excellent	Good	Fair	Poor	WA*
Overall satisfaction	3	5	0	0	3.4
Ease of installation	1	4	2	1	2.6
Ease of operation	1	6	1	0	3.0
Ease of expansion	2	3	3	0	3.0
Hardware reliability	2	4	2	0	3.0
Quality of vendor's software/firmware	1	4	0	2	2.6
Ease of programming	2	3	1	0	3.2
Quality of vendor's maintenance service	1	4	2	1	2.6
Quality of vendor's technical support	1	4	2	1	2.6

*Weighted Average based on a scale of 4.0 for Excellent.

Unspecified models	Excellent	Good	Fair	Poor	WA*
Overall satisfaction	1	0	1	0	3.0
Ease of installation	1	0	1	0	3.0
Ease of operation	1	0	1	0	3.0
Ease of expansion	1	0	0	1	2.5
Hardware reliability	1	1	0	0	3.5
Quality of vendor's software/firmware	1	0	0	1	2.5
Ease of programming	1	0	0	1	2.5
Quality of vendor's maintenance service	1	1	0	0	3.5
Quality of vendor's technical support	1	1	0	0	3.5

*Weighted Average based on a scale of 4.0 for Excellent.

56K bps, using async codes or BSC, SDLC or Comten's own CNS trunk protocol. With special software, the 3600 processors can also handle packet-level X.25 communications. The processors support a number of physical interfaces, each through a specific line interface feature. See Table 1 for a complete list of NCR Comten-supported communications.

OPERATOR INTERFACE

Both the 3650 and the 3690 feature an onboard maintenance panel. The 3650 supports a 30-cps, 132-column keyboard/printer as an operator's console. The 3690 uses either the keyboard/printer or a newer, CRT-based console. The 4034 Operator Console is available in two models; both have an 80-character by 24-line CRT with a detachable keyboard. The more complete model comes with an 80-column dot-matrix impact printer, a printer stand, and paper catcher. The other model includes only the CRT.

SOFTWARE

The operating system used in the Comten 3600 Series of communications processors is the Communications Operating System 2 (COS2). COS2 is available in two versions: COS2/50 for the 3650 and the obsolescent 3670, and COS2/90, for the 3690. This system is backward-compatible with SCS/63 programs, but includes a feature unique to any IBM-compatible communications processor: a communications processor-based access method that allows users to run communications applications, such as message switching, entirely in the communications processor without involving the host.

Software developed under SCS, NCR Comten's older 3600 Series operating system, that is now supported under COS2 includes:

Emulation Processing—which allows the 3600 Series processor to operate as an IBM 37XX Communications Controller emulating an IBM 270X hardwired controller. The Comten version of EP includes several features not found in the IBM version. These include:

- Terminal-Initiated Line Switching, a feature that allows users at terminals to switch from one host application to another through the communications processor.
- Automatic Baud Rate Detection, which allows asynchronous terminals with different line speeds and line codes to share the same line to a 3600 processor.
- Site-Initiated Line Switching, which allows the 3600 console operator to switch a terminal from one host application to another.
- Automated Dialing, which allows the host to initiate sessions automatically with dial-up terminals.

Advanced Communications Function/Network Control Program (ACF/NCP)—NCR Comten's version of IBM's operating software for the IBM 3705 or 3725 in an SNA network. Comten's ACF/NCP includes the Multisystem Networking feature of later versions of IBM's ACF/NCP. It works in conjunction with either ACF/TCAM or ACF/VTAM in the IBM host.

Partitioned Emulation Programming—which allows concurrent operation of EP and ACF/NCP in the same 3600 processor.

Multiple Access Facility—which allows terminal initiated line switching for IBM 3270 terminals, and relieves the host of the polling function for such devices.

Communications Networking System (CNS)—NCR Comten's 3600-to-3600 trunking protocol, used most often in

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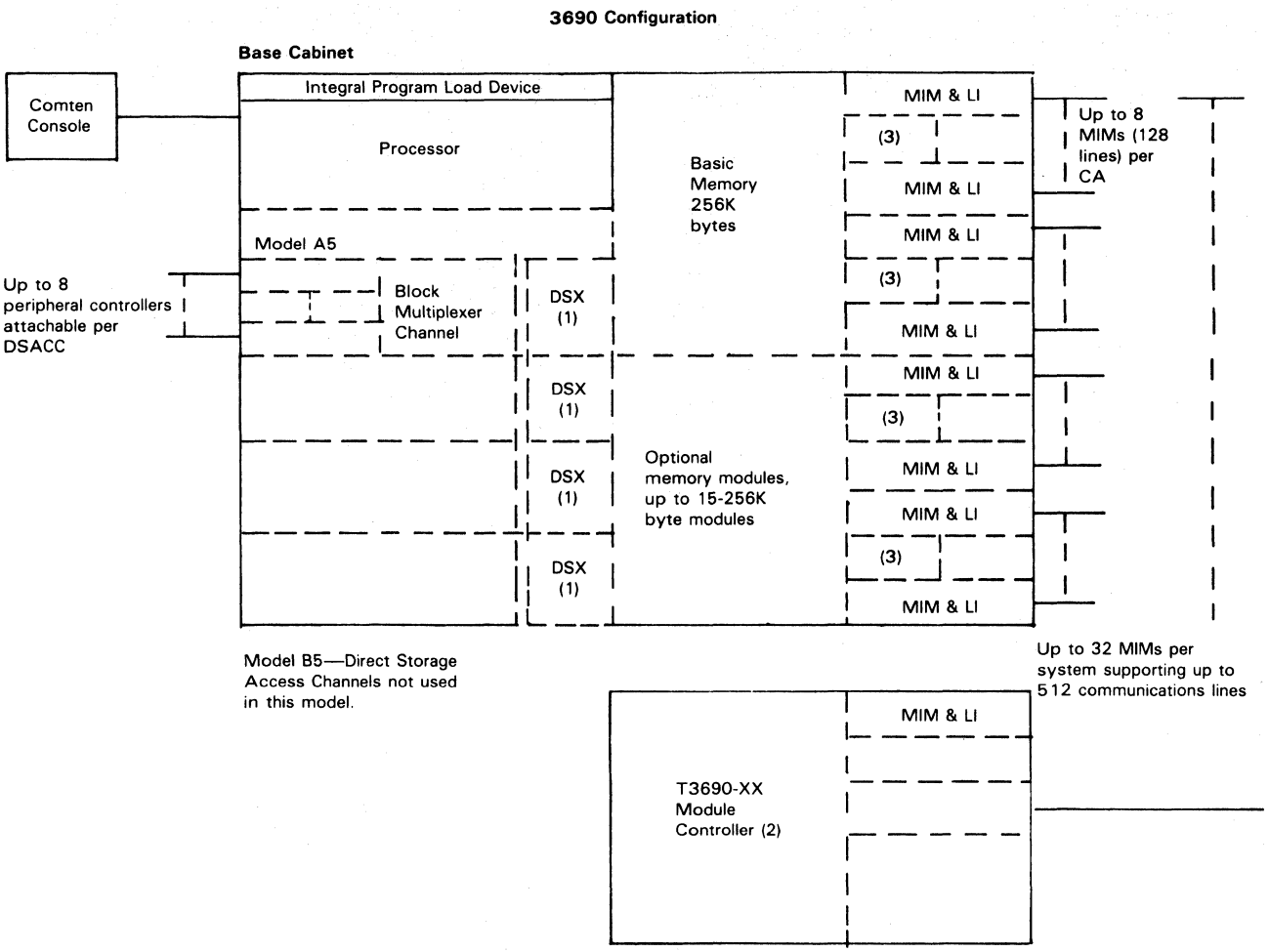

(1) Direct Storage Access Channel Controller available for attachment of a Channel Interface Adapter, a Block Multiplexer Channel, or an Integrated File Adapter.

(2) Module Controllers are available to accommodate 6, 12, 18, 24, 30, or 36 Logic Modules. Each size has a version that permits dual processor access; i.e., two 3690s can have access to the controller.

(3) Up to eight Modem Interface Modules (MIM) plus associated Line Interfaces (see Table 2) per Communications Interface Module. Requirement for Module Controllers (expansion housing for MIMs) is dependent on the MIMs selected and the space available in base cabinet; space available is expressed in Logic Modules. The 3690–A5, B5, C5 and D5 each have three Modules. The 3690–E5 has nine Logic Modules.

Figure 1. Direct Storage Access Channel Controller available for attachment of a Channel Interface Adapter, a Block Multiplexer Channel, or an Integrated File Adapter.

We also asked the users to list the primary functions performed by the communications processors that operated in their networks. The three major functions mentioned most often, by the NCR Comten communications processors users, were front-end processing, remote line concentration, and applications switching. Other functions performed by the Comten processors included terminal controller functions, message/packet switching, X.25 PAD or gateway functions, distributed processing node functions, and standalone network processing.

The full User's Survey will be published later this year and additional entries for the NCR Comten 3600 Series communications processors may change the ratings that are shown here. We were unable to contact any of these users by phone to obtain more detailed reactions. □

communications between a 3600 processor serving as a remote concentrator and a 3600 processor serving as a front-end. CNS is a Transport-layer protocol.

***CNS3 Release 1*—an enhancement to NCR Comten's Communications Networking System. This enhancement can handle up to 128 simultaneous transmissions.**

***Comten X.25 Interface*—a series of packet-level X.25 interface programs designed to connect the 3600 Series processor to public packet-switching networks. Separate versions are available for GTE Telenet, Tymnet, and Uninet in the United States; Datapac in Canada; the PTT in Great Britain; Transpac in France; and Datex-P in West Germany.**

***Comten Advanced Communications System for NCR hosts (NCR/ACS)*—a combination of hardware and software features, based in the Comten communications processor, that make the system compatible with NCR VRX and IBM hosts. Three components make up the Comten NCR/ACS family: the VRX Interface Module (VIM), the Comten Communications Access Method (CAM), and VRX Comten Support (VCS). VIM is a software interface for the Bit Serial Link (BSL) Channel Interface Adapter (CIA) that resides in the Comten 3600 communications processor. CAM resides in the Comten 3600 communications processor and supports customer- and vendor-written communica-**

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tions application programs. VCS consists of a group of Cobol application programs residing in the NCR host. The host prerequistite for Comten NCR/ACS is an NCR 8500/8600 VRX that utilizes TAM and/or an IBM 370, 303X, 308X 43XX, or compatible host.

NCR Comten software that runs only under COS2 includes:

Communications Access Method 3 (CAM3)—a 3600-based applications interface that allows certain application programs to run in a locally or remotely attached 3600 Series processor without involving the host. CAM3 runs independently of the host access method, and allows the running of both Comten-provided and user-generated applications. It runs concurrently with such programs as ACF/NCP. Recent improvements in memory capacity on 3650 and 3690 processors are designed primarily to support CAM3.

Automatic Message Switch (AMS)—the first CAM3-based application, AMS is the newer of Comten's two store-and-forward switching programs. It supports TTY, IBM Correspondence, 3270 BSC and SNA, 2780/3780 BSC, and 3767 SNA terminals.

Comten Network Gateway (CNG) Release 1—a new connectivity product from NCR Comten that allows multiple SNA networks to communicate with each other. The Gateway can translate addresses; accepts, processes, and translates SNA commands for starting and ending sessions between SNA networks. The CNG resides completely in the NCR Comten communications processor. Features include the following: automatic error recovery, no changes to host software, SNA network addressing restrictions are circumvented, device independent, functionally transparent to system control points, and supports the use of Comten CNS, X.25, and ACF/NCP trunking.

PRICING

The NCR Comten processors are available for purchase or on a 30-day, 2-year, 3-year, or 4-year lease. All systems software is included in the price of the equipment. Software is purchased on a monthly or annual license fee basis. A license fee is charged for each processor on which the software is installed. A separate monthly maintenance contract is available. Pricing has not yet been set for COS2, CAM3, or AMS software.

EQUIPMENT PRICES

			Monthly Charges				
		Purchase Price ($)	Monthly Maintenance ($)	Month-to-Month Rental ($)	2-Year Lease ($)	3-Year Lease ($)	4-Year Lease ($)
T-3650-G8	FEP, 512KB, 4 LM	43,900	363	2,004	1,713	1,542	1,456
T-3650-H8	FEP, 512KB, 12 LM	54,400	383	2,387	2,040	1,836	1,734
T-3650-J8	RCP, 512KB, 4 LM	46,100	381	2,100	1,795	1,616	1,526
T-3650-K8	RCP, 512KB, 12 LM	56,600	401	2,492	2,130	1,917	1,811
T-3650-S8	FEP, 256KB, 2 LM, 4 to 16 lines	41,000	261	1,463	1,250	1,125	1,063
T-3650-R8	RCP, 256KB, 3 LM, 4 to 16 lines	41,000	261	1,463	1,250	1,125	1,063
F-3609-A8	128KB Storage Expansion	4,700	18	164	140	126	119
F-1034-A8	IBM Channel Program Loader	1,074	14	47	40	36	34
F-2200-A8	Remote Initial Load	565	6	25	21	19	18
F-2207-A8	Remote Initial Load	735	6	33	26	23	23
T-4008	Comten Console	3,500	26	146	125	113	106
T-3029-A8	IBM Channel Interface Adapter	8,000	16	341	273	246	246
T-3030-B8	NCR Bit Serial Channel Interface Adapter	8,000	16	341	273	246	246
F-1044-A8	Peripheral Power Sequencer	1,500	9	54	46	42	39
F-2205-A8	3650 Extended Distance Interface Adapter	100	2	4	3	3	2
F-2239-A8	EIA RS-232-C/CCITT V.24/DDS Interface, 4 lines	3,000	10	175	140	126	119
T-3651-A8	Module Controller, 6 LM	10,500	20	380	325	310	290
T-3651-A9	Module Controller, 6 LM, 2 CPUs	12,000	43	435	370	355	330
T-3651-B8	Module Controller, 12 LM	20,600	40	745	635	605	565
T-3651-B9	Module Controller	23,600	86	855	730	695	650
T-2023-A8	Communications adapter	4,900	15	220	176	158	158
T-2023-B8	Extended distance comm. adapter	6,600	27	296	237	213	213
T-2023-C8	Extended distance comm. adapter, 2-CPU	9,350	46	416	333	300	300
T-4034-A5	Console, CRT/printer	3,650	28	152	130	117	110
T-4034-B5	Console, CRT only	1,645	6	69	59	53	50
F-1044-D8	Peripheral power seq.	1,500	9	54	46	42	39
T-3691-A8	Module controller, 6-LM	12,000	20	450	360	324	324
T-3691-A9	Module controller, 6-LM, 2-CPU	13,800	43	518	414	373	373
T-3692-A8	Module controller, 7-LM, adjacent	11,500	20	431	345	311	311
T-3691-B8	Module controller, 12-LM	23,500	40	883	706	635	635
T-3691-B9	Module controller, 12-LM, 2-CPU	27,100	86	1,018	814	733	733
T-3692-B8	Module controller, 14-LM, adjacent	22,500	40	845	676	608	608
T-3691-C8	Module controller, 18-LM	35,000	60	1,314	1,051	946	946
T-3691-C9	Module controller, 18-LM, 2-CPU	40,400	129	1,516	1,213	1,092	1,092
T-3692-C8	Module controller, 21-LM, adjacent	33,500	60	1,258	1,006	905	905
T-3691-D8	Module controller, 24-LM	46,500	80	1,745	1,396	1,256	1,256
T-3691-D9	Module controller, 24-LM, 2-CPU	53,700	172	2,016	1,613	1,452	1,452
T-3691-E8	Module controller, 30-LM	58,000	100	2,178	1,742	1,568	1,568

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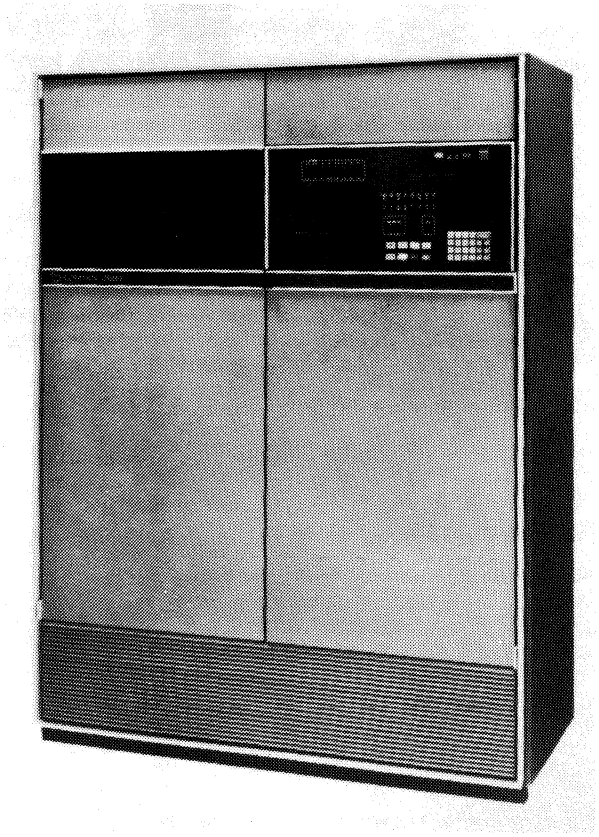
3690 Systems		Purchase Price ($)	Monthly Maintenance ($)	Month-to-Month Rental ($)	2-Year Lease ($)	3-Year Lease ($)	4-Year Lease ($)
			Monthly Charges				
T-3690-A8	Standalone comm. processor, 512KB, 5-LM	116,080	590	5,000	4,000	3,600	3,600
T-3690-B8	RCP, 512KB, 5-LM	105,450	442	4,500	3,600	3,240	3,240
T-3690-C8	FEP, 512KB, 5-LM	105,000	415	4,565	3,652	3,287	3,287
T-3690-D8	FEP, 512KB, 4-LM	124,625	465	5,428	4,342	3,908	3,908
T-3690-E8	FEP, 512KB, 11-LM	155,750	517	6,772	5,418	4,876	4,876
T-3690-F8	Standalone comm. processor, 512KB, 5-LM	116,080	509	5,000	4,000	3,600	3,600
T-3690-G8	RCP, 512KB, 5-LM	105,450	442	4,500	3,600	3,240	3,240
T-3690-H8	FEP, 512KB, 5-LM	105,000	415	4,565	3,652	3,287	3,287
T-3690-J8	FEP, 512KB, 5-LM	124,625	465	5,428	4,342	3,908	3,908
T-3690-K8	FEP, 512KB, 11-LM	155,750	517	6,772	5,418	4,876	4,876
T-3690-T8	FEP or RCP, 512K	65,900	366	2,821	2,257	2,032	2,032
F-3608-A8	Add-on memory, 256KB	9,400	36	328	280	252	238
F-3611-A8	Add-on memory, 512KB	4,700	18	164	140	126	119
F-2207-A8	Remote initial load (DLC MIM)	735	6	33	26	23	23
F-2207-B8	Remote initial load (BSC MIM)	735	6	33	26	23	23
F-1049-A8	IBM channel program loader	440	4	18	14	13	13
T-3209-A8	IBM channel adapter	8,000	16	341	273	246	246
T-3030-A8	NCR bit serial channel	8,000	16	341	273	246	246
T-3691-E9	Module controller, 30-LM, 2-CPU	67,000	215	2,515	2,012	1,811	1,811
T-3691-F8	Module controller, 36-LM	69,500	120	2,609	2,087	1,878	1,878
T-3691-F9	Module controller, 36-LM, 2-CPU	80,300	258	3,014	2,411	2,170	2,170
3600 Communications Equipment							
T-2014-C1	Auto-Call Adapter	3,100	15	123	98	88	83
F-2033-B1	Auto-Call Interface	175	2	7	6	5	5
T-2016-A2	16-Line Asynch. MIM	3,600	15	115	98	88	83
F-2068-01	Telegraph Interface	125	2	5	4	4	3
F-2074	2-Line Telegraph Interface	190	2	7	6	5	5
F-2072-A1	2-Line RS-232-C Interface	190	3	7	6	5	5
T-2018-A2	16-Line BSC MIM	6,700	20	211	180	162	153
F-2053-A1	2-Line RS-232-C/V.24 Interface	345	5	18	14	13	12
F-2053-B1	2-Line RS-232-C/V.24 Interface	345	5	18	14	13	12
F-2053-C1	2-Line RS-232-C/V.24 Interface	345	5	18	14	13	12
F-2064-A1	1-Line Wideband Interface	630	5	26	21	19	18
F-2064-B1	1-Line Wideband Interface	630	5	26	21	19	18
F-2092-A1	2-Line Wideband DDS Interface	1,010	6	39	31	28	26
F-2092-B1	1-Line Wideband DDS Interface	580	4	23	18	16	15
T-2020-A2	16-Line DLC MIM	8,000	36	263	210	189	179
F-2083-C1	2-Line Low Speed DDS, RS-232-C/V.24 Int.	700	4	22	19	17	16
F-2084	1-Line Wideband Interface	825	6	27	23	21	20
F-2085	1-Line Wideband DDS/V.35 Interface	800	6	26	22	20	19

SOFTWARE PRICES

		Monthly License Fee** ($)	Annual License Fee** ($)
S-EM04.1	Emulation Processing (EP)	NC	NC
S-EM04.2	Partitioned Emulation Processing (PEP)	NC	NC
S-NCP05	Network Control Program (NCP)	NC	NC
S-46F51-A1	Multiple Access Facility (MAF)	145	1,595
S-46003.01-A1	Advanced Communications Function/Network Control Program (ACF/NCP)	155	1,705
S-46004-A1	Communications Networking System (CNS)	110	1,210
S-46006-A1	Statistics and Extended Access Control (SEAC)	72	792
S-XN01	X.25 Network Interface	300	3,300
S-XN20	X.25 Packet Adapter	160	1,760
S-XN10	X.25 Datapac Service	48	528
S-XN11	X.25 GTE Telenet Service	48	528
S-XN12	X.25 Tymnet Service	48	528

**All lease charges include monthly maintenance.*
***A license fee is required for each processor on which the software is installed. NC—No charge.* ■

NCR Comten 3600 Series Communications Processors



NCR Comten's 3690 is perhaps the most powerful communications processor on the market today. The units support twice the main memory and communications line attachments of the IBM 3725.

NCR Comten's 3600 Series is IBM's leading competitor in the plug-compatible communications processor marketplace. The 3650 and 3690 processors have many technical advantages over their IBM counterparts. The 3650 is an entry level series of front-end and remote communications processors. The 3690 is a high-performance series of front-end, remote, and standalone processors.

FUNCTION: Front-end or remote full-service communications processors with message switching available in some configurations.
HOST COMPUTERS SUPPORTED: IBM and compatible mainframes; NCR mainframes.
ARCHITECTURE SUPPORTED: SNA; proprietary trunk protocol.
OPERATING SOFTWARE: SCS/63; Communications Operating System 2 (COS2).
COMPETITION: IBM 3705 and 3725; Amdahl 4705; CCI CC8, CC80, and CC85; Memorex 1270.
PRICE: Prices for 3650 models start at $41,000 for an entry-level front-end or remote processor with console, able to support four communications lines. Prices for 3690 models base systems start at $65,900 for the "packaged" Model T–8, and range up to $155,750 for Model K8.

MANAGEMENT SUMMARY

NCR Comten follows IBM as the leading vendor of communications processors for the IBM-mainframe environment. A communications processor specialist, the NCR subsidiary has been in the IBM plug-compatible business since the early 1970s.

Currently, the 3600 Series is undergoing a major overhaul. Comten has removed the time-worn 3670 from manufacturing, and is now offering it only on a limited basis from stock. At the same time, the company has introduced entirely new lines of its 3650 and 3690 models. These new lines feature a streamlined internal architecture that allows the attachment of more communications lines in less space than its predecessor. Most important is Comten's new networking software, the COS2 operating system and the CAM3 access method. CAM3 is a language for writing applications to run, independently of the host processor, in the 3600 communications processor. While NCR Comten has written only one application for CAM 3, the new access method has great potential to add value to the 3600 family.

CHARACTERISTICS

VENDOR: NCR Comten, Inc., 2700 Snelling Avenue North, St. Paul, MN 55113. Telephone (612) 638–7777.

DATE OF ANNOUNCEMENT: 3650—March 1976; 3650 Models G8-K8, R8 and S8—October 1983; 3690—July 1977; 3690 Models A8-K8 and T8—February 1984.

DATE OF FIRST DELIVERY: 3650—June 1976; 3650 Models G8-K8, R8 and S8—February 1984; 3690—June 1978; 3690 Models A8-K8 and T8—February 1984.

NUMBER DELIVERED TO DATE: 3650—1560; 3690—1130.

SERVICED BY: NCR Comten.

MODELS

As of the beginning of 1984, all active models in the 3600 family belong to the 3650 and 3690 Series; the original 3600 processor, the 3670, is no longer in production, and is available on a limited basis from stock. The capabilities of the lower end of the 3690 Series have expanded downward to fill the 3670's market niche.

NCR Comten 3600 Series
Communications Processors

The 3600 family has two branches as of this writing: the low-end 3650 models, and the high-performance 3690s. The 3650s come in front-end and remote configurations with 512K or 1M bytes of main memory. The smallest configurations support up to 16 communications lines, while the largest support up to 128.

The 3690s can be configured as front ends, remote communications processors, or standalone message switches. They support up to 4M bytes of main memory and up to 512 communications lines.

All active members of both families are relatively new. The latest 3650s were announced in October of 1983, while the new 3690s were announced in February of 1984. Also in February, 1984, NCR Comten doubled the available main memory on the new 3650 models.

In hardware, the 3600 models use a hierarchical architecture common among communications processors. On the network side, they use a two-level attachment, with Modem Interface Modules (MIMs) connecting physical-level Line Interface Features to the central processor. NCR Comten offers three basic types of MIM: an asynchronous unit, a BSC MIM, and a programmable DLC MIM. Use of the DLC MIM places some limits on line configuration because a single interface module occupies half each of two adjacent slots in the 3600 Series cabinet.

In software, the 3600 processors run Comten-developed programs compatible with equivalent IBM software for 270X Emulation and SNA network control. The NCR Comten programs are named similarly to their IBM counterparts: EP, ACF/NCP, PEP, etc. In addition, the 3600 processors support an X.25 interface and a message-switching application that runs under the new CAM3 access method.

COMPETITIVE POSITION

The 3600 Series leads a small pack that trails IBM by a wide margin in the communications processor market. IBM has a comfortable 90 percent share of the market for communications processors compatible with Big Blue mainframes. Among those trailing NCR Comten in the remaining 10 percent are Amdahl Corporation, with its 4705; Computer Communications, Inc. (CCI), the manufacturer of the CC8, CC80, and CC85 processors; and Memorex's 1270. NCR Comten has sold nearly twice as many communications processors as its nearest rival, CCI, and has been much more aggressive in developing a competitive product for the 1980s.

ADVANTAGES AND RESTRICTIONS

When compared to IBM's communications processors, the NCR Comten products are clear winners. The 3650 series competes head-to-head with IBM's low-end 3705–80 line, and exceeds the IBM models in main memory capacity, processor speed (by nearly a factor of two), and operability. The 3650 processors support a locally attached operator's console for error logging and diagnostics: the IBM models rely on the host's console.

The 3650 is currently available in 10 models. Models G8, H8, J8, and K8 have 512K bytes of memory; Models S8 and R8 have 256K bytes of memory upgradable to 512K bytes in a single 256K byte increment. Models G9, H9, J9, and K9 have 1M bytes of memory. The memory increment between the two series has no effect on communications line capacity; it serves to support applications that will run under Comten's new CAM3 access method. Models S8, G8, and H8 are entry-level, small-, and medium-sized front-end processors, respectively; Models R8, J8, and K8 are entry-level, small-, and medium-sized remote communications processors, respectively; Models G9, H9, J9, and K9 correspond to models G8, H8, J8, and K8, but have double the main memory capacity.

The 3690 is currently available in 11 models. All come with 512K bytes of main memory, expandable to 4M bytes in 256K or 512K byte increments. Model A8 is a standalone message processor; Model B8 is a remote communications processor; Models C8, D8, and E8 are front-end processors with the ability to attach to two, four, and eight host computers, respectively. All have the capacity, initially, to support up to eight Modem Interface Modules (MIMs).

Models F8 through K8 correspond in sequence to Models A8 through E8, except that they can initially support up to seven MIMs and a communications adapter that itself can support up to eight additional MIMs.

Model T8 is an entry-level 3690 system that can be configured either as a front-end processor or as a remote communications processor. As a front end, it can support up to two host computers. In either configuration, it can support up to eight MIMs initially.

CONFIGURATION

3650 Models

The entry-level, "packaged" 3650 models, R8 and S8, are single-cabinet units that come with a CPU, 256K bytes of main storage upgradable to 512K bytes in a single increment of 256K bytes, and a single, built-in MIM. Both come with a Comten console (30 cps, 132 column keyboard/printer) as standard equipment. The Model S8 front-end processor comes with a built-in host channel interface.

Models G8, J8, G9, and J9 are single-cabinet units. The base cabinet houses the CPU, main memory (512K bytes for x8 models; 1M bytes for x9 models), an integral program loading device, and space for the attachment of eight MIMs. The front-end configurations include an integral channel adapter for attachment to the host. The remote configurations include an integral DLC MIM (a MIM that supports such bit-oriented, synchronous protocols as SDLC and HDLC) for remote initial program loading. These models support the Comten console, but do not include it as standard equipment.

Models H8, H9, K8, and K9 are two-cabinet systems with the same base cabinet configuration as Models G8, G9, J8, and J9, along with an additional cabinet that can contain up to eight MIMs. These models also support the Comten console as an optional piece of equipment.

3690 Models

All models of the 3690 come in a two-cabinet base configuration, with the base cabinet of all models containing the CPU, main memory, the maintenance panel, and space for the MIMs, channel adapters, or both, as appropriate to the individual model. Model A8 is a standalone message switching system with a block multiplexer channel for the attachment of up to eight peripheral storage devices, and space for the attachment of eight MIMs. Model B8 is a remote

NCR Comten 3600 Series
Communications Processors

The 3690 models compete directly with IBM's obsolescent larger 3705s and the new 3725 processor. Against the 3705, the 3690 supports eight times the main memory, one third more processor speed, and 512 communications lines to the 3705's 324. The 3690's advantages over the 3725 are somewhat less: it has twice the main memory of the IBM product, and can run vendor- or user-developed applications software. The 3690 can support twice as many communications lines as the 3725. The 3725 has an operator's diagnostic console and a diskette-based diagnostic system, the latter missing from the 3690.

The NCR Comten processors' restrictions are common to all IBM-compatible equipment. The vendor is constantly one step behind IBM in product development, and must always try to catch up. Among the plug-compatible vendors of communications processors, Comten has always been the most aggressive in trying to lead IBM in technology. Their 3600s clearly outperform anything on the market, and their software is beginning to leap forward. If it catches on with the users, the new CAM3 access method will provide a whole new channel for adding value to the product: applications processing in the communications processor.

Another advantage of the 3600 processor is its support of local peripheral devices, such as disk drives. While this feature is most useful now in message switching configurations, it may become more useful as CAM3 applications take hold.

A final restriction is the awkward placement of the DLC MIM in the 3600 Series cabinet. While having a single interface module occupy half each of two adjacent slots is a minor flaw in one of the simpler processor configurations on the market, NCR Comten should have amended it while redesigning the processor for its latest models.

USER REACTION

When Datapro conducted its 1984 Network Users Survey, a total of 49 users of NCR Comten 3650 and 3690 communications processors responded. Of these, 21 reported on the 3650, with an installed base of 59 machines; 28 reported on the 3690, with an installed base of 264 machines. We list their reactions below.

3650 Systems

	Excellent	Good	Fair	Poor	WA*
Overall satisfaction	12	7	1	1	3.6
Ease of installation	8	12	0	1	3.4
Ease of operation	5	14	1	0	3.2
Ease of expansion	3	14	3	0	3.0
Hardware reliability	14	6	1	0	3.6
Quality of vendor's software/firmware	5	10	3	1	3.0
Ease of programming	3	11	5	0	2.9
Quality of vendor's maintenance service	11	4	4	0	3.3
Quality of vendor's technical support**	8	8	3	1	3.2

communications processor with a single, integral DLC MIM for remote initial loading, and space for the attachment of eight MIMs.

Model C8 is a front-end processor that can support up to two channel-attached hosts (or one host and one channel-attached peripheral). It comes with one IBM channel adapter as standard equipment, and has space in the base cabinet for the attachment of eight MIMs.

Model D8 is a front-end processor that can support up to four host computers and one channel-attached peripheral device. It comes with a direct memory attachment base (DSX) equipped with one IBM channel adapter, and with space in the base cabinet for the attachment of eight MIMs.

Model E8 is a front-end processor that can support up to eight host computers. It comes with two DSXs, one IBM channel adapter, and space in the base cabinet for the attachment of eight MIMs.

Models F8 through K8 correspond in sequence to Models A8 through E8, except that they can initially support only seven MIMs. The eighth MIM is replaced by space for the attachment of a communications adapter, which itself can connect up to eight MIMs.

Model T8 is an entry-level 3690 system that can be configured as a front-end or remote communications processor. As a front end, it can support up to two hosts. It features space for up to eight MIMs in its base configuration.

Beyond the capacities of their base cabinets, 3690 processors can be expanded through the addition of Model 3692 Module Controllers (expansion cabinets). Each Module Controller has space for 6 to 36 MIMs and one communications adapter. NCR Comten offers three kinds of Module Controller: one for local attachment, one for extended distance attachment (up to 100 cable feet from the base cabinet), and one that can be shared by two 3690 CPUs in different base cabinets. The third type of module controller is useful in fault-tolerant configurations, where one processor can take over the line attachments in the Module Controller should the other processor fail.

PROCESSING COMPONENTS

All models of the 3600 Series use a CPU with a 36-bit word length and an 18-bit data path between the processor and main memory. Main memory on the 3650 models has a cycle time of 650 nanoseconds; main memory on the 3690 models has a cycle time of 520 nanoseconds. The 3650 CPU uses a set of 62 instructions, 54 of which are in IBM format; the 3690 uses a set of 101 instructions, all of which are in IBM format.

CONNECTION TO HOST AND PERIPHERALS

Front-end processors in both the 3650 and 3690 series connect to the byte or block multiplexer or selector channel of an IBM host through an IBM Channel Interface Adapter (CIA) that uses one control position on the IBM channel, supporting from 1 to 256 subchannel addresses. Front-end processors must include an IBM Channel Program Loader, an initial load program contained in 2048 bytes of read-only memory, that performs a CPU startup test and loads a bootstrap channel program loader into main storage.

Front-end processors in the 3650 Series may also attach to an NCR V-8000 host through an NCR Bit Serial Link Channel Interface Adapter.

Remote communications processors connect to the host through a Remote Initial Load feature, similar to the Channel Program Loader, that attaches to a dedicated

NCR Comten 3600 Series Communications Processors

TABLE 1. COMMUNICATIONS LINE INTERFACES & MODEM INTERFACE MODULES

Line Interface		Timing	Half- or Full-Duplex	Speed, bps	Line Interface Feature	Lines per Interface	No. of Interfaces per MIM	MIM Feature
EIA RS-232-C	Bell 113B, 103A, 202	Async.	Half	Up to 1800	F2072	2	8	T2016-A2
	BSC	Sync.	Half	Up to 19.2K	F2053-A1	2	8	T2018-A2
	CNS trunkline	Sync.	Full	Up to 19.2K	F2053-B1	1	8	T2018-A2
	IBM 2848/2260, 2845/2265	External	Half	Up to 9600	F2053-C1	2	8	T2018-A2
	SDLC	Sync.	Half or Full	Up to 20K	F2083-C1	2	8	T2020-A2
Current loop, 20 ma or 60 ma		Async.	Half	Up to 75	F2074*	2	8	T2016-A2
Wideband	Bell 300 Series	Sync.	Half	Up to 50K	F2064-A1	1	4	T2018-A2
	CNS trunkline	Sync.	Full	Up to 50K	F2064-B1	1	2	T2018-A2
DDS	BSC	Sync.	Half	Up to 56K	F2092-A1	2	2	T2018-A2
	CNS trunkline	Sync.	Full	Up to 56K	F2092-B1	1	2	T2018-A2
	Bell System Data Service Unit	Sync.	Half or full	Up to 56K	F2085	1	2 (HDX), 1 (FDX)	T2020-A2
Wideband	Bell 300 Series	Sync.	Half or Full	Up to 50K	F2084	1	2 (HDX), 1 (FDX)	T2020-A2
Auto Call Adapter	#T2014	—	—	—	F2033-B1	1	16	T2016-A2

**Requires Telegraph Interface Base Feature #2068.*

3690 Systems

	Excellent	Good	Fair	Poor	WA*
Overall satisfaction	15	9	4	0	3.4
Ease of installation	8	15	4	0	3.2
Ease of operation	6	21	0	0	3.2
Ease of expansion	7	18	2	0	2.7
Hardware reliability	15	11	2	0	3.5
Quality of vendor's software/firmware	4	12	7	2	2.7
Ease of programming	1	12	10	0	2.6
Quality of vendor's maintenance service	8	14	5	0	3.1
Quality of vendor's technical support**	5	12	9	1	2.8

*Weighted Average based on a scale of 4.0 for Excellent.
**Technical support includes documentation, training, and troubleshooting.

Since Datapro conducted the survey from which these results were taken, NCR Comten has replaced all models of the 3650 and 3690 with newer versions. Datapro was unable to contact any 3600 Series users by phone to obtain more detailed reactions. □

DLC MIM. Remote Initial Load is also available on a BSC MIM for 3690 models.

All 3600 family processors are able to support locally attached peripheral devices, such as IBM-compatible disk drives. The processors support these devices through their channel interface adapters.

CONNECTION TO THE NETWORK

The 3650 and the 3690 models use essentially the same network-side equipment, but it is arranged differently in processors of each series. The basic unit of network connectivity for the 3600 Series is one of three general types of MIM: the Asynchronous MIM (or A-MIM), the BSC MIM, and the DLC MIM. Each MIM can attach up to 16 communications lines. The 3600 Series processors also use a variety of special wideband interfaces that, like MIMs, occupy logic module slots in the processor or module controller cabinet. Table 1 lists the communications performed by the 3600 processors, and the specific communications hardware that supports them.

The async and BSC MIMs are nonprogrammable devices, while the DLC MIM is a programmable interface that can handle a variety of bit-oriented, synchronous protocols (such as SDLC, ADCCP, and HDLC). The use of the DLC MIM creates some problems in configuration. While other logic modules use one attachment slot, the DLC MIM uses half each of two adjacent slots. Thus, a 3600 Series processor configured with DLC MIMs cannot be loaded to its full line capacity. In the new models, main storage modules and block multiplexer peripheral attachment channels share this feature with the DLC MIM, thus allowing a larger number of options for configuration although limiting full capacity on the system.

In the 3650 models, the MIMs and other logic modules attach directly to the processor. In the 3690 models F8 through K8, some MIMs attach directly, while others attach through a special logic module called a communications adapter. A communications adapter occupies the highest MIM position in a given base cabinet or module controller. The communications adapter houses up to eight MIMs. In the 3690 configurations that support the communications adapter, the user loses one direct MIM attachment, but gains eight attachments through the adapter. There is no difference in performance between directly attached MIMs and MIMs attached through an adapter.

TRANSMISSION SPECIFICATIONS

The 3600 Series processors can handle synchronous or asynchronous communications at data rates from 75 bps to 56K bps, using async codes or BSC, SDLC or Comten's own

NCR Comten 3600 Series Communications Processors

CNS trunk protocol. With special software, the 3600 processors can also handle packet-level X.25 communications. The processors support a number of physical interfaces, each through a specific line interface feature. See Table 1 for a complete list of NCR Comten-supported communications.

OPERATOR INTERFACE

Both the 3650 and the 3690 feature an onboard maintenance panel. The 3650 supports a 30 cps, 132 column keyboard/printer as an operator's console. The 3690 uses either the keyboard/printer or a newer, CRT-based console. The 4034 Operator Console is available in two models; both have an 80-character by 24-line CRT with a detachable keyboard. The more complete model comes with an 80 column dot-matrix impact printer, a printer stand, and paper catcher. The other model includes only the CRT.

SOFTWARE

As of this writing, NCR Comten is in the middle of a major change in operating software. The older 3600 Series operating system, SCS/63, is on its way out as the vendor introduces its newer and more broadly capable Communications Operating System 2 (COS2). COS2 is available in two versions: COS2/50 for the 3650 and the obsolescent 3670, and COS2/90, for the 3690. The new system is backward-compatible with SCS/63 programs, but includes a new feature unique to any IBM-compatible communications processor: a communications processor-based access method that allows users to run communications applications, such as message switching, entirely in the communications processor without involving the host.

Software developed under SCS that is now supported under COS2 includes:

Emulation Processing—which allows the 3600 Series processor to operate as an IBM 37XX Communications Controller emulating an IBM 270X hardwired controller. The Comten version of EP includes several features not found in the IBM version. These include:

- Terminal Initiated Line Switching, a feature that allows users at terminals to switch from one host application to another through the communications processor.
- Automatic Baud Rate Detection, which allows asynchronous terminals with different line speeds and line codes to share the same line to a 3600 processor.
- Site Initiated Line Switching, which allows the 3600 console operator to switch a terminal from one host application to another.
- Automated Dialing, which allows the host to initiate sessions automatically with dial-up terminals.

Advanced Communications Function/Network Control Program (ACF/NCP)—NCR Comten's version of IBM's operating software for the IBM 3705 or 3725 in an SNA network. Comten's ACF/NCP includes the Multisystem Networking feature of later versions of IBM's ACF/NCP. It works in conjunction with either ACF/TCAM or ACF/VTAM in the IBM host.

Partitioned Emulation Programming—which allows concurrent operation of EP and ACF/NCP in the same 3600 processor.

Multiple Access Facility—which allows terminal initiated line switching for IBM 3270 terminals, and relieves the host of the polling function for such devices.

Communications Networking System (CNS)—NCR Comten's 3600-to-3600 trunking protocol, used most often in communications between a 3600 processor serving as a remote concentrator and a 3600 processor serving as a front-end. CNS is a Transport-layer protocol.

Statistics and Extended Access Control—NCR Comten's facility for recording session statistics and for multilevel access control.

Comten X.25 Interface—a series of packet-level X.25 interface programs designed to connect the 3600 Series processor to public packet switching networks. Separate versions are available for GTE Telenet, Tymnet, and Uninet in the United States; Datapac in Canada; the PTT in Great Britain; Transpac in France; and Datex-P in West Germany.

NCR Comten software that runs only under COS2 includes:

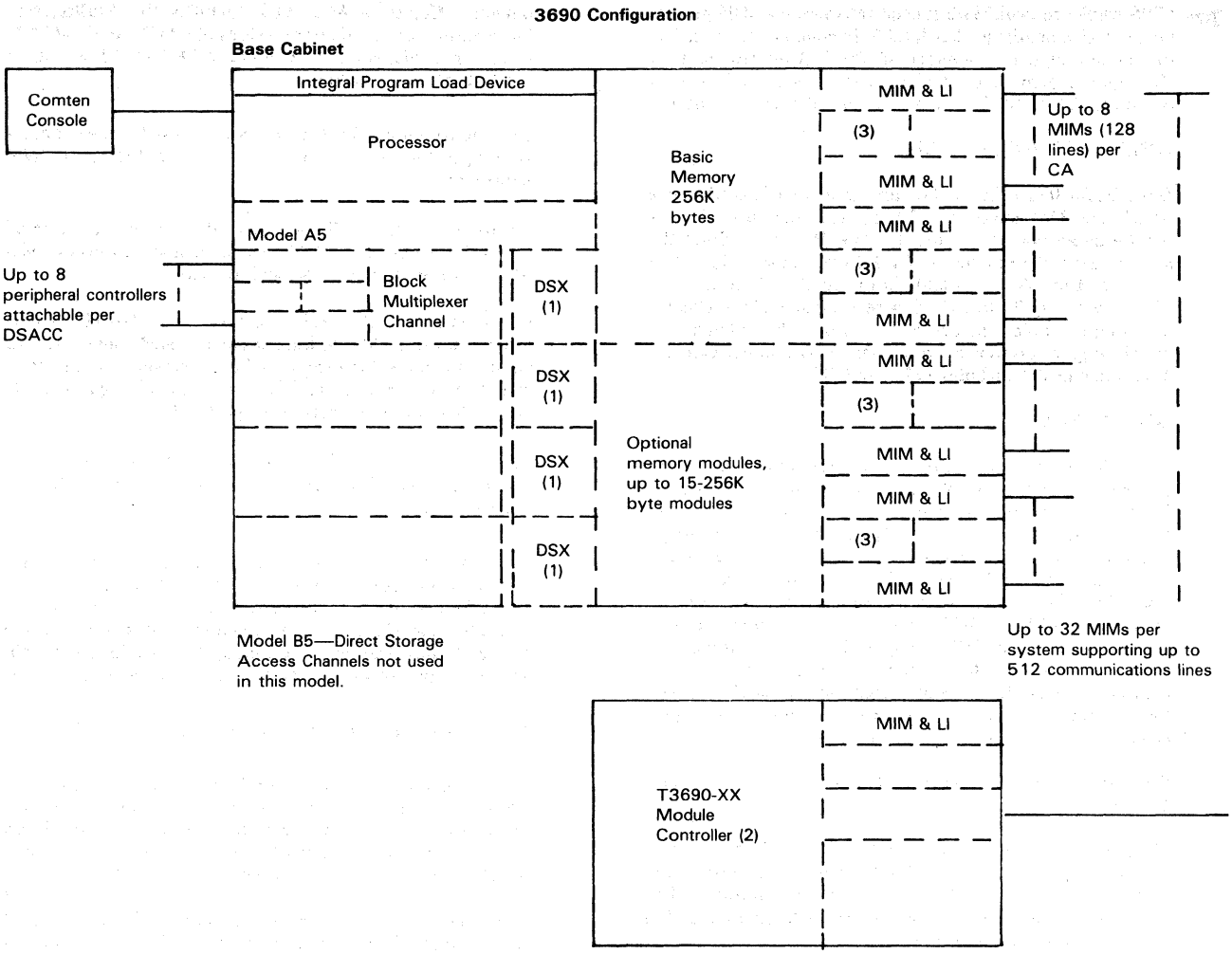
Communications Access Method 3 (CAM3)—a 3600-based applications interface that allows certain application programs to run in a locally or remotely attached 3600 Series processor without involving the host. CAM3 runs independently of the host access method, and allows the running of both Comten-provided and user-generated applications. It runs concurrently with such programs as ACF/NCP. Recent improvements in memory capacity on 3650 and 3690 processors are designed primarily to support CAM3.

Automatic Message Switch (AMS)—the first CAM3-based application, AMS is the newer of Comten's two store-and-forward switching programs. It supports TTY, IBM Correspondence, 3270 BSC and SNA, 2780/3780 BSC, and 3767 SNA terminals.

PRICING

The NCR Comten processors are available for purchase or on a 30-day, 2-year, 3-year, or 4-year lease. All systems software is included in the price of the equipment. Software is purchased on a monthly or annual license fee basis. A license fee is charged for each processor on which the software is installed. A separate monthly maintenance contract is available. Pricing has not yet been set for COS2, CAM3, or AMS software.

NCR Comten 3600 Series
Communications Processors



(1) Direct Storage Access Channel Controller available for attachment of a Channel Interface Adapter, a Block Multiplexer Channel, or an Integrated File Adapter.

(2) Module Controllers are available to accommodate 6, 12, 18, 24, 30, or 36 Logic Modules. Each size has a version that permits dual processor access; i.e., two 3690s can have access to the controller.

(3) Up to eight Modem Interface Modules (MIM) plus associated Line Interfaces (see Table 2) per Communications Interface Module. Requirement for Module Controllers (expansion housing for MIMs) is dependent on the MIMs selected and the space available in base cabinet; space available is expressed in Logic Modules. The 3690–A5, B5, C5 and D5 each have three Modules. The 3690–E5 has nine Logic Modules.

NCR Comten 3600 Series
Communications Processors

EQUIPMENT PRICES

		Monthly Charges					
		4-Year Lease	3-Year Lease	2-Year Lease	Month-to-Month Rental	Purchase Price	Monthly Maintenance
T-3650-G8	FEP, 512KB, 4 LM	$1,456	$1,542	$1,713	$2,004	$ 43,900	$363
T-3650-H8	FEP, 512KB, 12 LM	1,734	1,836	2,040	2,387	54,400	383
T-3650-J8	RCP, 512KB, 4 LM	1,526	1,616	1,795	2,100	46,100	381
T-3650-K8	RCP, 512KB, 12 LM	1,811	1,917	2,130	2,492	56,600	401
T-3650-S8	FEP, 256KB, 2 LM, 4 to 16 lines	1,063	1,125	1,250	1,463	41,000	261
T-3650-R8	RCP, 256KB, 3 LM, 4 to 16 lines	1,063	1,125	1,250	1,463	41,000	261
F-3609-A8	128KB Storage Expansion	119	126	140	164	4,700	18
F-1034-A8	IBM Channel Program Loader	34	36	40	47	1,074	14
F-2200-A8	Remote Initial Load	18	19	21	25	565	6
F-2207-A8	Remote Initial Load	23	23	26	33	735	6
T-4008	Comten Console	106	113	125	146	3,500	26
T-3029-A8	IBM Channel Interface Adapter	246	246	273	341	8,000	16
T-3030-B8	NCR Bit Serial Channel Interface Adapter	246	246	273	341	8,000	16
F-1044-A8	Peripheral Power Sequencer	39	42	46	54	1,500	9
F-2205-A8	3650 Extended Distance Interface Adapter	2	3	3	4	100	2
F-2239-A8	EIA RS-232-C/CCITT V.24/DDS Interface, 4 lines	119	126	140	175	3,000	10
T-3651-A8	Module Controller, 6 LM	290	310	325	380	10,500	20
T-3651-A9	Module Controller, 6 LM, 2 CPUs	330	355	370	435	12,000	43
T-3651-B8	Module Controller, 12 LM	565	605	635	745	20,600	40
T-3651-B9	Module Controller	650	695	730	855	23,600	86
T-2023-A8	Communications adapter	158	158	176	220	4,900	15
T-2023-B8	Extended distance comm. adapter	213	213	237	296	6,600	27
T-2023-C8	Extended distance comm. adapter, 2-CPU	300	300	333	416	9,350	46
T-4034-A5	Console, CRT/printer	110	117	130	152	3,650	28
T-4034-B5	Console, CRT only	50	53	59	69	1,645	6
F-1044-D8	Peripheral power seq.	39	42	46	54	1,500	9
T-3691-A8	Module controller, 6-LM	324	324	360	450	12,000	20
T-3691-A9	Module controller, 6-LM, 2-CPU	373	373	414	518	13,800	43
T-3692-A8	Module controller, 7-LM, adjacent	311	311	345	431	11,500	20
T-3691-B8	Module controller, 12-LM	635	635	706	883	23,500	40
T-3691-B9	Module controller, 12-LM, 2-CPU	733	733	814	1,018	27,100	86
T-3692-B8	Module controller, 14-LM, adjacent	608	608	676	845	22,500	40
T-3691-C8	Module controller, 18-LM	946	946	1,051	1,314	35,000	60
T-3691-C9	Module controller, 18-LM, 2-CPU	1,092	1,092	1,213	1,516	40,400	129
T-3692-C8	Module controller, 21-LM, adjacent	905	905	1,006	1,258	33,500	60
T-3691-D8	Module controller, 24-LM	1,256	1,256	1,396	1,745	46,500	80
T-3691-D9	Module controller, 24-LM, 2-CPU	1,452	1,452	1,613	2,016	53,700	172
T-3691-E8	Module controller, 30-LM	1,568	1,568	1,742	2,178	58,000	100
3690 Systems							
T-3690-A8	Standalone comm. processor, 512KB, 5-LM	3,600	3,600	4,000	5,000	116,080	590
T-3690-B8	RCP, 512KB, 5-LM	3,240	3,240	3,600	4,500	105,450	442
T-3690-C8	FEP, 512KB, 5-LM	3,287	3,287	3,652	4,565	105,000	415
T-3690-D8	FEP, 512KB, 4-LM	3,908	3,908	4,342	5,428	124,625	465
T-3690-E8	FEP, 512KB, 11-LM	4,876	4,876	5,418	6,772	155,750	517
T-3690-F8	Standalone comm. processor, 512KB, 5-LM	3,600	3,600	4,000	5,000	116,080	509
T-3690-G8	RCP, 512KB, 5-LM	3,240	3,240	3,600	4,500	105,450	442
T-3690-H8	FEP, 512KB, 5-LM	3,287	3,287	3,652	4,565	105,000	415
T-3690-J8	FEP, 512KB, 5-LM	3,908	3,908	4,342	5,428	124,625	465
T-3690-K8	FEP, 512KB, 11-LM	4,876	4,876	5,418	6,772	155,750	517
T-3690-T8	FEP or RCP, 512K	2,032	2,032	2,257	2,821	65,900	366
F-3608-A8	Add-on memory, 256KB	238	252	280	328	9,400	36
F-3611-A8	Add-on memory, 512KB	119	126	140	164	4,700	18
F-2207-A8	Remote initial load (DLC MIM)	23	23	26	33	735	6
F-2207-B8	Remote initial load (BSC MIM)	23	23	26	33	735	6
F-1049-A8	IBM channel program loader	13	13	14	18	440	4
T-3209-A8	IBM channel adapter	246	246	273	341	8,000	16
T-3030-A8	NCR bit serial channel	246	246	273	341	8,000	16
T-3691-E9	Module controller, 30-LM, 2-CPU	1,811	1,811	2,012	2,515	67,000	215
T-3691-F8	Module controller, 36-LM	1,878	1,878	2,087	2,609	69,500	120
T-3691-F9	Module controller, 36-LM, 2-CPU	2,170	2,170	2,411	3,014	80,300	258

NCR Comten 3600 Series Communications Processors

EQUIPMENT PRICES (Continued)

	3600 Communications Equipment	Monthly Charges: 4-Year Lease	3-Year Lease	2-Year Lease	Month-to-Month Rental	Purchase Price	Monthly Maintenance
T-2014-C1	Auto-Call Adapter	83	88	98	123	3,100	15
F-2033-B1	Auto-Call Interface	5	5	6	7	175	2
T-2016-A2	16-Line Asynch. MIM	83	88	98	115	3,600	15
F-2068-01	Telegraph Interface	3	4	4	5	125	2
F-2074	2-Line Telegraph Interface	5	5	6	7	190	2
F-2072-A1	2-Line RS-232-C Interface	5	5	6	7	190	3
T-2018-A2	16-Line BSC MIM	153	162	180	211	6,700	20
F-2053-A1	2-Line RS-232-C/V.24 Interface	12	13	14	18	345	5
F-2053-B1	2-Line RS-232-C/V.24 Interface	12	13	14	18	345	5
F-2053-C1	2-Line RS-232-C/V.24 Interface	12	13	14	18	345	5
F-2064-A1	1-Line Wideband Interface	18	19	21	26	630	5
F-2064-B1	1-Line Wideband Interface	18	19	21	26	630	5
F-2092-A1	2-Line Wideband DDS Interface	26	28	31	39	1,010	6
F-2092-B1	1-Line Wideband DDS Interface	15	16	18	23	580	4
T-2020-A2	16-Line DLC MIM	179	189	210	263	8,000	36
F-2083-C1	2-Line Low Speed DDS, RS-232-C/V.24 Int.	16	17	19	22	700	4
F-2084	1-Line Wideband Interface	20	21	23	27	825	6
F-2085	1-Line Wideband DDS/V.35 Interface	19	20	22	26	800	6

SOFTWARE PRICES

		Monthly License Fee**	Annual License Fee**
S-EM04.1	Emulation Processing (EP)	N/C	N/C
S-EM04.2	Partitioned Emulation Processing (PEP)	N/C	N/C
S-NCP05	Network Control Program (NCP)	N/C	N/C
S-46F51-A1	Multiple Access Facility (MAF)	$145	$1,595
S-46003.01-A1	Advanced Communications Function/Network Control Program (ACF/NCP)	155	1,705
S-46004-A1	Communications Networking System (CNS)	110	1,210
S-46006-A1	Statistics and Extended Access Control (SEAC)	72	792
S-XN01	X.25 Network Interface	300	3,300
S-XN20	X.25 Packet Adapter	160	1,760
S-XN10	X.25 Datapac Service	48	528
S-XN11	X.25 GTE Telenet Service	48	528
S-XN12	X.25 Tymnet Service	48	528

*All lease charges include monthly maintenance.
**A license fee is required for each processor on which the software is installed. ■

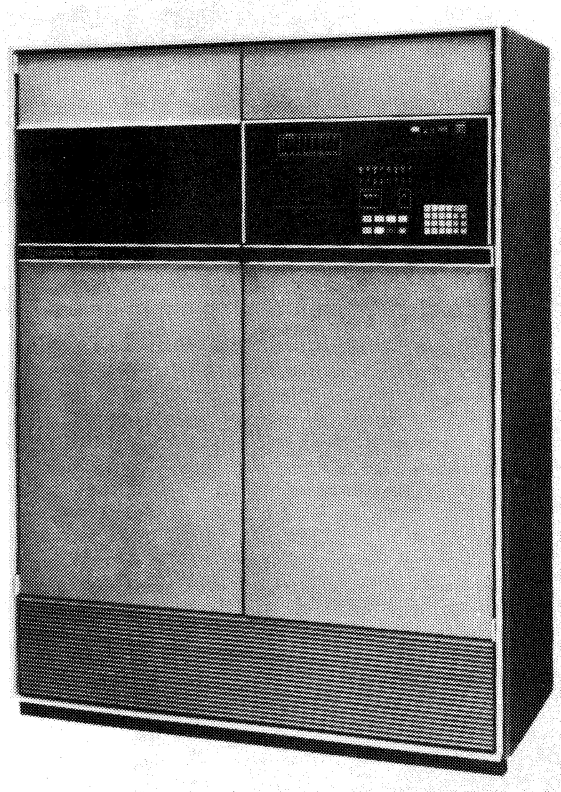
NCR Comten 3600 Communications Processors

MANAGEMENT SUMMARY

The NCR Comten 3600 family of communications processors come in three distinct groups. The Comten 3650, 3670, and 3690 provide varying levels of capacity and connectability to meet the needs of a small, medium, or large communications user. They may be employed as either front-end or remote network processors. Because all models in the family are fully compatible with one another, they can operate together in the same network and also provide a flexible upward migration path.

COMPETITIVE POSITION

Comten delivered its first communications processor in 1972. The company's strategy was to provide a lower-cost alternative to IBM communications processors. This strategy succeeded and led to Comten's purchase by NCR in 1979. NCR has maintained a laissez faire attitude by allowing Comten to continue its operation from the home base of St. Paul, Minnesota. In fact, NCR turned over complete jurisdiction of its entire communications processor product line to Comten by also allowing it to market NCR's own 721-II front-end processor.



The top of the line Comten 3690, shown above, is a worthy replacement of an IBM communications processor. It has up to four times the main memory capacity, supports more hosts simultaneously, and supports one and a half times as many communications lines.

A family of sophisticated communications processors which may be used as software-compatible replacements for the IBM 270X and 370X, or as general-purpose communications processors in non-IBM environments.

In IBM networks, a 3600 system can support IBM BSC and SDLC and can participate in IBM's SNA. Additional software allows a 3600 system to conform to NCR's CNA, as well as providing an X.25-compatible gateway to public data networks. In its maximum configuration, a 3690 system can support up to 512 communications lines and four megabytes of main memory, and can channel attach up to eight hosts.

A low-end Comten 3650 with 64K bytes of memory and support for 16 asynchronous communications lines can be purchased for $48,645, or can be leased on a two-year basis for $1,588 per month including maintenance. A high-end Comten 3690 with 512K bytes of memory and support for 32 mixed asynchronous and bisynchronous lines costs $162,150, or is available on a two-year lease including maintenance for $5,711 per month.

CHARACTERISTICS

VENDOR: NCR Comten, Inc., 2700 Snelling Avenue North, St. Paul, Minnesota 55113. Telephone (612) 638-7777.

DATE OF ANNOUNCEMENT: 3650—March 1976; 3670—March 1976; 3690—July 1977; 3670 Model 85—June 1982.

DATE OF FIRST DELIVERY: 3650—June 1976; 3670—June 1976; 3690—June 1978; 3670 Model 85—July 1982.

NUMBER DELIVERED TO DATE: 3650—over 1400; 3670—over 400; 3690—over 750.

SERVICED BY: NCR Comten.

CONFIGURATION

The NCR Comten communications processors are designed for use in small, medium, or large communications facilities. They may be employed as channel-attached front-end processors, remote concentrators, remote communications processors, host-independent data switching systems, or combination data switching/front-end processing systems. The first model was introduced in January 1972 and called the 3670. In March of 1976, Comten introduced another 3670 model, called it the 3670 II, and began referring to the previous model as the 3670 I. The same occurred with the

NCR Comten 3600 Communications Processors

Current competitors of the NCR Comten 3600 Series include the IBM 3705-II, 3705-80 and 3725 and the Amdahl 4705 and 4705E. The top-of-the line NCR Comten 3690 matches or exceeds IBM's former top-of-the-line 3705-II and its new high-end 3725, as well as the Amdahl 4705 and new high-end 4705E. The NCR Comten 3690 is channel attachable to a maximum of eight hosts, all of which can operate concurrently; the IBM 3725 is channel attachable to up to eight hosts, six of which can operate concurrently; and the Amdahl 4705E is channel attachable to up to four hosts, which operate concurrently. The NCR Comten 3690 supports up to 512 half- or full-duplex lines, twice as many as the 3725 supports (256 half- or full-duplex lines) and also more than the Amdahl 4705 or 4705E supports (352 half-duplex, or 176 full-duplex). The NCR Comten maximum main memory of four megabytes exceeds that of the 3725 and 4705E which each support up to one megabyte.

ADVANTAGES AND RESTRICTIONS

Advantages of the NCR Comten Communications processors include their ability to support their own peripherals (i.e., disk drives), which are not supported by IBM. When performing as a front-end processor, NCR Comten processors can transfer data a file at a time to and from the host they serve. This is due, in part, to the larger memory and disk drive support.

All communications processing software is loaded on the 3600 processor instead of part of it residing in the host. Since the communicatons processor controls the network and not the host, network reconfiguration or support for an independent network other than SNA, such as NCR's CNA, is possible. NCR Comten supplies amenities like an automatic baud rate detection function as standard, instead of optional as with IBM.

NCR Comten makes the substitution of one of its processors for an IBM one as painless as possible by using corresponding terminology. PEP, NCP and ACF/NCP are some of the features that directly coincide with IBM names and capabilities. A user need only replace the IBM unit to enjoy increased functionality without having to become acquainted with a new vendor's jargon.

A restriction exists with the use of the DLC-MIM (T-2020-A2), a type of Modem Interface Module for the 3650-G4, a front-end model. The 3650-G4 base cabinet has space and electrical interfaces to house three Logic Modules (decks of up to 70 circuit boards). Two of the three types (T-2016-A2 and T-2018-A2) of attachable MIMs each use one Logic Module. Three MIMs of these two types, in any combination, can be installed on the 3650-G4, each MIM supporting up to 16 lines. The third type of MIM, however, the DLC-MIM, occupies one-half of two adjacent Logic Modules. A basic 3650-G4 therefore holds only two DLC-MIMs or one DLC-MIM and one of the other two types of MIMs.

3650. NCR Comten has since discontinued those original models. The 3670 II and the 3650 II are now simply referred to as the Comten 3670 and 3650 respectively. The current 3690 was introduced in July 1977.

The 3650 and 3670 models are based on the same processor. The 3650 system is a stripped-down version of the 3670 and supports a reduced number of direct host connections, communications lines, and memory capacity. The Comten 3690 has a faster processor. Architectural sophistication enables the 3690 to operate from two to five times faster than the 3650/3670. All NCR Comten 3600 processors are software-compatible with one another, and upgrade models are available in all product categories.

All 3600 models support direct channel attachment to the IBM System/370, 43XX, 303X, 308X, and compatible systems. NCR Comten will also produce custom interfaces for other host systems, as required. Table 1, NCR Comten 3600 Model Features, distinguishes the characteristics of each 3600.

Comten 3650

The 3650 family can support up to 128 communications lines, up to 512K bytes of memory, and up to two directly channel attached hosts. All models include the base cabinet with a 650-nanosecond processor, 128K bytes of memory, the Integral Program Load Device, and two Direct Storage Access Channel Controllers. Main memory word size is 16 bits.

The 3650 is offered in four basic models. Two of the models are intended for use as a front-end processor and two of the models are intended for use as a remote concentrator. The two front-end processor models, the 3650-G4 and 3650-H4 include one IBM Channel Interface Adapter (T-3029-A1), which provides a direct storage access connection with the host computer system. An optional second channel is available for attachment of either peripherals requiring a direct channel interface or a second IBM Channel Interface Adapter. The latter can be attached to the same host or to another host computer. The 3650-G4 and 3650-H4 models also include as standard a Communications Interface Module (F-1027) that will permit the attachment of up to eight Modem Interface Modules (T-2016-A2, T-2018-A2, and T-2020-A2) and their associated Line Interfaces to the system. Each Modem Interface Module (MIM) will support up to 16 communications lines.

The base cabinet of the 3650-G4 has space and electrical interfaces to accommodate three Logic Modules. (A Logic Module is a deck of up to 70 circuit boards occupying about 23-by-6-by-9 inches of space within the cabinet.) Two of the three types (T-2016-A2 and T-2018-A2) of attachable MIMs each require the space of one Logic Module. Three of these MIMs, in any combination, can be installed on the 3650-G4 models, with each MIM supporting up to 16 lines. A third type of MIM, the DLC-MIM (T-2020-A2), occupies one-half of two adjacent Logic Modules. The basic 3650-G4 therefore can accommodate only two of the DLC-MIMs. Physical considerations prevent the third Logic Module from being used when two DLC-MIMs are attached. An alternate configuration permits one DLC-MIM and one of the other two types of MIMs to be attached.

Expansion cabinets (Module Controllers) must be employed to add more MIMs to reach the system maximum of eight MIMs. The Module Controllers are available in two models. One model supplies space to accommodate six Logic Modules (T-3651-A1); the other model supplies space to accommodate 12 Logic Modules (T-3651-B1). Two additional models, a six LM (T-3651-A2) and a 12 LM size (T-3651-B2), allow two 3650s to have access to the same Module Controller. One use for the dual access Module

NCR Comten 3600 Communications Processors
Product Enhancement

NCR Comten has replaced its entire 3650 Series of communications processors with new models, and has added two new entry-level systems to the line. The new models feature additional line capacity and greatly improved price/performance over their predecessors. Models G8 and H8 replace models G4 and H4 respectively as small and large front-end processors. Models J8 and K8 replace models J4 and K4 as small and large remote communications processors. Model S8 is an entry-level front-end, and model R8 is an entry-level remote processor. Models G8, J8, H8, and K8 feature 512K bytes of memory as standard equipment. Models S8 and R8 come with 256K bytes of memory expandable to 512K. The front-end processor models (G8, H8, and S8) come equipped with a host interface. The remote models (J8, K8, and R8) come equipped with one programmable DLC Modem Interface Module (DLC MIM).

The principal advantage of the new models over the old is a new internal arrangement that opens more cabinet space for modem interface modules. This and an augmented power supply allow the new 3650s to support one additional DLC MIM for a one-third increase in capacity. The new models carry significantly lower prices than their predecessors. For basic systems, the G8 and the H8 each cost approximately $4,200 less than the G4 and H4 front-ends they replace; the J8 and the K8 each cost approximately $5,200 less than the J4 and the K4. The new models also have twice the standard memory of their predecessors. The lower prices, increased memory size, and increased communications line capacity add up to a significant price/performance advantage for the new 3650 models.

In conjunction with the new models, Comten also announced a new operating system for its entire 3600 Series. The new software, called the Communications Operating System 2 (COS2) comes in two versions, COS2/90 for the high-end 3690 Series, and COS2/50 for the 3650 and 3670 Series and for 3690 processors running in 3670 extended mode. COS2/90 is the first Comten operating system to support entire 4M byte maximum memory of the 3690. Both versions of COS2 are more modular in structure than Comten's older SCS63 operating system.

The new processor models are available immediately. Both versions of COS2 will be available in the third quarter of 1984.

		Monthly Charges					
		4-Year Lease	3-Year Lease	2-Year Lease	Month-to-Month Rental	Purchase Price	Monthly Maintenance
T-3650-G8	FEP, 512KB, 4 LM	$1,456	$1,542	$1,713	$2,004	$43,900	$363
T-3650-H8	FEP, 512KB, 12 LM	1,734	1,836	2,040	2,387	54,400	383
T-3650-J8	RCP, 512KB, 4 LM	1,526	1,616	1,795	2,100	46,100	381
T-3650-K8	RCP, 512KB, 12 LM	1,811	1,917	2,130	2,492	56,600	401
T-3650-S8	FEP, 256KB, 2 LM, 4 to 16 lines	1,063	1,125	1,250	1,463	41,000	261
T-3650-R8	RCP, 256KB, 3 LM, 4 to 16 lines	1,063	1,125	1,250	1,463	41,000	261
F-3609-A8	128KB Storage Expansion	119	126	140	164	4,700	18
F-1034-A8	IBM Channel Program Loader	34	36	40	47	1,074	14
F-2200-A8	Remote Initial Load	18	19	21	25	565	6
F-2207-A8	Remote Initial Load	23	23	26	33	735	6
T-4008	Comten Console	106	113	125	146	3,500	26
T-3029-A8	IBM Channel Interface Adapter	246	246	273	341	8,000	16
T-3030-B8	NCR Bit Serial Channel Interface Adapter	246	246	273	341	8,000	16
F-1044-A8	Peripheral Power Sequencer	39	42	46	54	1,500	9
F-2205-A8	3650 Extended Distance Interface Adapter	2	3	3	4	100	2
F-2239-A8	EIA RS-232-C/CCITT V.24/DDS Interface, 4 lines	119	126	140	175	3,000	10
T-3651-A8	Module Controller, 6 LM	290	310	325	380	10,500	20
T-3651-A9	Module Controller, 6 LM, 2 CPUs	330	355	370	435	12,000	43
T-3651-B8	Module Controller, 12 LM	565	605	635	745	20,600	40
T-3651-B9	Module Controller	650	695	730	855	23,600	86

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NCR Comten 3600 Communications Processors

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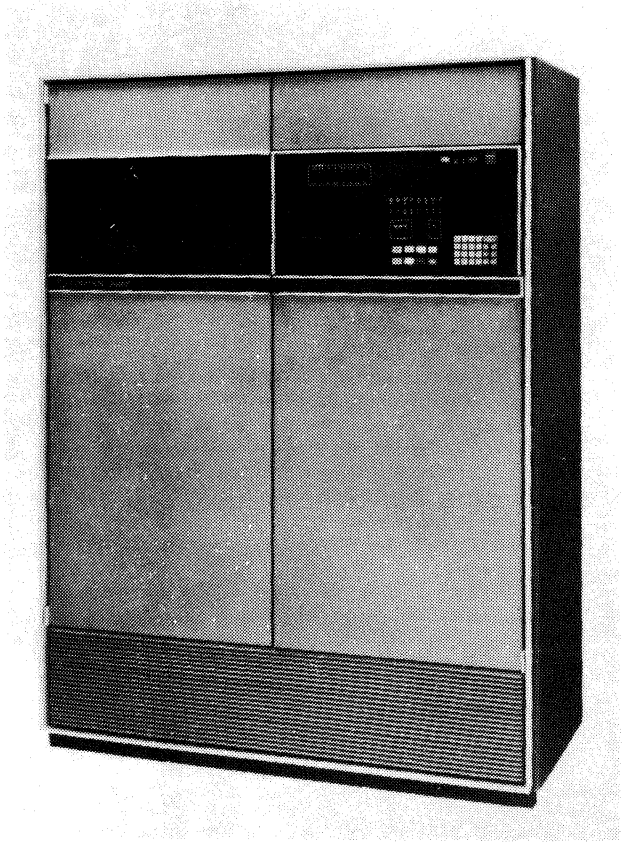

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Comten 3650

The 3650 family can support up to 128 communications lines, up to 512K bytes of memory, and up to two directly channel attached hosts. All models include the base cabinet with a 650-nanosecond processor, 128K bytes of memory, the Integral Program Load Device, and two Direct Storage Access Channel Controllers. Main memory word size is 16 bits.

The 3650 is offered in four basic models. Two of the models are intended for use as a front-end processor and two of the models are intended for use as a remote concentrator. The two front-end processor models, the 3650-G4 and 3650-H4 include one IBM Channel Interface Adapter (T-3029-A1), which provides a direct storage access connection with the host computer system. An optional second channel is available for attachment of either peripherals requiring a direct channel interface or a second IBM Channel Interface Adapter. The latter can be attached to the same host or to another host computer. The 3650-G4 and 3650-H4 models also include as standard a Communications Interface Module (F-1027) that will permit the attachment of up to eight Modem Interface Modules (T-2016-A2, T-2018-A2, and T-2020-A2) and their associated Line Interfaces to the system. Each Modem Interface Module (MIM) will support up to 16 communications lines.

The base cabinet of the 3650-G4 has space and electrical interfaces to accommodate three Logic Modules. (A Logic Module is a deck of up to 70 circuit boards occupying about 23-by-6-by-9 inches of space within the cabinet.) Two of the three types (T-2016-A2 and T-2018-A2) of attachable MIMs each require the space of one Logic Module. Three of these MIMs, in any combination, can be installed on the 3650-G4 models, with each MIM supporting up to 16 lines. A third type of MIM, the DLC-MIM (T-2020-A2), occupies one-half of two adjacent Logic Modules. The basic 3650-G4 therefore can accommodate only two of the DLC-MIMs. Physical considerations prevent the third Logic Module from being used when two DLC-MIMs are attached. An alternate configuration permits one DLC-MIM and one of the other two types of MIMs to be attached.

Expansion cabinets (Module Controllers) must be employed to add more MIMs to reach the system maximum of eight MIMs. The Module Controllers are available in two models. One model supplies space to accommodate six Logic Modules (T-3651-A1); the other model supplies space to accommodate 12 Logic Modules (T-3651-B1). Two additional models, a six LM (T-3651-A2) and a 12 LM size (T-3651-B2), allow two 3650s to have access to the same Module Controller. One use for the dual access Module

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USER REACTION

The 1983 Datapro Network Users Survey, conducted in November and December of 1982, produced 51 NCR Comten 3600 users with a total of 258 systems installed. There was 14 Comten 3650 users, 10 3670 users, and 27 3690 users. This figure represents about eight percent of all users surveyed and reflects the rather substantial gain NCR Comten has made in the market.

	Excellent	Good	Fair	Poor	WA*
Overall performance	32	19	0	0	3.6
Ease of installation	17	25	8	0	3.2
Ease of operation	21	21	6	3	3.2
Ease of expansion	20	24	7	0	3.2
Hardware reliability	30	18	3	0	3.5
Quality of Manufacturer's Software/Firmware	17	18	12	4	2.9
Ease of programming	4	20	15	2	2.6
Manufacturer's maintenance service	22	21	6	1	3.0
Quality of manufacturer's technical support	16	14	16	4	2.8

*Weighted Average based on a scale of 4.0 for Excellent.

The hardware scores are very respectable, but IBM has a decisive edge in technical support. Users with some knowledge and the ability to maintain their own shops might profit by using NCR Comten communications processors. The NCR Comten 3600 Weighted Averages are better than or equal to the IBM 3705 Weighted Averages in the Overall Performance, Ease of Installation, Ease of Operation, Ease of Expansion, Hardware Reliability, and Ease of Programming User rating categories. However, the NCR Comten Weighted Averages are lower than IBM's in the Quality of Manufacturer's Software/Firmware, Maintenance Service (NCR Comten is only one-tenth of a point lower than IBM), and Technical Support categories.

Controller is for fall-back. When the primary 3650 front-end is not operative, the secondary 3650 can assume the prime function in handling the lines.

The basic 3650-H4 cabinet includes capacity for housing 11 Logic Modules. When more Logic Modules are required, Module Controllers are employed. However, the maximum number of MIMs configurable per 3650-H4 remains eight.

The basic 3650-J4 and the 3650-K4 remote concentrators do not include a Channel Interface Adapter; however, up to two adapters can be optionally attached to each system. Included in the basic 3650-J4 and the 3650-K4 are a BSC-MIM (T-2018-A2) and a Trunkline Interface that will support eight full-duplex communications lines. These two features are used to support NCR Comten's CNS trunkline protocol and can transmit data at speeds up to 56K bps.

Add-on memory for the Comten 3650 family comes in 128KB units (F-3609-A1). A maximum of three units may be employed for a total of 512K bytes of main memory.

Comten 3670

The 3670 family, except the 3670 Model 85, can support up to 384 communications lines, up to 512K bytes of memory, and up to four directly channel attached hosts. The 3760 Model 85 is a pre-configured system containing 256K bytes of memory and supporting up to 128 communications lines. All 3670 models include the base cabinet with a 650-nanosecond processor, 64K bytes of memory, the Integral Program Load Device (F-1034-A1), two Direct Storage Access (F-1044-A3) Channel Controllers and one Communications Interface Module (F-1027). Main memory word size is 16 bits.

The 3670 family is offered in six basic models. Three of the models are intended for use as a front-end processor and two of the models are intended for use as a remote concentrator. The sixth, the 3670-M85 can be used as either. The three front-end processor models, the 3670-E1, 3670-F1, and 3670-G1 include one IBM Channel Interface Adapter (T-3018), which provides a direct channel access connection with the host computer system. Up to three additional IBM Channel Interface Adapters can be optionally attached to the Direct Storage Access Channel Controllers. A Block Multiplexer Channel (T-3023-B1) feature can also be attached to a Direct Storage Access Controller and can support up to eight Peripheral Controllers (T-7214-B2), which will support disk drives, and other peripherals such as line printers, tape drives, and card readers. Two additional Communications Interface Modules (F-1027) can be optionally added, for a total of three, on all 3670 models, permitting attachment of a total of 24 MIMs and their associated Line Interfaces. Each MIM supports up to 16 lines for maximum total of up to 384 communications lines.

The three front-end models, the 3670-E1, F1, and G1, have 11, 19, and 27 Logic Modules, respectively. When more MIMs are required than can be contained in the base configuration, Module Controllers (expansion cabinets) are necessary. Module Controllers are available in four single-processor models, containing 6 (T-3671-A1), 12 (T3671-B1), 18 (T-3671-C1), and 24 (T-3671-D1) Logic Modules, and four dual-processor models (T-3671-A2, B2, C2, and D2, respectively).

The two remote concentrator systems, the 3670-H1 and 3670-J1, include one BSC-MIM (T-2018-A2) and one Trunkline Interface that accommodates up to eight full-duplex lines at speeds up to 56K bps. Two additional Communications Interface Modules (F-1027) can be optionally added, permitting a total of 24 MIMs supporting up to 384 communications lines. As with the front-end models, Direct Storage Access Channels are standard on the remote systems, and when a Block Multiplexer is attached to each Direct Storage Access Channel, up to 16 Peripheral Controllers can be supported. The basic 3670-H1 has 12 Logic Modules, and the 3670-J1 has 20 LMs. When adding more MIMs than can be contained in the base configuration, the Module Controllers, as described above, are used.

The 3670 family of processors may be expanded to 512K bytes of main memory in 64K increments (F-3602-A1) or 128KB increments (F-3610-A1) except the 3670-M85. The Model 85 has 256K and is expandable to 512K bytes with one 256K byte add-on memory module (F-3608-A1).

The basic 3670-M85 is offered containing 256K bytes of storage, one DLC-MIM (T-2020-A2), one two-line RS-232-C Line Interface (F-2053-A1), a system console (T-4008), and either a Channel Interface Adapter (T-3018) or an Integral Program Load Device (F-1034-A1).

Comten 3690

The most notable architectural changes that contribute to the speed enhancement of the 3690 are:

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TABLE 1. NCR COMTEN 3600 MODEL FEATURES

	Comten 3650	Comten 3670	Comten 3690*
Processor—			
Main memory cycle time, nanoseconds	650	650	520
Main memory word size, bits	16	16	32
Minimum main memory capacity, bytes	64K	64K**	256K
Maximum main memory capacity, bytes	512K	512K	4096K
Logic Control	Hardwired	Hardwired	Microprogrammed
Network—			
Maximum number of communications lines physically attachable	128	384	512
Maximum number of direct host attachments	2	4	8
Host systems supported	IBM 370, 43XX, 30XX, and compatibles; custom	IBM 370, 43XX, 30XX, and compatibles; custom	IBM 370, 43XX, 30XX, and compatibles; custom

*Architectural features such as the look-ahead instruction execution, dual storage access, and a 32-bit word results in the 3690 operating two to five times faster than the other two models.

**3670 Model 85 has a minimum main memory of 256K bytes.

- The processor logic control is microprogrammed.
- Data transfers to and from memory are via an odd/even dual access.
- The word size is 32 bits.
- Instruction execution includes a look-ahead capability.

The Comten 3690 is offered in seven basic models and supports up to 4M of main memory. Four of the models, 3690-A5, 3690-C5, 3690-D5, and 3690-E5 are intended for use as front-end processors. The 3690-T1 and 3690-U1 may be utilized as either front-end or remote communications processors. The 3690-B5 serves as a remote communications processor only.

All members of the 3690 family have a microprogrammed 520-nanosecond processor with dual-odd/even storage access, an Integral Program Load Device (F-1049-A1), 512K bytes of memory (except 256K for the 3690-T1 and 3690-U1), and one Communications Interface Module (T-2023-A1). The CIM accommodates up to eight Modem Interface Modules and associated Line Interfaces to support up to 128 communications lines. Up to three additional CIMs can be optionally attached permitting the physical attachment of up to 512 communications lines per 3690 system.

The basic 3690 models include space for up to nine Logic Modules. Module Controller expansion cabinets are provided to accommodate the attachment of MIMs and Line Interfaces. The single-processor Module Controllers are available to handle Logic Module requirements of six (T-3691-A1), 12 (T-3691-B1), 18 (T-3691-C1), 24 (T-3691-D1), 30 (T-3691-E1) or 36 (T-3691-F1) Logic Modules. Each of the Module Controller sizes also has a version that permits dual 3690s (T-3691-A2, B2, C2, D2, E2, and F2, respectively) to access the controller and the lines attached to that controller.

The basic 512K bytes of memory can be expanded to 4M bytes using the 256 KB add-on memory units (F-3608-A1) on all models except the 3690-T1 and 3690-U1. Models 3690-T1 and 3690-U1 have a maximum memory of 1M bytes and use 128 KB add-on memory units (F-3611-A1).

The 3690 basic models differ in the number of Direct Storage Access Channel Controllers (T-7214-B2) provided and the devices that can be attached to the DSACCs.

The 3690-A5 is intended to operate as a stand-alone data switching system and/or front-end processor configured to support a variety of peripheral attachments. Therefore, the 3690-A5 provides four DSACCs with one of the DSACCs having a Block Multiplexer Channel (T-3023-B1) attached. The Block Multiplexer has the capacity to accommodate up to eight peripheral controllers and transfers data at a rate of 806K bps. The remaining three DSACCs can optionally receive Block Multiplexer Channels or Integrated File Adapters (for multiple disk attachment). The 3690-A5 has a maximum line capacity of 384 and supports up to four Channel Interface Adapters (T-3018). This model includes space for three Logic Modules in the base cabinet.

The 3690-B5 is intended to function as a remote communications processor and does not include any Direct Storage Access Channels. This model includes space for three Logic Modules in the base cabinet.

The 3690-C5, D5, and E5 are intended to function as front-end processors. All three models include four Direct Storage Access Channels. The 3690-C5 also includes one Channel Interface Adapter for direct attachment to the host. The three remaining DSACCs can be used to attach up to three additional Channel Interface Adapters, up to three Block Multiplexer Channels, up to three Integrated File Adapters, or any combination of the three feature attachments.

The 3690-D5 has a Channel Interface Adapter Base attachment to one of the DSACCs. This CIA Base can support attachment of up to four Channel Interface Adapters, still leaving three DSACCs available. The three DSACCs are restricted to either attachment to Block Multiplexers or Integrated File Adapters. The basic 3690-D5 includes one IBM Channel Interface Adapter.

The 3690-E5 includes two CIA Bases, each able to accommodate up to four host attachments or a system total of eight. One of the CIA Bases includes an IBM Channel Interface Adapter as part of the basic configuration. The two remaining DSACCs can be used for Block Multiplexer or Integrated File Adapter attachment.

DIRECT CONNECTION TO HOST COMPUTER

The 3650 supports up to two direct host connections; the 3670, up to four; and the 3690, up to eight. Transfer rate from the NCR Comten 3600 to the host processor is 806K bps. The Channel Interface Adapter (T-3029-A1 or T-3018) controls byte transfers between the NCR Comten processors and the multiplexer channel on an IBM or compatible host computer. The ability to make transfers in byte, block, or file modes distinguishes NCR Comten from almost all other front-end processors. Subchannel addresses from one to 256 are supported.

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TRANSMISSION SPECIFICATIONS

The NCR Comten 3600 family supports asynchronous lines of up to 9,600 bps, and synchronous lines of up to 56K bps. RS-232-C, current loop, wideband, and DDS interfaces are supported in either full or half-duplex modes. Major protocols supported include TTY, BSC, CNS trunkline (NCR Comten's internal, BSC-like protocol), SDLC, HDLC, and CCITT recommendation X.25.

Each type of line requires specific Modem Interface Module and Line Interface features. These features are attached to the system's Communications Interface Module. Table 2, Communications Line Interfaces and Modem Interface Modules, lists the features required to support the various types of communications lines. Throughput limitations are noted by the number of lines each MIM will support for a given type of interface.

SOFTWARE

NCR Comten refers to the software used to drive the NCR Comten 3600 family as System Control Software (SCS). SCS accommodates a wide range of communications needs. SCS is compatible with NCR's Communications Network Architecture (CNA), and pre-SNA and SNA IBM environments. Currently, several major software packages are available. These software products are Emulation Processing (EP), Network Control Program (NCP), Advanced Communications Function/Network Control Program (ACF/NCP), and Partitioned Emulation Processing (PEP). SCS also provides value-added programs such as Comten Multiple Access Facility (MAF), Communications Networking System (CNS), Statistics and Extended Access Control (SEAC), X.25 Interface to Public Data Networks, and Data Switching System (DSS). Comten EP, PEP, and NCP are available at no additional charge. All others are available on a monthly or annual license fee basis.

Emulation Processing (S-EM04.1) permits the 3600 to operate as an IBM 3704/3705 communications controller, and includes the capability to emulate the 270X. In addition to permitting one NCR Comten 3600 to replace multiple 270X/370X devices attached to one host, the 3600 can be connected to multiple hosts. Emulation also supports terminals that are not compatible with the 270X and 370X.

EP consists of a module for each terminal-type requiring support and a string of special purpose programs:

- Terminal Initiated Line Switching (TILS)
- Automatic Baud Rate Detection (ABRD)
- Site Initiated Line Switching (SILS)
- Automated Dialing (DIAL)

TILS assigns the appropriate host subchannel address that is associated with a particular application. The assignment is based upon the terminal operator's description of the linkage required. TILS includes a feature that will automatically reroute transactions to a backup host when the primary host is unavailable.

ABRD enables multiple start/stop terminals with different speeds and data-link control procedures to share the same line to an NCR Comten front-end processor. ABRD is used in conjunction with TILS. When a terminal operator initiates a linkage under TILS, it is ABRD that determines the terminal's speed and data-link control.

SILS, under the control of the front-end processor's operator, performs the TILS function for dedicated lines. DIAL allows the host to automatically initiate sessions with dial-up terminals. DIAL allows the host to control when sessions are established and data transfer between the host and terminal takes place.

EP also provides utility programs for monitoring and maintenance, on-line terminal testing, console I/O, and on-line system generation.

The *Network Control Program* (S-NCP05) is functionally compatible with IBM's NCP. NCP removes many of the network control functions from the host processor, freeing its use for applications processing. NCP provides a path between the terminal and the host application utilizing either VTAM or TCAM as the access method. All data is multiplexed between the host and the front-end processor, significantly reducing the host processor time required to transmit/receive data. Comten NCP is compatible with IBM NCP in performing line handling and network control functions such as dynamic buffering, message traffic control, code translation, addressing, and polling. Comten NCP also provides concurrent support for multiple IBM host processors.

Advanced Communications Function/Network Control Program (S-46003.01-A1) is compatible with IBM's ACF/NCP releases. It also adds several functions to enhance ACF/NCP operations. When operating in unison with a host access method supporting ACF, ACF/NCP enables increased accessibility of data within the network by supporting cross-domain sharing of resources. ACF/NCP must use either VTAM or TCAM as the host access method. ACF/NCP supports the IBM Multisystem Networking Facility (MSNF) that allows up to eight ACF hosts to be accessed by the ACF/NCP network. Comten's ACF/NCP is both SNA and CNA compatible.

Partitioned Emulation Processing (S-EM04.2) permits EP and NCP or ACF/NCP to co-reside and execute simultaneously within a single NCR Comten 3600 processor. PEP provides the capabilities and features of EP and NCP and/or ACF/NCP in the same network at the same time. Additionally, users may switch to specified lines and terminals between EP and NCP or ACF/NCP control. Under this control a user may switch from an SNA to CNA environment from a remote location.

Multiple Access Facility (S-46F51-A1) relieves the host of the polling function for IBM 3270 systems and permits the terminals to select applications in any host computer attached to the NCR Comten front-end processor. DIAL under MAF handles up to 16 phone lines for host originated calls. MAF provides increased host accessibility and improved performance for BSC 3270 devices. Under MAF, a 3270 device can select any host processor and establish a session with any number of previously defined host applications. Moreover, MAF and NCP provide a tool to allow migration between SNA and EP-based BSC 3270 networks.

When there is a need for two or more NCR Comten processors to communicate with each other within a network, the EP software package is replaced with the *Communications Networking System* (S-46004-A1). While performing all of the functions of EP, CNS also enables an NCR Comten processor functioning as a remote concentrator to transmit to and receive from an NCR Comten processor functioning as a front-end processor. Terminals using start/stop or BSC protocols are supported by the remote concentrator through the CNS interface modules. While these modules perform the data-link function, the Transparent Concentrator (TCON) module performs the multiplexing/demultiplexing function for the data from each terminal. The module that handles the network's internal protocol (CNS Trunkhandler) is the TCTH module. This internal protocol is transparent to the terminals and the host

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TABLE 2. COMMUNICATIONS LINE INTERFACES & MODEM INTERFACE MODULES

Line Interface		Timing	Half- or Full-Duplex	Speed, bps	Line Interface Feature	Lines per Interface	No. of Interfaces per MIM	MIM Feature
EIA RS-232-C	Bell 113B, 103A, 202	Async.	Half	Up to 1800	F2072	2	8	T2016-A2
	BSC	Sync.	Half	Up to 19.2K	F2053-A1	2	8	T2018-A2
	CNS trunkline	Sync.	Full	Up to 19.2K	F2053-B1	1	8	T2018-A2
	IBM 2848/2260, 2845/2265	External	Half	Up to 9600	F2053-C1	2	8	T2018-A2
	SDLC	Sync.	Half or Full	Up to 20K	F2083-C1	2	8	T2020-A2
Current loop, 20 ma or 60 ma		Async.	Half	Up to 75	F2074*	2	8	T2016-A2
Wideband	Bell 300 Series	Sync.	Half	Up to 50K	F2064-A1	1	4	T2018-A2
	CNS trunkline	Sync.	Full	Up to 50K	F2064-B1	1	2	T2018-A2
DDS	BSC	Sync.	Half	Up to 56K	F2092-A1	2	2	T2018-A2
	CNS trunkline	Sync.	Full	Up to 56K	F2092-B1	1	2	T2018-A2
	Bell System Data Service Unit	Sync.	Half or Full	Up to 56K	F2085	1	2 (HDX), 1 (FDX)	T2020-A2
Wideband	Bell 300 Series	Sync.	Half or Full	Up to 50K	F2084	1	2 (HDX) 1(FDX)	T2020-A2
Auto Call Adapter #T2014		—	—	—	F2033-B1	1	16	T2016-A2

*Requires Telegraph Interface Base Feature #2068.

processors. CNS emulator modules, comparable to the EP modules above, are resident in the front-end processor for each terminal-type sending and receiving data. Other CNS features support alternate routing, node reconfiguration, satellite links, remote auto-dial, and multiple-circuit trunks. Both the CNS and the EP packages require a separate subchannel address for each terminal communicating with the host.

Statistics and Extended Access Control (S-46006-A1) extends access control and data gathering capabilities. SEAC provides an extra level of access control within the 3600 and thereby extends security. SEAC also provides a means of collecting data concerning host/terminal sessions throughout the network.

Comten X.25 Interface

The *X.25 Interface* (S-XN01) for public data networks is a series of licensed programs which enable 3600s to function as packet-mode data terminals. With the X.25 Interface, users can attach their terminals to public data networks and terminate them at a 3600 front-end processor connected to an IBM or compatible host. The X.25 Interface has been certified by GTE Telenet (S-XN11), Tymnet (S-XN12), and Uninet in the United States, Datapac (S-XN10) in Canada, British Postal Service in the United Kingdom, Transpac in France, and Datex-P in West Germany.

The X.25 Interface complies with the CCITT recommendations as implemented in current public data networks using the HDLC protocol. Communications between terminals attached to an X.25 public data network and a host are controlled by packet adapters (S-XN20) in the 3600's nodes. The packet adapters convert commands and data between the formats required by the host software and the formats required by the X.25 public data network.

The Comten processor can be operated as a nodal processor on a distributed network by the use of the *Data Switching System* (DSS). DSS is a set of communications software programs designed to enhance network capabilities by providing such attributes as data/message switching and processing, file access and processing, and user defined applications processing.

DSS operates co-residently with NCP and CNS. In effect, DSS can independently drive a communications network or may conform to the rules established by IBM's System Network Architecture.

DSS is composed of three modules: the Communications Access Method (S-56010-A1), the Data Switch/Message Control Program (S-46012-A1), and the Data Management System (DMS).

The Communications Access Method controls the access to all lines assigned to CAM, whether to a terminal, to another node processor, or to a host processor. CAM provides a central access method to interface NCP or ACF/NCP with channel attached IBM or compatible host systems. Three sub-modules of CAM provide a standard interface with the remainder of the CAM module and each of the three separate protocols. The sub-modules are called Transmission Subsystem Elements (TSE). The Basic Mode SNA TSE provides the interface between CAM and data received (from terminals) by the processor via NCP. The Communications Networking System TSE provides the interface between CAM and data received (from terminals and other NCR Comten processors) by the processor via CNS. The 3270 Emulation TSE provides the interface between CAM and up to four IBM or compatible hosts. The hosts, operating BTAM or TCAM applications programs, view the interface between CAM and IBM or compatible systems executing "read/write" queries to DDS through the host's Basic Sequential Access Method (BSAM).

The DS/MCP performs the message handling function for data it receives from CAM. DS/MCP provides a store-and-forward message switching facility in both main and auxiliary storage with a standard subsystem-type relationship with CAM. Messages are analyzed, edited, routed, queued, and logged. Error recovery is controlled by this DSS module.

DMS provides non-communication I/O with direct access storage devices such as disk drives on a disk controller supplied by the host system.

Parameter setting for tailoring either EP, CNS, NCP, or ACF/NCP to a given system is done in Codel (S-CL), a

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		Monthly Charges*					
		4-Year Lease	3-Year Lease	2-Year Lease	Month-to-Month Lease	Purchase Price	Monthly Maintenance
T-3691-C2	Module Controller, 18 LM, 2 CPU	$1,092	$1,092	$1,213	$1,516	$40,400	$234
T-3691-D1	Module Controller, 24 LM	1,256	1,256	1,396	1,745	46,500	208
T-3691-D2	Module Controller, 24 LM, 2 CPU	1,452	1,452	1,613	2,016	53,700	312
T-3691-E1	Module Controller, 30 LM	1,568	1,568	1,742	2,178	58,000	260
T-3691-E2	Module Controller, 30 LM, 2 CPU	1,811	1,811	2,012	2,515	67,000	390
T-3691-F1	Module Controller, 36 LM	1,878	1,878	2,087	2,609	69,500	312
T-3691-F2	Module Controller, 36 LM, 2 CPU	2,170	2,170	2,411	3,014	80,300	468
	3600 Communications Equipment						
T-2014-C1	Auto-Call Adapter	83	88	98	123	3,100	15
F-2033-B1	Auto-Call Interface	5	5	6	7	175	2
T-2016-A2	16-Line Asynch. MIM	83	88	98	115	3,600	15
F-2068-01	Telegraph Interface	3	4	4	5	125	2
F-2074	2-Line Telegraph Interface	5	5	6	7	190	2
F-2072-A1	2-Line RS-232-C Interface	5	5	6	7	190	3
T-2018-A2	16-Line BSC MIM	153	162	180	211	6,700	20
F-2053-A1	2-Line RS-232-C/V.24 Interface	12	13	14	18	345	5
F-2053-B1	2-Line RS-232-C/V.24 Interface	12	13	14	18	345	5
F-2053-C1	2-Line RS-232-C/V.24 Interface	12	13	14	18	345	5
F-2064-A1	1-Line Wideband Interface	18	19	21	26	630	5
F-2064-B1	1-Line Wideband Interface	18	19	21	26	630	5
F-2092-A1	2-Line Wideband DDS Interface	26	28	31	39	1,010	6
F-2092-B1	1-Line Wideband DDS Interface	15	16	18	23	580	4
T-2020-A2	16-Line DLC MIM	179	189	210	263	8,000	36
F-2083-C1	2-Line Low Speed DDS, RS-232-C/V.24 Int.	16	17	19	22	700	4
F-2084	1-Line Wideband Interface	20	21	23	27	825	6
F-2085	1-Line Wideband DDS/V.35 Interface	19	20	22	26	800	6
	3600 Peripheral Equipment						
F-1034-A1	Integral Program Load Device for 3650 and 3670	34	36	40	47	1,265	14
F-1049-A1	Integral Program Load Device for 3690	13	13	14	18	520	4
F-1044-A3	Direct Storage Access Channel Controller	39	42	46	54	1,800	9
T-3023-B1	Block Multiplexer Channel	500	529	588	735	18,020	101
T-7214-B2	Peripheral Controller	605	640	710	890	21,600	208
T-3029-A1	IBM Channel Interface Adapter for 3650	246	246	273	341	8,620	47
T-3018	IBM Channel Interface Adapter for 3670 and 3690	200	212	235	275	7,420	42
T-6214-B2	58.3 MB Disk Drive	320	335	375	470	11,500	131
T-6224-B2	116.6 MB Disk Drive	640	670	750	940	23,000	259

	SOFTWARE	Monthly License Fee**	Annual License Fee**
S-CL	Codel	N/C	N/C
S-EM04.1	Emulation Processing (EP)	N/C	N/C
S-EM04.2	Partitioned Emulation Processing (PEP)	N/C	N/C
S-NCP05	Network Control Program (NCP)	N/C	N/C
S-46F51-A1	Multiple Access Facility (MAF)	$145	$1,595
S-46003.01-A1	Advanced Communications Function/Network Control Program (ACF/NCP)	155	1,705
S-46004-A1	Communications Networking System (CNS)	110	1,210
S-46006-A1	Statistics and Extended Access Control (SEAC)	72	792
S-46012-A1	Data Switch/Message Control Program (DS/MCP)	84	924
S-56010-A1	Communications Access Method (CAM)	36	396
S-XN01	X.25 Network Interface	300	3,300
S-XN20	X.25 Packet Adapter	160	1,760
S-XN10	X.25 Datapac Service	48	528
S-XN11	X.25 GTE Telenet Service	48	528
S-XN12	X.25 Tymnet Service	48	528

*All lease charges include monthly maintenance.
**A license fee is required for each processor on which the software is installed.■

NCR Comten 5620XP Communications Processor

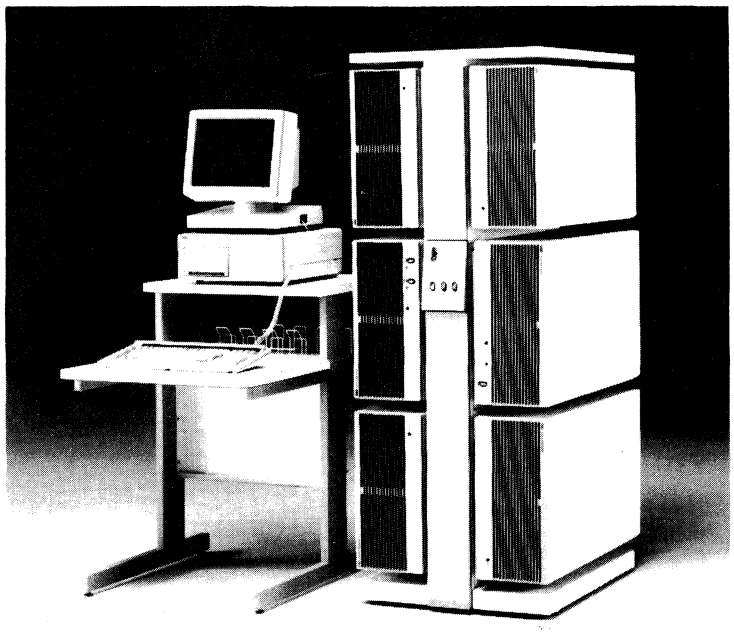
datapro ANALYSIS

UPDATE: *Since our last report on NCR Comten's 5620XP, the company has not made significant changes in the product. The 5620XP continues to serve as the entry-level product in NCR Comten's processor line.*

For almost 20 years, NCR Comten has specialized in data communications systems, first as an independent company and then as a subsidiary of NCR Corporation. The company develops, manufactures, markets, and services the various computer communications processing systems that comprise its major product line. Two major NCR Comten communications processor products are the 3600 Series, which includes the 3690 and 3695, and the 5600 Series, which consists of the 5620XP, the 5660, and more recently the 5655, 5665, and 5675 communications processors. Both the 3600 and 5600 product families are compatible with IBM equipment and major common carrier services. They are, in fact, IBM's major competition in the communications processor market.

VENDOR: NCR Comten, Inc., 2700 Snelling Avenue North, St. Paul, Minnesota 55113. Telephone (612) 638-7777.
CANADIAN DISTRIBUTION: NCR Comten, 515 Consumers Road, Suite 100, Willowdale, Ontario M2J 4Z2. Telephone (416) 496-1300.
MODEL: NCR Comten 5620XP.
FUNCTION: Front-end processor, remote concentrator, or both.
HOST COMPUTERS SUPPORTED: IBM and compatible mainframes, NCR mainframes.
ARCHITECTURE SUPPORTED: SNA, pre-SNA, X.25, proprietary trunk protocol.
OPERATING SOFTWARE: Communications Operating System 2 (COS2).
COMPETITION: Amdahl and IBM communications processors; AT&T, Codex, DCA, Infotron, and Timeplex high-end statistical, switching multiplexers.
PRICING: From $22,000 to $95,000 depending upon configuration.

REPORT HIGHLIGHTS **PAGE**



NCR Comten's 5620XP communications processor supports up to 64 communications lines using asynchronous, bisynchronous, SDLC, or X.25 protocols. The Comten 5620XP can be used in both SNA and non-SNA network configurations.

NCR Comten 5620XP Communications Processor

The 5620XP is the entry-level product in Comten's processor family, but it offers the same basic capabilities as the larger models. Designed for smaller sites where a larger communications processor is not justified, it is competitively priced. Since the 5620XP is fully software compatible with other Comten communications processors, users can upgrade to larger models as needs arise. The Comten 3695, at the midrange of the product line, handles up to 512 lines and supports up to eight host processors.

When NCR Comten introduced the 5620 in February 1985, the company broke new ground in communications processor design. A price-and-performance solution for small sites, the 5620 offered all the processing power of systems designed for large networks but in a much smaller package. The Comten 5620XP continues this original concept.

Although the 5620XP is smaller and less expensive than the other Comten systems, it provides identical capabilities, such as application switching, routing, automated dialing, data concentration, polling, and error recovery. Functional as a front-end processor in a small network or as a data concentrator at remote sites in a large network, the 5620XP consists of modular components and, when fully configured, supports up to 64 full- or half-duplex communications lines and one or two host computers. The 5620XP features one to four megabytes of main memory, includes a sealed hard disk for enhanced load/dump and rapid restart/recovery operations, handles both SNA and pre-SNA line products concurrently, and operates virtually unattended.

The 5620XP is transparent to the IBM host and IBM 372X communications processors in a network. Since NCR Comten supports the same protocols and interfaces as IBM, anyone contemplating the purchase of an NCR Comten processor can be sure that it will function within an IBM SNA network.

PRODUCT EVALUATION

As an enhanced version of the Comten 5620, the 5620XP is between 2.2 and 3.7 times more powerful than the earlier version and has more processing power than IBM's 3725, but not as much line capacity. It is designed to reduce network costs through more efficient use of lines, hosts, and terminals. Its small size and efficient power consumption enable it to function in an office environment.

Enhancements offered on the Comten 5620XP allow it to match, and in some cases surpass, the capabilities of the IBM 3720 Network Controller. The 5620XP offers greater line capacity, more memory, and Comten value-added software. NCR Comten's Integrated Protocol Converter (IPC) applications allow users to dynamically access SNA, non-SNA, or non-IBM mainframe applications from asynchronous devices.

The 5620XP offers advantages over statistical multiplexers with which it competes in certain applications. The product provides more extensive application switching and routing functions, polling, more programmability, and an unrestricted choice of communications facilities, including support for X.25 networks and satellites.

In addition, when the 5620XP is used in an SNA network, Comten's Advanced Communication Function/Network Control Program (ACF/NCP) is acknowledged and supported as a Physical Unit Type 4 (PU4) device by management facilities in an IBM host network. In this same situation, statistical multiplexers appear transparent to the network but are not operational with IBM network management facilities.

The Comten 5620XP's capabilities as a remote concentrator makes it popular with users operating a network with Digital Equipment Corporation's VAX systems at remote locations and IBM hosts at a central site. In this environment, there is a need for terminal users on the network to access both the IBM mainframe and a remotely located asynchronous host. IBM had intended that its 3710 Network Controller fill the need for a remote concentrator that could support both synchronous and asynchronous hosts, but when the 3710 failed to meet the need, IBM introduced the 3720. IBM customers have greeted the 3720 with enthusiasm because it handles remote concentration more adequately than the 3710. Some analysts believe that Comten's desire to match and/or exceed the 3720's capabilities served as an impetus for the creation of the 5620XP.

MARKET POSITION

Although many analysts believe that NCR Comten produces a superior communications processor, IBM holds 85 percent of the communications processor market. NCR Comten has about a 5 or 6 percent share, and the remaining 9 or 10 percent is divided among other vendors.

NCR Comten bases its marketing strategy on appealing to typical IBM users by showing them how easy it is to install an NCR Comten communications processor in an SNA network. Many IBM mainframe users, however, hesitate to go with another vendor's processor because they want quick access to the latest software updates. A few years ago, between 18 and 24 months elapsed before Comten offered compatible software. Now, the company has cut the waiting time to less than a year. If users are willing to put up with the delay, they gain greater networking flexibility, multivendor support, better prices, and network management between front ends, independent of the host.

Although IBM dominates the market, NCR Comten remains aggressive. The company continues to introduce new products, most recently the 5655, 5665, and 5675 communications processors, announced in March 1989.

NCR Comten 5620XP Communications Processor

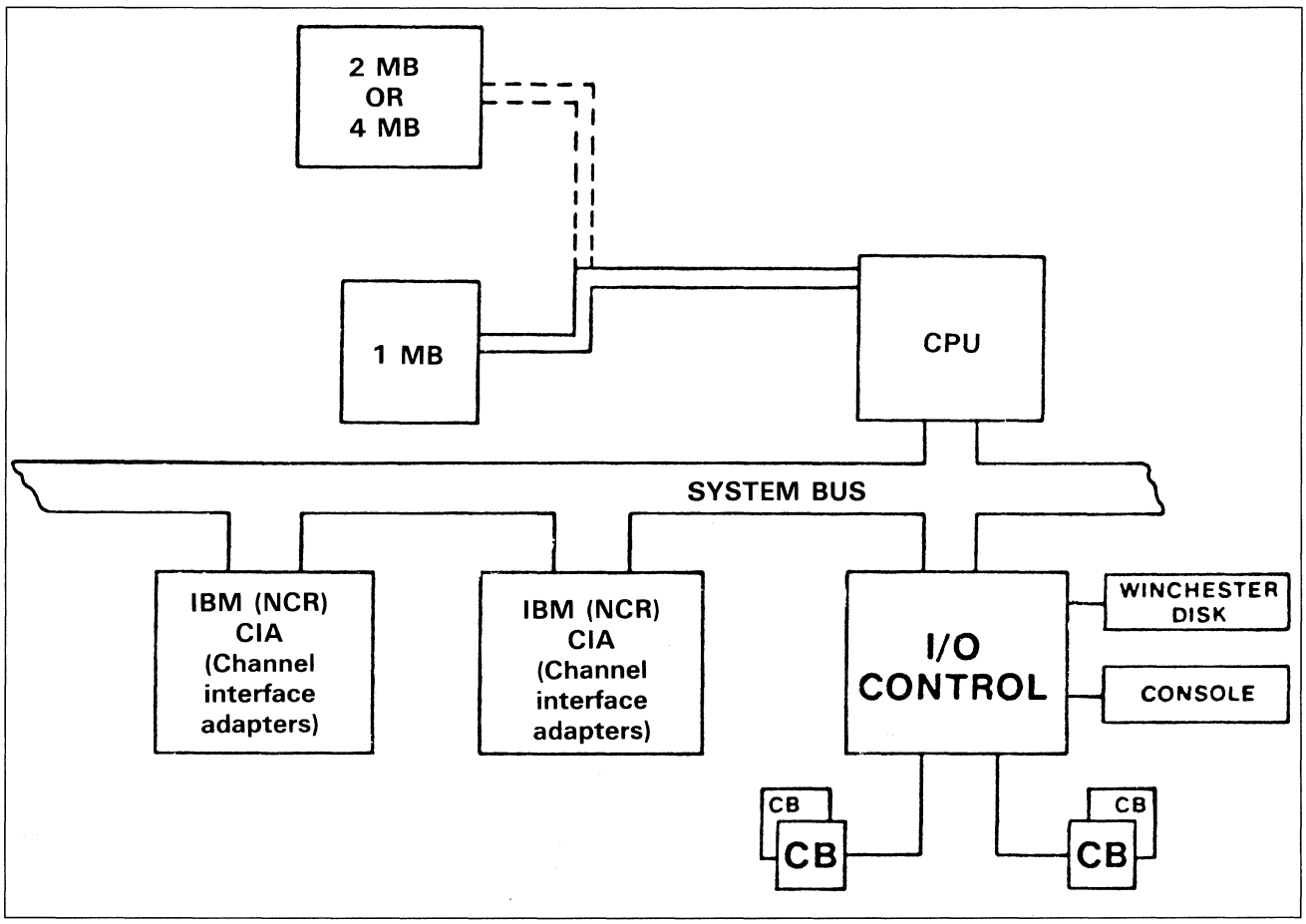


Figure 1. The basic Comten 5620XP consists of a central processing unit (CPU), a channel interface unit, a fixed disk drive, a communications subsystem, and an optional system console.

These systems offer up to 2.5 times the performance of an IBM 3745 and are compatible with the NCR Comten 3695 and 5600 product lines.

NCR Comten places the 5620XP in direct competition with comparable systems in both the communications processor and statistical multiplexer markets. Configured as a front-end processor, the 5620XP competes against the IBM 3720 and Amdahl processors. But when configured as a remote concentrator, the 5620XP competes against sophisticated, high-end, statistical multiplexers sold by AT&T, Codex Corporation, Digital Communications Associates (DCA), Infotron, and Timeplex.

The NCR Comten 5620XP appeals to users with large networks or those who already use Comten equipment, e.g., the federal government. They can use the Comten 5620XP at remote sites without paying a hefty price for full processing capabilities. The compatibility of the Comten processors is also an advantage in a Comten shop.

SPECIFICATIONS

MODEL: 5620XP.
DATE ANNOUNCED: July 1987.
DATE FIRST INSTALLED: July 1987 (32 lines); fourth-quarter 1987 (64 lines).
NUMBER INSTALLED TO DATE: Information not available.
SERVICED BY: NCR Comten.

OVERVIEW

The Comten 5620XP supports up to two host processors and can support up to 64 full-duplex or half-duplex lines in

NCR Comten 5620XP Communications Processor

any of three configurations: as a front-end processor, as a remote concentrator, or as a front-end processor and remote concentrator.

The NCR Comten 5620XP Communications Processor is hardware/software compatible with IBM host processors and with the Comten 3600 Series. The 5620XP functions as a direct replacement for an IBM 370X or 270X Communications Controller. It uses IBM Virtual Telecommunications Access Method (VTAM), Telecommunications Access Method (TCAM), Advanced Communication Function/Telecommunications Access Method (ACF/TCAM), and ACF/VTAM and provides an IBM 270X/370X-compatible interface through a channel interface adapter.

The 5620XP can handle switching, polling, routing, error recovery, automated dialing, multiplexing, and data concentration. Since the 5620XP does not require special computer room conditions, users can install the unit in an office environment. The system runs all of NCR Comten's networking products and supports various terminals and protocols. The 5620XP's modular architecture is based on VLSI technology.

CONFIGURATION

A fully configured 5620XP has a CPU, four communications subsystems, a fixed disk drive, and a channel interface adapter for host connections. Each communications subsystem handles up to 16 communications lines. With four communications subsystems, the 5620XP can support up to 64 full- or half-duplex lines and one or two host computers. The Comten 5620XP channel interface adapter unit supports IBM, IBM-compatible, or NCR hosts and asynchronous, bisynchronous, SDLC, and X.25 line protocols. The fixed disk drive supports rapid restart and recovery capabilities and allows virtually unattended remote operation.

The 5620XP's modular architecture employs Very Large-Scale Integration (VLSI) technology that provides greater reliability, lowers power consumption, and requires less space (smaller footprint).

Users can replace one or two of the 5620XP's four subsystems with a Comten Integrated Protocol Converter (IPC), which converts asynchronous protocol to bisynchronous protocol for accessing IBM 3270 applications from an asynchronous terminal. Comten IPCs also pass through data from asynchronous terminals without protocol conversion so that the terminals can access both bisynchronous and asynchronous applications without additional hardware or software changes. On the older 5620, the IPC option provided 32 additional lines, allowing the system to support up to 64 lines. On the 5620XP, the addition of IPCs increases maximum system capacity to 96 lines.

At sites that do not require host channel attachment, a 5620XP configuration consists of a central processing unit, a communications subsystem, and a fixed disk drive. An optional system console provides the user with centralized or distributed network control. This configuration offers connections for up to 16 full- or half-duplex communications lines.

The Comten 5620XP offers full-scale communications processor capabilities and acts as a front-end processor in a small network or as a remote data concentrator in a larger network. When used as a nodal processor in an SNA network environment, the 5620XP acts like an SNA PU4 device via standard SNA trunk protocols. In a mixed SNA and non-SNA environment, the 5620XP can attach to the network via NCR Comten's proprietary Comten Network System (CNS) procedures.

The communications subsystem is modular, supporting up to four communications base cabinets that hold up to 16 communications lines each. It uses proprietary VLSI technology and is fully programmable. The subsystem uses two different types of character processors for various line speeds: a multiplexing character processor for one to eight lines transmitting data at 19.2K bps to 50 bps; and a higher speed processor supporting one line operating at 19.2K bps to 64K bps.

PROCESSING COMPONENTS

Based on the 32-bit NCR 32 microprogrammable processor chip, the CPU of the 5620XP performs I/O control, makes use of proprietary VLSI technology to assist interrupt processing, and includes sixteen 32-bit general-purpose registers and sixteen 32-bit control registers. The processor executes a set of 101 instructions, 54 in IBM S/370 format. The system uses 256K-bit memory chips, and memory cycle time is 200 nanoseconds. Main storage in the processor is 1M byte, expandable to 2M or 4M bytes.

The communications subsystem is fully programmable for SDLC, HDLC, Bisync, Start/Stop, and ECA protocols.

Program loading occurs from an attached disk drive, from a host through a channel interface adapter, or from a remote system through a communications link. Power-up or operator reset initiates self-test routines; a displayed error code indicates a failing board and the type of error. All domestic installations require a disk subsystem for loading software modules.

The NCR channel interface adapter, which is Motorola 68000 based, contains two 14-by-21 logic boards, direct access to 5620XP memory, and a standard NCR 16MHz bit-serial-link channel. The NCR adapter provides the interface to an NCR IOSS bit-serial-link channel for an NCR V-8000 host computer.

NCR Comten 5620XP Communications Processor

The NCR 32-based IBM channel interface adapter, microprogrammed to handle the channel adapter function, serves as the interface to a standard IBM selector or byte multiplexer or block multiplexer CPU channel. The adapter contains two 14-by-21 logic boards, has direct access to 5620XP memory, uses one control unit position on the IBM channel, and can support from 1 to 64 addresses.

Host Channel interfaces support one or two host computers in various combinations of the following models: IBM 360/370, 303X, 308X, and 43XX and compatible host processors or NCR 8500/8600 VRX host processors.

TRANSMISSION SPECIFICATIONS

The Comten 5620XP attaches to the network through NCR Comten's proprietary CNS procedures or through SNA protocols. This network trunking program allows the Comten 5620XP to transmit asynchronous, bisynchronous, and SDLC traffic simultaneously over terrestrial lines, microwave links, or satellite links. CNS3, a CNS procedure, enables a concentration of data from multiple terminals at remote sites to be transmitted over a single high-speed trunk, which can be terrestrial, microwave, or satellite link. This facility runs under EP4 Release 1 or higher, NCP Release 3 or higher, or ACF/NCP2 Release 1 or higher. Bit- or byte-oriented protocols and up to 1,024 logical lines are supported. These protocols, transparent to the terminal user and host, accommodate remote processing and a variety of network configurations.

The system can accept individual line speeds up to 64K bps. An automatic baud rate detection (ABRD) capability operates at speeds up to 19.2K bps. ABRD defines the speed and code sets of transmitting asynchronous terminals at the time of connection.

The 5620XP supports the following communications interfaces: RS-232-C/V.24, RS-449/-422/-423, MIL-STD 188-114, CCITT V.35, AT&T 303C, CCITT X.21/X.21 bis, and NCR DLC (in-house). The system supports asynchronous, bisynchronous, HDLC, SDLC, and Start/Stop protocols.

SOFTWARE

The 5620XP supports Communications Operating System 2 (COS2) communications and network control software, which operates on Comten 3600 Series and 5600 Series systems. COS2 network control modules incorporate such features as application selection, data switching, and data multiplexing. COS2 also supports trunking between nodes in a network, automatic baud rate detection (ABRD), and terminal on-site-initiated line switching.

COS2-based networking software consists of ACF/NCP, Subarea Routing Manager (SRM), Multiple Access Facility (MAF), MAF with Remote Host Option (MAF/RHO), Communications Networking System (CNS), and the Comten X.25 Interface to Public Data Networks. NCR Comten's control and management software includes the Communications Alerting Facility (CAF) and Network Support Services (NSS). Comten's Communications Access Method (CAM) is used for integrated network applications. Users can load programs from an attached disk drive, by host channel, or remotely through communications lines.

Comten's CNS is a network trunking program that allows the 5620XP to send asynchronous, bisynchronous, and SDLC traffic concurrently over terrestrial lines or microwave or satellite links. The Comten X.25 software allows users to access X.25 packet switched networks worldwide. This package also permits CNS traffic to be sent over an X.25 network, allowing the use of X.25 circuits for peak traffic loads or as a backup circuit if a leased line fails.

The Comten X.21 Interface is functionally compatible with IBM's X.21 support offering. The X.21 interfaces, supported under the Comten COS2 operating system, can coreside with other COS2-based products. This support for X.21 circuit switched data networks has been implemented through the Comten Advanced Communications Function/Network Control Program 3 (ACF/NCP3), Comten Communications Networking System 3 (CNS3), and Comten X.25 Interface to Public Data Networks.

PHYSICAL SPECIFICATIONS

The 5620XP is 8.5 inches high, 17.5 inches wide, and 33.0 inches deep. When fully configured, the system weighs 350 pounds.

PRICING

The NCR Comten 5620XP ranges in price from $22,000 to $95,000, depending on configuration. □

NCR Comten 5620XP Communications Processor

datapro ANALYSIS

UPDATE: *Continuing its aggressive approach in the communications processor market, NCR Comten offers yet another model, the Comten 5620XP. This new product offers more power and functionality than the 5620, the previous version. NCR Comten, while no longer marketing the Comten 5620, continues to support the installed base of Comten 5620s. Users have the option of upgrading to the Comten 5620XP.*

As this report was being prepared for publication, NCR Comten announced that it was withdrawing from the modem and private X.25 network equipment markets to refocus its resources on communications processors and value-added software. The additional resources gained through this strategy are intended to help the company achieve higher productivity in its major business—developing and marketing communications processors.

For almost 20 years, NCR Comten, first as an independent company and then as a subsidiary of NCR Corporation, has specialized in data communications systems. The company develops, manufactures, markets, and services the various computer communications processing systems that comprise NCR Comten's major product line. Two major NCR Comten communications processor products are the 3600 Series, which includes the 3690 and 3695, and the 5600 Series, which incorporates the 5620XP and the 5660. Both the 3600 and 5600 product families are compatible with IBM equipment and major common-carrier services. They are, in fact, IBM's major competition in the communications processor market.

The 5620XP, the subject of this report, is the entry-level product in Comten's processor family, but it offers the same basic capabilities as the larger models. The Comten 5620XP, designed for smaller sites where a larger communications processor is not justified, is competitively priced. Since the 5620XP is fully software compatible with other Comten communications processors, it is upgradable to a larger model as needs indicate. The Comten 3690 and Comten 3695, at the higher end of the product line, handle up to 512 lines and support up to eight host processors. The Comten 5660, at the very high end of the company's communications processor family, has three times more power than any other communications processor currently on the market. It also handles larger amounts of data than competing products and has increased processing power for T1 traffic. The Comten 5660 supports up to 1,024 full-duplex communications lines and up to eight IBM or IBM-compatible mainframes running concurrently. (For a complete look at the Comten 5660, see Report C13-656-301 in this service.)

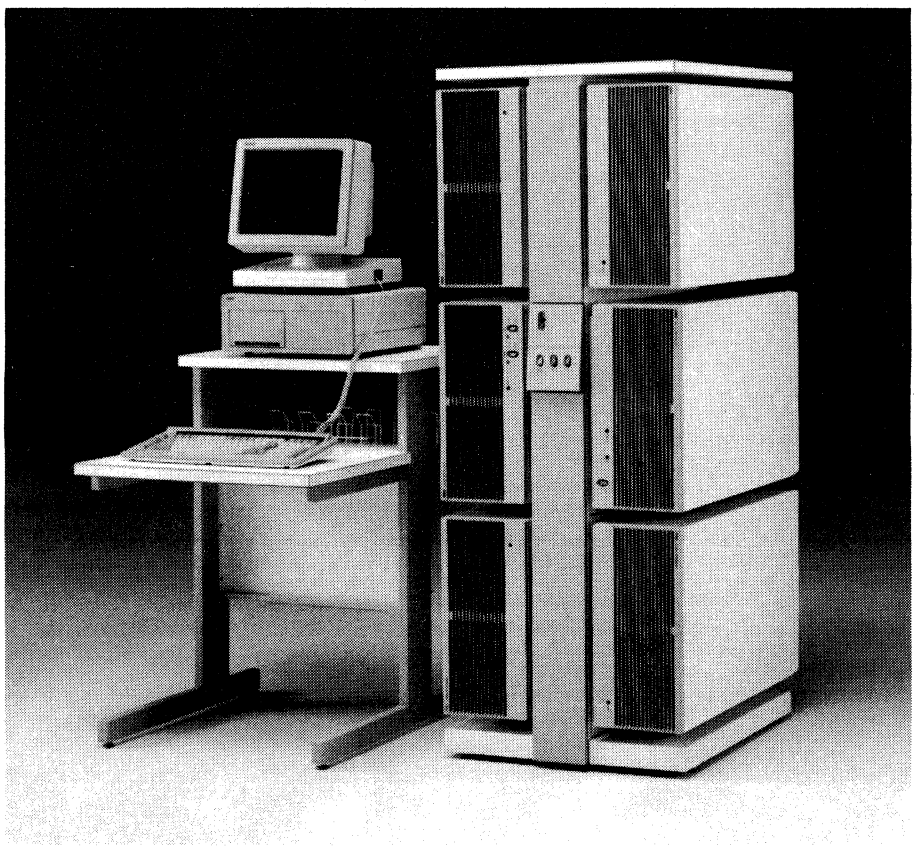
VENDOR: NCR Comten, Inc., 2700 Snelling Avenue North, St. Paul, Minnesota 55113. Telephone (612) 638-7777.
CANADIAN DISTRIBUTION: NCR Comten, 515 Consumers Road, Suite 100, Willowdale, Ontario M2J 4Z2. Telephone (416) 496-1300.
MODEL: NCR Comten 5620XP.
FUNCTION: Front-end processor, remote concentrator, or both.
HOST COMPUTERS SUPPORTED: IBM and compatible mainframes, NCR mainframes.
ARCHITECTURE SUPPORTED: SNA, pre-SNA, X.25, proprietary trunk protocol.
OPERATING SOFTWARE: Communications Operating System 2 (COS2).
COMPETITION: Amdahl, IBM (communications processors vendors); AT&T, Codex, DCA, Infotron, Timeplex (high-end statistical, switching multiplexer vendors).
PRICING: Depends upon configuration.

REPORT HIGHLIGHTS **PAGE**

With the introduction of the 5620 in February 1985, NCR Comten broke new ground in the communications processor arena. The company designed the original 5620 as a price-and-performance solution for small sites; it offered all of the processing power of systems designed for large networks in a much smaller package. With the introduction of the Comten 5620XP, NCR Comten continues the original concept of preserving or expanding processing power, but reduces the size of the product. The company markets the new 5620XP as not only an improved product, but also a faster one.

The NCR Comten 5620XP Communications Processor is the second model in a new generation of communications processors from the company. The 5620XP is smaller and less expensive than the other Comten systems, but pro-

NCR Comten 5620XP Communications Processor



NCR Comten's 5620XP communications processor is 2.2 to 3.7 times more powerful than the earlier Comten 5620, depending on software configuration. It supports up to 64 communications lines using asynchronous, bisynchronous, SDLC, or X.25 protocols. The Comten 5620XP can be used in both SNA and non-SNA network configurations.

vides identical capabilities, such as application switching, routing, automated dialing, data concentration, polling, and error recovery. Functional as a front-end processor in a small network or as a data concentrator at remote sites in a large network, the 5620XP consists of a set of modular components that, when fully configured, support up to 64 full- or half-duplex communications lines and one or two host computers. The 5620 offers 1 to 4 megabytes of main memory, contains a sealed hard disk for enhanced load/dump and rapid restart/recovery capabilities, handles both SNA and pre-SNA line products concurrently, and operates virtually unattended.

A fully configured Comten 5620XP incorporates six modules mounted on a stand, a system console, and a fixed disk drive. The six modules include an enhanced central processing unit (CPU) that is 2.2 to 3.7 times more powerful than its predecessor, a channel interface adapter (CIA) unit for connecting one or two hosts, and four communications subsystems. Each subsystem handles up to 16 communications lines for a total line connectivity of 64 lines that support asynchronous, bisynchronous, SDLC, or X.25 protocols. This represents twice the line capacity available on the older 5620. The 5620XP's modular architecture employs Very Large-Scale Integration (VLSI) technology that provides greater reliability, lowers power consumption, and requires less space (smaller footprint). These enhancements make the 5620XP a more appropriate system for offices, where large size and hefty power consumption are major problems.

One or two of the 5620XP's four subsystems is replaceable with a Comten Integrated Protocol Converter (IPC), used to convert asynchronous protocol to bisynchronous protocol for accessing IBM 3270 applications from an asynchronous terminal. Comten IPCs also pass through data from asynchronous terminals without protocol conversion so that the terminals can access both bisynchronous and asynchronous applications without additional hardware or software changes. On the older 5620, the IPC option provided 32 additional lines, allowing the system to support up to 64 lines. On the 5620XP, the addition of IPCs increases maximum system support to 96 lines.

The NCR Comten 5620XP Communications Processor is hardware/software compatible with IBM host processors and with the Comten 3600 Series. The 5620XP functions as a direct replacement for an IBM 370X or 270X Communications Controller. It utilizes IBM Virtual Telecommunications Access Method (VTAM), Telecommunications Access Method (TCAM), Advanced Communication Function/Telecommunications Access Method (ACF/TCAM), and ACF/VTAM and provides an IBM 270X/370X-compatible interface through a channel interface adapter.

The 5620XP supports Communications Operating System 2 (COS2) communications and network control software, which operates on both Comten 3600 Series and 5600 Series systems. COS2 software includes a complete

NCR Comten 5620XP Communications Processor

TABLE 1. NCR COMTEN AND IBM ACF/NCP COMPARISON CHART

	NCR Comten ACF/NCP	IBM ACF/NCP		
	V4.0	V3	V4R1	V4R2
FEATURE				
Switched 3270 BSC	Yes	No	No	No
ENA	*(1)* Yes	No	Yes	Yes
—VM Support	Yes	No	No	Yes
SNI	*(2)* Yes	Yes	Yes	Yes
—VM Support	*(2)* Yes	No	No	Yes
Token-Ring (TR) Interconnection	No	No	No	Yes
19.2 Async Support	Yes	Yes	Yes	Yes
XRF Support	No	No	Yes	Yes
Modulo 128 for INN Links	Yes	Yes	Yes	Yes
OPERATIONAL				
Definition of TG Threshold	Yes	Yes	Yes	Yes
Forced Deactivation	Yes	Yes	Yes	Yes
Dynamic Threshold Alteration for SNA and certain BSC device	No	No	Yes	Yes
Port Swapping	*(2)* Yes	Yes	Yes	Yes
Enhanced 3710 Support	No	No	Yes	Yes
Auto Scanner Re-IML for 3720	*(3)* NA	No	Yes	Yes
Switched Subarea Dial Support	No	No	No	Yes
Multipoint Subarea Support	No	No	No	Yes
NETWORK MANAGEMENT				
NLDM Session Awareness —ROUTE Test	Yes	Yes	Yes	Yes
NLDM Port Mapping	Yes	Yes	Yes	Yes
NLDM SNI Session Data	No	No	Yes	Yes
RECMS Cause Code	No	No	Yes	Yes
LPDA Enhancements				
—Multiplex Link and Tail Circuit	Yes	Yes	Yes	Yes
—Receive Signal	Yes	Yes	Yes	Yes
—Remote Self Test	Yes	Yes	Yes	Yes
—LPDA-2 for 586X Modems	No	No	No	Yes
—5812 Modem Support	No	No	No	Yes
—Dynamic LPDA Parameters (Display, Alter)	No	No	Yes	Yes
Virtual Route and Buffer Utilization Status	No	No	No	Yes

(1) Separate feature.
(2) Comparable feature is available.
(3) Not applicable.

OBJECTIVE: NCR Comten plans to continue its policy of providing full compatibility with IBM by offering the remaining features of IBM's ACF/NCP Versions 3 and 4, such as SNA Network Interconnect (SNI) and Enhanced IBM 3710 Support, in future releases of Comten ACF/NCP.

Source: NCR Comten, Inc., 1987.

array of network control modules that incorporate a number of features, including application selection, data switching, and data multiplexing. It also supports trunking between nodes in a network, as well as special features such as automatic baud rate detection (ABRD) and terminal on-site-initiated line switching. Special software support for X.25 and an interface to public packet switched networks are also available on the system.

NCR Comten's marketing strategy is to make it easy for a typical IBM user to install an NCR Comten communications processor in an SNA network. NCR Comten also offers value-added features that are not found in the most recent IBM releases. To maintain compatibility with IBM's software releases, such as Advanced Communication Function/Network Control Program (ACF/NCP), NCR Comten offers a version that is within one release of the IBM version. Table 1 compares the features, operational factors, and network management capabilities of the current IBM and Comten ACF/NCP releases.

The 5620XP is transparent to the IBM host and IBM 372X Communications Processors in a network. NCR Comten also supports the same protocols and interfaces as IBM. Therefore, those contemplating the purchase of an NCR Comten processor are assured that it will be fully operational within an IBM SNA network.

NCR Comten 5620XP Communications Processor

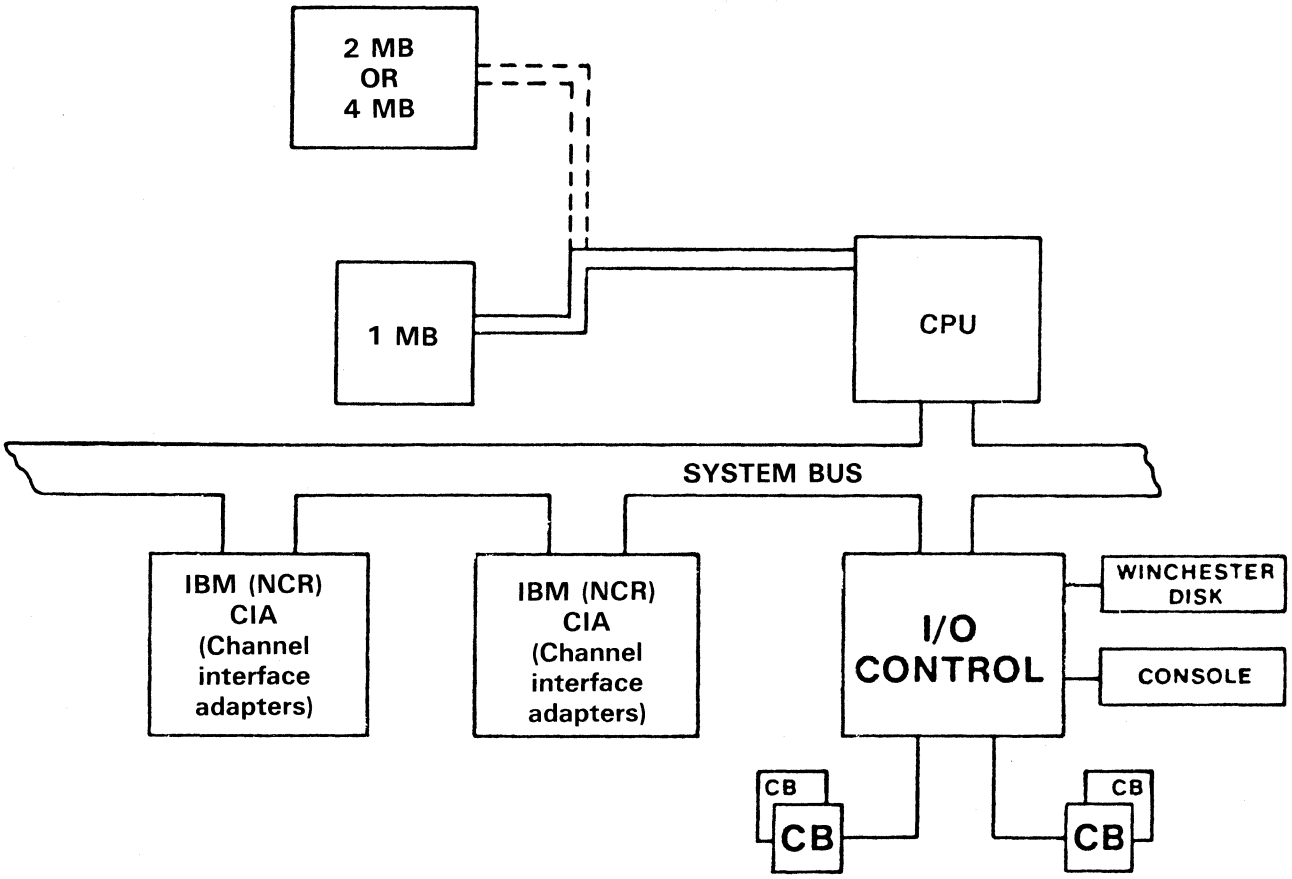


Figure 1. The basic Comten 5620XP is made up of a central processing unit (CPU), a channel interface unit, a fixed disk drive, a communications subsystem, and an optional system console.

PRODUCT EVALUATION

NCR Comten has been offering an alternative to IBM communications processors since the early 1970s. Generally, the company has succeeded in giving IBM customers more functionality for less money in comparable products. The lag in Comten software releases behind the IBM releases is understandable and does not appear to disturb customers.

The Comten 5620XP is an enhanced version of the Comten 5620, which was introduced in February 1985. The 5620XP is between 2.2 and 3.7 times more powerful than the earlier version and has more processing power than IBM's 3725, but not as much line capacity. It is designed to reduce network costs through more efficient utilization of lines, hosts, and terminals. NCR Comten also designed the 5620XP for the office environment. It is smaller and requires less power; therefore, it does not have to be placed in a computer room.

Enhancements offered on the Comten 5620XP allow it to match, and in some cases surpass, capabilities of the IBM 3720 Network Controller. The Comten 5620XP offers greater line capacity, more memory, and Comten value-added software, and it does not require a mainframe computer's special operating environment. The IPC applications, unlike the 3720, let users dynamically access SNA, non-SNA, or non-IBM mainframe applications from asynchronous devices.

The 5620XP also offers certain advantages over statistical multiplexers with which it competes in certain applications. Compared to a statistical multiplexer, the 5620XP provides more extensive application switching and routing functions, polling, more programmability, and an unrestricted choice of communications facilities, including support for X.25 networks and satellites.

In addition, when the 5620XP is used in an SNA network, Comten ACF/NCP is acknowledged and supported as a Physical Unit Type 4 (PU4) device by management facilities in an IBM host network. In this same situation, statistical multiplexers appear transparent to the network, but are not operational with IBM network management facilities.

The Comten 5620XP's operation as a remote concentrator makes it popular with end users operating a network with

NCR Comten 5620XP Communications Processor

Digital Equipment Corporation VAX systems at remote locations and IBM hosts at the central site. In this application, there is a need for a terminal user located anywhere in the network to access both the IBM mainframe and a remotely located asynchronous host. IBM had hoped that its 3710 Network Controller would fill the need for a remote concentrator that could support both synchronous and asynchronous hosts, but when it failed to do so, the 3720 was introduced. IBM customers have apparently greeted the 3720 "with open arms," as it addresses the need for remote concentration more adequately than its predecessor, the 3710. Some analysts believe that Comten's desire to match and/or exceed the 3720's capabilities was a principal reason for the 5620XP's creation.

After studying the communications processor market, NCR Comten has identified a number of reasons why customers select Comten products over IBM's. First, and most importantly, Comten processors are fully compatible with competing IBM products, therefore operating transparently within an SNA network. They offer enhanced performance, more processing power, and a greater number of connections than comparable IBM systems, as well as more diverse end points, additional configuration and planning tools, and connectivity to a variety of vendors' mainframes and terminals. Fully aware of the advantages of competing equipment over its own, IBM continues to introduce products that facilitate network management, configuration planning and implementation, and connectivity.

MARKET POSITION

NCR Comten has been in the IBM-compatible business since the early 1970s and, after IBM, is the leading vendor of communications processors for the IBM mainframe environment. The key words in the previous sentence are "after IBM." Although many analysts feel that NCR Comten produces a superior communications processor, it is still a "blue" world in which IBM holds 85 percent of the communications processor market. NCR Comten has about a 5 or 6 percent share with the remaining 9 or 10 percent divided among the other vendors.

Many IBM mainframe users are hesitant to go with another vendor's processor because they want quick access to the latest software updates. The use of any non-IBM processor means at least a one-release delay. Actually, a few years ago it took between 18 and 24 months for Comten to offer compatible software. Now, the company has cut the waiting time to less than a year. If users are willing to put up with the delay, the advantages are greater networking flexibility, multivendor support, better prices, and network management between front ends, independent of the host.

Although the market statistics appear overwhelming, NCR Comten remains aggressive in the communications processor market. In May 1986, NCR Comten broke new ground with the introduction of the Comten 5660, the most powerful communications processor on the market today. That same year also saw new models of the 3690 introduced along with the 3695 communications processor. This year the company continued its introduction of new products with the Comten 5620XP.

NCR Comten has long held a reputation for integrity in its product offerings—users have come to expect solid, dependable, and easily expanded systems. The Comten 5620XP continues that reputation. Currently, NCR Comten processors interconnect over 400,000 terminals and host computers in geographically dispersed private and public data communications networks throughout the world.

As a basic marketing strategy, NCR Comten places the 5620XP in direct competition with comparable systems in both the communications processor and statistical multiplexer markets. When configured as a front-end processor, the 5620XP competes against the IBM 3720 and Amdahl processors. But when configured as a remote concentrator, the 5620XP competes against sophisticated, high-end, statistical multiplexers sold by AT&T, Codex Corporation, Digital Communications Associates, Infotron, and Timeplex.

The NCR Comten 5620XP appeals to users with large networks or those who already use Comten equipment, e.g., the federal government. They can use the Comten 5620XP at remote sites without paying a hefty price for full processing capabilities. The compatibility of the Comten processors is also an advantage in a Comten shop.

SPECIFICATIONS

MODEL: 5620XP.

DATE ANNOUNCED: July 1987 (5620 announced February 1985).

DATE FIRST INSTALLED: July 1987 (32 lines); fourth-quarter 1987 (64 lines).

NUMBER INSTALLED TO DATE: Information not available.

DISTRIBUTION: NCR Comten.

MODELS

The Comten 5620XP is NCR Comten's low-end, reasonably priced communications processor that supports up to

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two host processors. The processor currently can support up to 32 full-duplex or half-duplex lines in any of three configurations, including operation as a front-end processor, remote concentrator, or both. According to the vendor, support for 64 lines will be available in the fourth quarter of 1987.

The 5620XP can be used for application switching, polling, routing, error recovery, automated dialing, multiplexing, and data concentration. Special computer room conditions are not needed for the Comten 5620XP, so users can set up the unit in an office environment. The system runs all of NCR Comten's networking products and supports various terminals and protocols. The 5620XP's architecture is modular and uses VLSI technology.

CONFIGURATION

A 5620XP configuration, at sites that do not need host channel attachment, includes a central processing unit, a communications subsystem, and a fixed disk drive. An optional system console provides the user with centralized or distributed network control. This configuration offers connections for up to 16 full- or half-duplex communications lines.

A fully configured 5620XP has a CPU, four communications subsystems, a fixed disk drive, and a channel interface adapter for host connections. Each communications subsystem handles up to 16 communications lines. With four communications subsystems, the 5620XP can support up to 64 full- or half-duplex communications lines and one or two host computers. The Comten 5620XP channel interface adapter unit supports IBM, IBM-compatible, or NCR hosts and asynchronous, bisynchronous, and SDLC line protocols. The fixed disk drive offers rapid restart and recovery capabilities and allows virtually unattended remote operation.

The Comten 5620XP offers full-scale communications processor capabilities and acts as a front-end processor in a small network or as a remote data concentrator in a larger network. When used as a nodal processor in an SNA network environment, the 5620XP acts like an SNA PU4 device via standard SNA trunk protocols. If it is a mixed SNA and non-SNA environment, the 5620XP can attach to the network via NCR Comten's proprietary Comten Network System (CNS) procedures.

The communications subsystem is modular, supporting up to four communications base cabinets that hold up to 16 communications lines each. It uses proprietary VLSI technology and is fully programmable. The subsystem uses two different types of character processors for various line speeds: a multiplexing character processor is used for one to eight lines transmitting data from 50 bps through 19.2K bps; a higher speed processor supports one line operating from 19.2K bps through 64K bps.

Processing Components

The 5620XP's CPU, based on the 32-bit NCR 32 microprogrammable processor chip, has I/O control, uses proprietary VLSI technology to assist interrupt processing, and includes sixteen 32-bit general-purpose registers and sixteen 32-bit control registers. TTL technology implements system logic. The processor executes 101 instructions, 54 in IBM S/370 format. The system uses 256K-bit memory chips, and memory cycle time is 200 nanoseconds. Main storage in the processor is 1M bytes, expandable to 2M or 4M bytes.

The communications subsystem uses proprietary VLSI technology, provides 1 to 16 lines per cabinet, and is fully programmable for SDLC, HDLC, Bisync, Start/Stop, and ECA protocols. The communications subsystem offers two character processor types for different line speeds: a multiplexing character processor for one to eight lines that transmit data from 50 bps through 19.2K bps, and a higher speed processor for one line operating at 19.2K bps through 64K bps.

Program loading is from an attached disk drive, from a host through a channel interface adapter, or from a remote system through a communications link. Power-up or operator reset initiates self-test routines; a displayed error code indicates a failing board and the type of error that is causing the failure. All domestic installations require a disk subsystem to load software modules.

Connection to Host and Peripherals

The NCR channel interface adapter is Motorola 68000 based. It contains two 14-by-21 logic boards, direct access to 5620XP memory, and a standard NCR 16MHz bit-serial-link channel. The NCR adapter provides the interface to an NCR IOSS bit-serial-link channel for a V-8000 NCR host computer.

The NCR 32-based IBM channel interface adapter, microprogrammed to handle the channel adapter function, is the interface to a standard IBM selector or byte multiplexer or block multiplexer CPU channel. The adapter contains two 14-by-21 logic boards, has direct access to 5620XP memory, uses one control-unit position on the IBM channel, and can support from 1 to 64 addresses.

Host Channel interfaces support one or two host computers in various combinations of the following models: IBM 360/370, 303X, 308X, 43XX, and compatible host processors or NCR 8500/8600 VRX host processors.

Network Connection

The Comten 5620XP attaches to the network through NCR Comten's proprietary CNS procedures or through SNA protocols. This network trunking program allows the

NCR Comten 5620XP Communications Processor

Comten 5620XP to transmit asynchronous, bisynchronous, and SDLC traffic simultaneously over terrestrial lines, microwave links, or satellite links. CNS3, a CNS procedure, allows concentration of data from multiple terminals at remote sites for transmission over a single high-speed trunk, which can be terrestrial, microwave, or satellite links. This facility runs under EP4 Release 1 or higher, NCP Release 3 or higher, or ACF/NCP2 Release 1 or higher. Bit- or byte-oriented protocols and up to 1,024 logical lines are supported. These protocols, transparent to the terminal user and host, allow remote processing and a variety of network configurations.

TRANSMISSION SPECIFICATIONS

The system can accept individual line speeds up to 64K bps. Automatic baud rate detection (ABRD) capability is available up to 19.2K bps. ABRD defines the speed and code set of transmitting asynchronous terminals at the time of connection.

The 5620XP supports the following communications interfaces: RS-232-C/V.24, RS-449/-422/-423, MIL-STD 188-114, CCITT V.35, AT&T 303C, CCITT X.21/X.21 bis, and NCR DLC (in-house). The system supports asynchronous, bisynchronous, HDLC, SDLC, and Start/Stop protocols.

SOFTWARE

The 5620XP system runs on NCR Comten's COS2-based networking software, which consists of ACF/NCP, Subarea Routing Manager (SRM), Multiple Access Facility (MAF), MAF with Remote Host Option (MAF/RHO), Communications Networking System (CNS), and the Comten X.25 Interface to Public Data Networks. NCR Comten's control and management software includes the Communications Alerting Facility (CAF) and Network Support Services (NSS). Comten's Communications Access Method (CAM) is used for integrated network applications. Programs can be loaded from an attached disk drive, by host channel, or remotely through communications lines.

Comten's CNS is a network trunking program that allows the 5620XP to send asynchronous, bisynchronous, and SDLC traffic concurrently over terrestrial lines or microwave or satellite links. The Comten X.25 software allows users to access X.25 packet switched networks worldwide. This package also permits CNS traffic to be sent over an X.25 network, allowing the use of X.25 circuits for peak traffic loads or as a backup circuit if a leased line fails.

The Comten X.21 Interface, which conforms to CCITT recommendation X.21, is functionally compatible with IBM's X.21 support offering. The X.21 interfaces, supported under the Comten COS2 operating system, can coreside with other COS2-based products. This support for X.21 circuit switched data networks has been implemented through the Comten Advanced Communications Function/Network Control Program 3 (ACF/NCP3), Comten Communications Networking System 3 (CNS3), and Comten X.25 Interface to Public Data Networks.

PHYSICAL SPECIFICATIONS

The 5620XP is 8.5 inches high, 17.5 inches wide, and 33 inches deep. When fully configured, the system weighs 350 pounds.

PRICING

The NCR Comten 5620XP ranges in price from $22,000 to $95,000, depending on configuration options chosen. Pricing for the different features and options available on the Comten 5620XP are shown in the following table. Software pricing for the NCR Comten 5620XP is the same as Comten 3600 software pricing (see Report C13-656-101).

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EQUIPMENT PRICES

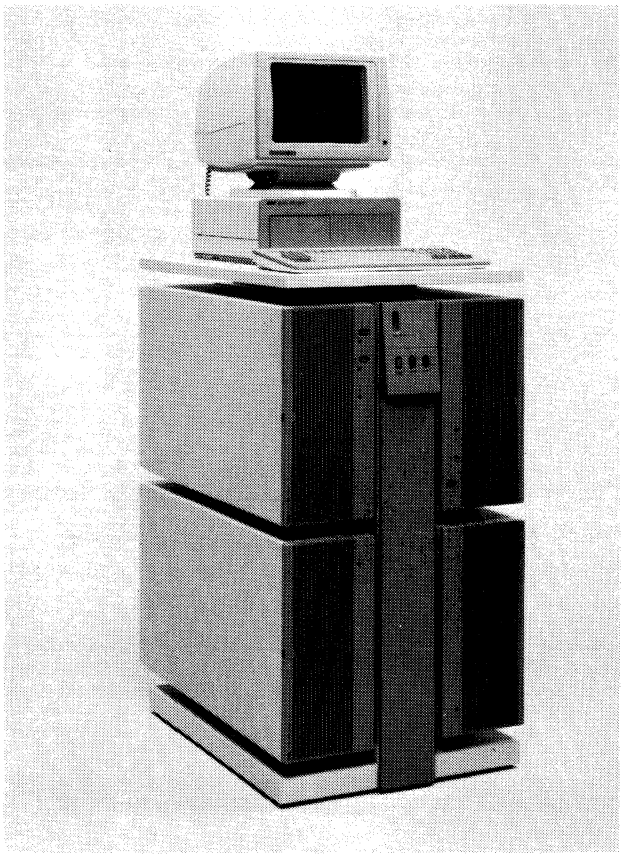
		Purchase Price ($)
MODELS		
T-5620-B1	Processor with 1MB storage	16,000
F-1169-A1	1MB storage expansion	3,000
F-1169-B1	2MB storage expansion	6,000
F-1169-C1	3MB storage expansion	9,000
T-3031-A2	CIA cabinet	2,500
F-3040-A2	Channel I/F adapter, IBM	6,000
T-8054-A2	System stand	2,000
F-1087-A2	Remote power control (RPO)	400
F-8053-A1	Work surface	100
T-4030-A1	System console	1,200
T-2040-A2	Communications cabinet	1,500
T-2060-A2	Communications base, single	350
T-2060-B2	Communications base, dual	400
T-2060-C2	Communications base, quad	425
F-2237-A2	Character processor, low speed	725
F-2237-B2	Character processor, low speed w/RIL	625
F-2238-A2	Character processor, medium speed	750
F-2238-B2	Character processor, medium speed w/RIL	850
F-2240-A2	Processor interface	500
F-2241-A1	Line interface, 2 line, RS-232-C	500
F-2242-A1	Line interface, 2 line, RS-449/-423	1,300
F-2243-A2	Line interface, 2 line, X.21	615
F-2244-BX	Line interface, 2 line, MIL-STD 188-114	600
F-2245-BX	Line interface, 1 line, MIL-STD 188-114	800
F-2246-A2	Line interface, 1 line, V.35/DDS	575
F-2247-A2	Line interface, 1 line, AT&T 303	600
F-2248-A2	Line interface, 1 line, RS-449/-422	1,500
F-2249-A2	Line interface, 1 line, NCR DLC	665
F-2250-A2	Line interface, 1 line, X.21	1,300
T-7360-A1	10MB disk subsystem	3,000
T-4032-A1	Printer	780
F-4040-A1	Buffer memory	265
F-5621-A1	32-line system expansion	11,000 □

NCR Comten 5620 Communications Processor

MANAGEMENT SUMMARY

NCR Comten, a subsidiary of NCR Corporation, develops, manufactures, markets, and services various computer communications processing systems and SNA-compatible diagnostic modems. The company has been specializing in data communications systems since 1968. Their main area of development is in the communications processor market. Their systems are designed to be compatible with IBM and major common carrier services. NCR Comten's 3600 Series of communications processors offers the 3650 and the 3690. This series is one of the main contenders in the IBM-compatible communications processor marketplace. In February 1985, NCR Comten broke new ground with the introduction of the Comten 5620 Communications Processor. This was designed as a price and performance solution for small sites, without having to give up any of the capabilities offered by NCR Comten's larger communications processors.

The NCR Comten 5620 Communications Processor is hardware/software compatible with IBM host processors; it is the first of a new series of communications processors that are compatible with the 3600 Series. The 5620 can ➢



NCR Comten's 5620 Communications Processor is the first member of the company's new generation of communications processors. The 5620 provides the same capabilities as Comten's larger models, the 3650 and the 3690.

The NCR Comten 5620 is designed to handle application switching, polling, switching, error recovery, automated dialing, and multiplexing for up to 32 lines. The Comten 5620 may operate in a dual mode, as both a front-end processor for a local host and as a remote concentrator in a large network. The communications processor features modular architecture and uses VLSI technology for reliability, low power usage, and a small footprint. The Comten 5620 offers all the networking capabilities of NCR Comten's larger communications processors, but at a lower price.

FUNCTION: Front-end processor, remote concentrator, or both.
HOST COMPUTERS SUPPORTED: IBM and compatible mainframes, NCR mainframes.
ARCHITECTURE SUPPORTED: SNA, pre-SNA, X.25, proprietary trunk protocol.
OPERATING SOFTWARE: Communications Operating System 2 (COS2).
COMPETITION: Amdahl, IBM (Communications processors vendors); AT&T Information Systems, Codex, DCA, Infotron, Timeplex (High-end statistical, switching multiplexer vendors).
PRICE: Depends upon configuration.

CHARACTERISTICS

VENDOR: NCR Comten, Inc., 2700 Snelling Avenue North, St. Paul, MN 55113. Telephone (612) 638-7777.

DATE OF ANNOUNCEMENT: February 1985.

DATE OF FIRST DELIVERY: November 1985.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: NCR Comten.

MODELS

The Comten 5620 is a small-scale, reasonably priced communications processor that will support up to two host processors. The processor can support up to 32 full-duplex or half-duplex lines in any of three configurations, including front-end processor, remote concentrator, or both.

The 5620 can be used for application switching, polling, routing, error recovery, automated dialing, multiplexing, and data concentration. Special computer room conditions are not needed for the Comten 5620, so users can set up the unit in the office environment. The system runs all of NCR Comten's networking products and supports various terminals and protocols. The architecture of the 5620 is modular in nature and uses VLSI technology. ➢

NCR Comten 5620 Communications Processor

function as a direct replacement for the IBM 370X or 270X Communications Controllers. It can utilize the IBM VTAM, TCAM, ACF/VTAM, and ACF/TCAM access methods and provide an IBM 270X/370X-compatible interface with a channel interface adapter. Up to two host processors can be interconnected.

Communications and network control software includes all the COS2 software available for the Comten 3600 Series of communications software. That software includes a complete array of network control modules that incorporate such features as application selection, data switching, and data multiplexing. It also supports trunking between nodes in a network, as well as special features such as Automatic Baud Rate Detection and terminal on-site initiated line switching. There is also special software support for X.25 with an interface to public packet switched networks.

The NCR Comten 5620 Communications Processor is smaller and less expensive than the other Comten communications processors, but can provide the same capabilities such as application switching, routing, automated dialing, data concentration, polling, and error recovery. The Comten 5620 is designed to be the first in a new generation of communications processors from NCR Comten. The Comten 5620 is made up of a set of modular components that, when fully configured, are able to support up to 32 full- or half-duplex communications lines and one or two host computers. The system has built-in self-test programs that can isolate faults to a specific board. Unlike the larger Comten communications processors, the Comten 5620 does not require computer center conditions and can be set up in an office environment.

The Comten 5620 can operate as a front-end processor in a small network, or it can operate as a data concentrator at remote sites in a large network. The 5620 offers one to four megabytes of main memory, contains a sealed hard disk for enhanced load and dump and rapid restart and recovery capabilities, handles both SNA and pre-SNA line products concurrently, and can operate virtually unattended.

The 5620 can function as a Comten Network Gateway (CNG) to interconnect up to 64 SNA networks. IBM requires a gateway Network Control Program (NCP) running in an IBM 37X5 to support its SNA Network Interconnection facility. The 5620 can be configured with 1M/2M/4M bytes of memory. The IBM 3710 Network Controller can be configured with 384K to 512K bytes of memory. IBM supplies no software for the 3710; it runs under microcode supplied on a diskette in conjunction with the Configuration Control Program facility of ACF/SSP running on an MVS host. The 5620 can run all the COS2 software developed for the NCR Comten 3600 Series.

NCR Comten makes it easy for a typical IBM user to install the NCR Comten 5620 in a network. The software is compatible with the IBM host and communications processor software. Currently, the NCR Comten software releases are from 9 months to 1 year behind comparable IBM

CONFIGURATION

The configuration of a 5620, at sites that do not need host channel attachment, includes the following: a central processing unit, a communications subsystem, and a fixed disk drive. An optional system console for network control capabilities is also available. The system console provides the user with centralized or distributed network control. This configuration offers connections for up to 16 full- or half-duplex communications lines.

A fully configured 5620 has a CPU, two communications subsystems, a 10-megabyte fixed disk drive, and a channel interface unit for host connections. With two communications subsystems, the 5620 can support up to 32 full- or half-duplex communications lines and one or two host computers. IBM, IBM-compatible, or NCR hosts are supported by the Comten 5620 channel interface unit, as are asynchronous, bisynchronous, and SDLC line protocols.

The Comten 5620 offers full-scale communications processor capabilities and can act as a front-end processor in a small network, or as a remote data concentrator processor in a larger network. When used as a nodal processor in an SNA network environment, the 5620 acts like an SNA PU Type 4 via standard SNA trunk protocols. If it is a mixed SNA and non-SNA environment, the 5620 can attach to the network via NCR Comten's proprietary CNS procedures.

The communications subsystem is a modular system that can support up to two communications base cabinets that are capable of supporting up to 16 communications lines. It uses proprietary VLSI technology and is fully programmable. The subsystem uses two character processor types for various line speeds: muxing character processor for 1 to 8 lines from 50 bps through 19.2K bps; and a higher speed processor for one line from 19.2K bps through 64K bps.

PROCESSING COMPONENTS

The CPU for the 5620 is based on the 32-bit NCR 32 microprogrammable processor chip, has I/O control, uses proprietary VLSI technology to assist interrupt processing, includes sixteen 32-bit general-purpose registers, and sixteen 32-bit control registers. TTL technology is used to implement system logic. The processor executes 101 instructions, 54 in IBM S/370 format. The system uses 256K-bit memory chips, and memory cycle time is 200 nanoseconds. Main storage in the processor is 1MB, but is expandable to 2 or 4MB.

The communications subsystem uses proprietary VLSI technology, provides 1 to 16 lines per cabinet, and is fully programmable for SDLC, HDLC, BSC, Start/Stop, and ECA. The communications subsystem offers two character processor types for different line speeds: a muxing character processor for 1 to 8 lines from 50 bps through 19.2K bps, and higher speed processor for 1 line from 19.2K bps through 64K bps.

Program loading is from an attached disk drive, from a host through Channel Interface Adapter, or from a remote system through a communications link. Power-up or operator reset initiates self-test routines; a displayed error code indicates a failing board and type of error.

All domestic installations require a disk subsystem to load software modules.

CONNECTION TO HOST AND PERIPHERALS

The NCR channel interface adapter is Motorola 68000-based. The adapter contains two 14-by-21 logic boards, direct access to 5620 memory, and a standard NCR 16MHz

NCR Comten 5620 Communications Processor

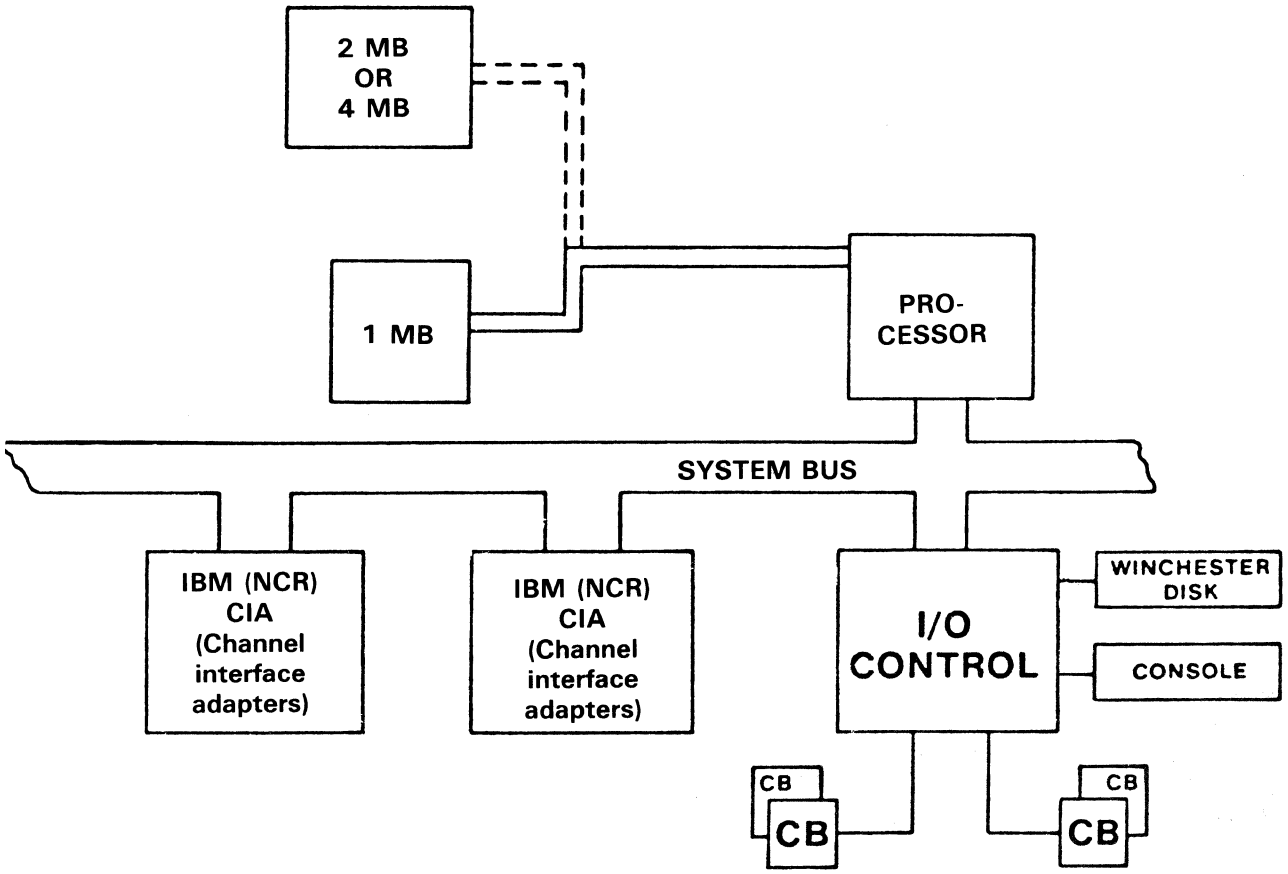


Figure 1. The basic Comten 5620 is made up of a central processing unit (CPU), a channel interface unit, a fixed disk drive, a communications subsystem, and an optional system console.

releases. The company's goal is to reduce the lead time to 6 months.

Generally, the 5620 will be transparent to the IBM host and 37X5 Communications Processors in a network. NCR Comten also supports the same protocols and interfaces as IBM.

NCR Comten's line of communications processors includes the 3650 and the 3690 series. The 5620 comes in at the lower end of the scale, but offers the same capabilities as the larger models. The Comten 5620 is designed for the smaller sites where a larger communications processor would not be justified. This smaller version meets the users' needs, as well as their price. Since the 5620 is part of the Comten family, the growth of individual network nodes can be done by upgrading to one of the larger processors. The Comten 3650 handles up to 128 lines and can support one or two hosts. The Comten 3690 handles up to 512 lines and can support up to eight host processors. The same communications software is able to run on all of the communications processors.

bit serial link channel. The NCR adapter provides the interface to a NCR IOSS bit serial link channel for a V-8000 NCR host computer.

The IBM channel interface adapter is NCR 32-based and is microprogrammed for the channel adapter function. This adapter is the interface to a standard IBM selector, byte multiplexer or block multiplexer CPU channel. The adapter contains two 14-by-21 logic boards, has direct access to 5620 memory, uses one control unit position on the IBM channel, and can support from 1 to 64 addresses.

Host Channel interfaces can support one or two host computers in various combinations of the following: IBM 360/370, 303X, 308X, 43XX, compatible host processors, or NCR 8500/8600 VRX host processors.

CONNECTION TO THE NETWORK

The Comten 5620 attaches to the network through NCR Comten's proprietary Communications Network System (CNS) procedures or through SNA protocols. This network trunking program allows the 5620 to send asynchronous, bisynchronous, and SDLC traffic at the same time. This data can be sent over terrestrial lines, microwave links, or satellite links.

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COMPETITIVE POSITION

NCR Comten has been in the IBM-compatible business since the early 1970s, and after IBM, is the leading vendor of communications processors for the IBM-mainframe environment. In 1983 and 1984, NCR Comten brought out new lines of its 3650 and 3690 models. Currently, NCR Comten processors interconnect over 400,000 terminals and host computers in geographically dispersed private and public data communications networks throughout the world. In studying the communications processor market, NCR Comten has come up with the following reasons why they believe their customers use Comten products: IBM compatibility, performance/number of connections, switching and networking facilities, more diverse end points, configuration and planning tools, network-based applications and management, and connectivity to a variety of vendor mainframes and terminals.

In looking at the market for the Comten 5620, NCR Comten's strategy is direct competition against other processors. When configured as a front-end processor, the 5620 competes against the IBM 3705 and Amdahl processors, but when configured as a remote concentrator, it is competing against sophisticated, high-end, statistical multiplexers. This marketing strategy puts the Comten 5620 against products offered by AT&T Information Systems, Codex Corporation, DCA, Infotron, and Timeplex.

The 5620 is designed for small or remote network sites. Compared to a statistical multiplexer that also could be used in those applications, the 5620 can provide more extensive application switching and routing functions, polling, more programmability, and an unrestricted choice of communications facilities that includes support for X.25 networks and satellites.

The NCR Comten 5620 has also been designed to be competitive with the IBM 3710 Model 1 Network Controller. As such, it has some advantages to offer over the 3710. The primary one is that it can function as a Physical Unit Type 4 (PU4) on SNA while the 3710 is a PU2 device. The PU4 devices have considerably more power and flexibility than PU2 devices.

A second advantage of the 5620 over the 3710 is that the 5620 can run the same COS2 software as the Series 3600 and can perform the same functions of front-end processing, remote front-end processing, and line concentration. The 3710 cannot function as a local processor or remote front-end processor; it can function only as a line concentrator and conversion system. However, as a conversion system, the 3710 is a stronger product, offering management of multiple protocols, protocol enveloping, and protocol conversion. Through communications adapters recently added to the 3710, asynchronous hosts and terminals can access an IBM host, as well as operate as ASCII devices through a passthrough support capability.

ADVANTAGES AND RESTRICTIONS

NCR Comten has been offering an alternative to IBM communications processors since the early 1970s. General-

CNS3 allows concentration of data from multiple terminals at remote sites for transmission over a single high-speed trunk; trunks can be terrestrial, microwave, or satellite links. This facility runs under EP4 Release 1 or higher, NCP Release 3 or higher, or ACF/NCP2 Release 1 or higher. Bit- or byte-oriented protocols up to 1,024 logical lines are supported. These protocols are transparent to the terminal user and host, and allow remote processing and variety of network configurations.

TRANSMISSION SPECIFICATIONS

The system can accept individual line speeds up to 64K bps, with an automatic baud rate detection (ABRD) capability up to 19.2K bps. The ABRD defines the speed and code set of asynchronous terminals at the time of connection.

The communications interfaces supported by the 5620 include RS-232-C/V.24, RS-449/422/423, MIL-STD 188-114, CCITT V.35, AT&T 303C, CCITT X.21/X.21 bis, and NCR DLC (in-house). The system supports asynchronous, bisynchronous, HDLC, SDLC, and Start/Stop protocols.

OPERATOR INTERFACE

The 5620 features an operator's panel and a CRT/keyboard system console. The optional system console can be used to control network capabilities, and allows for centralized or distributed network control.

SOFTWARE

The system runs on NCR Comten COS2-based networking software. The system software for network connectivity consists of Advanced Communications Function/Network Control Program (ACF/NCP), Subarea Routing Manager (SRM), Multiple Access Facility (MAF), MAF with Remote Host Option (MAF/RHO), Communications Networking System (CNS), and the Comten X.25 Interface to Public Data Networks. The control and management software offered by NCR Comten includes Communications Alerting Facility (CAF), and Network Support Services (NSS). Comten's Communications Access Method (CAM) is used for integrated network applications. Programs can be loaded from an attached disk drive, by host channel, or remotely through communications lines.

Comten's CNS is a network trunking program that allows the 5620 to send asynchronous, bisynchronous, and SDLC traffic concurrently over terrestrial lines, microwave, or satellite links. The Comten X.25 software allows users to access X.25 packet switched networks worldwide. This package also permits CNS traffic to be sent over an X.25 network, allowing X.25 circuits to be used for peak traffic loads or as a backup circuit if a leased line fails.

The Comten X.21 Interface conforms to CCITT recommendation X.21 and is functionally compatible with IBM's X.21 support offering. The X.21 interfaces are supported under Comten Communications Operating System 2 and can coreside with other COS2-based products. This support for X.21 circuit switched data networks has been implemented through the Comten Advanced Communications Function/Network Control Program 3 (ACF/NCP3), Comten Communications Networking System 3 (CNS3), and Comten X.25 Interface to Public Data Networks.

PHYSICAL SPECIFICATIONS

The physical characteristics of a 5620 component are as follows: Height—8.5 inches, Width—17.5 inches, and Depth—33.0 inches. When the Comten 5620 is fully configured, it weighs 350 pounds.

NCR Comten 5620 Communications Processor

ly, the company has succeeded in giving IBM customers more functionality for less money for comparable products. The lag in Comten software releases behind the IBM release is understandable and does not appear to disturb customers.

The Comten 5620 is designed to reduce network costs by more efficient utilization of lines, hosts, and terminals. NCR Comten also designed the 5620 for the office environment, so that it does not require computer room conditions.

The 5620 is the first product of a new series of communications processors using new technology. The 5620 is at the low end of the product line. The next product under development is a high-performance communications processor that will certainly compete with the IBM 37X5.

The 5620 far exceeds the functionality and flexibility of its IBM 3710 competitor and has some advantages over competing statistical multiplexers. For example, when the 5620 is used in an SNA network, Comten ACF/NCP is acknowledged and supported as a PU4 by management facilities in an IBM host network. In this same situation, multiplexers could appear transparent to the network, but could also stop network management facilities.

The main problem that seems to be facing NCR Comten right now is filling the orders for the 5620. The company planned to deliver 80 to 100 by the end of 1985, but so many orders were placed, they considered using a lottery to allocate the systems. This seems to be one problem that NCR Comten can live with. □

PRICING

The NCR Comten 5620 ranges in price from $22,000 to $95,000 depending on configuration options chosen. Pricing for the different features and options available on the Comten 5620 are shown below. Software pricing for the NCR Comten 5620 is the same as Comten 3600 software pricing (see Report C13-656-101).

EQUIPMENT PRICES

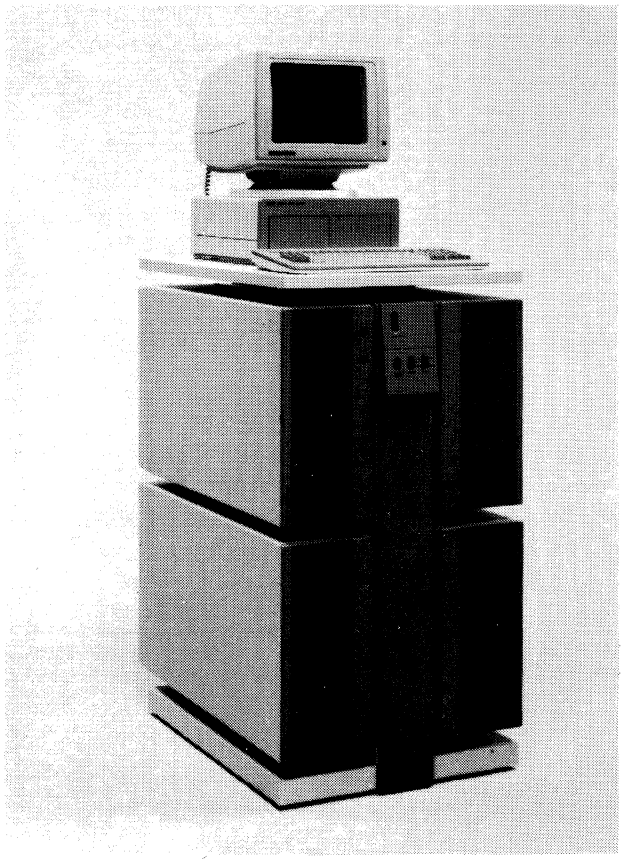
MODELS		Purchase Price ($)
T-5620-A1	Processor with 1MB storage	16,000
F-1169-A1	1MB storage expansion	8,000
F-1169-B1	2MB storage expansion	16,000
F-1169-C1	3MB storage expansion	24,000
T-3031-A1	CIA cabinet	4,000
F-3040-A1	Channel I/F adapter, IBM	6,000
F-3039-A1	Channel I/F adapter, NCR	6,000
T-8054-A1	System stand	1,800
F-1087-A1	Remote power control (RPC)	600
F-8053-A1	Work surface	100
T-4030-A1	System console	1,200
T-2040-A1	Communications cabinet	1,500
T-2060-A1	Communications base, single	350
T-2060-B1	Communications base, dual	400
T-2060-C1	Communications base, quad	425
F-2237-A1	Character processor, low-speed	725
F-2237-B1	Character processor, low-speed w/RIL	625
F-2238-A1	Character processor, medium-speed	750
F-2238-B1	Character processor, medium-speed w/RIL	850
F-2240-A1	Processor interface	500
F-2241-A1	Line interface, 2 line, RS-232-C	500
F-2242-A1	Line interface, 2 line, RS-449/423	1,300
F-2243-A1	Line interface, 2 line, X.21	615
F-2244-A1	Line interface, 2 line, MIL-STD 188-114	600
F-2245-A1	Line interface, 1 line, MIL-STD 188-114	800
F-2246-A1	Line interface, 1 line, V.35/DDS	575
F-2247-A1	Line interface, 1 line, AT&T 303	600
F-2248-A1	Line interface, 1 line, RS-449/422	1,500
F-2249-A1	Line interface, 1 line, NCR DLC	665
F-2250-A1	Line interface, 1 line, X.21	1,300
T-7360-A1	10MB disk subsystem	3,000
T-4032-A1	Printer	780
F-4040-A1	Buffer memory	265 ■

NCR Comten 5620 Communications Processor

PRODUCT DESCRIPTION

The NCR Comten 5620 Communications Processor is smaller and less expensive than the other Comten communications processors, but can provide the same capabilities such as application switching, routing, automated dialing, data concentration, polling, and error recovery. The Comten 5620 is designed to be the first in a new generation of communications processors from NCR Comten. The Comten 5620 is made up of a set of modular components that, when fully configured, are able to support up to 32 full- or half-duplex communications lines and one or two host computers. The system has built-in self-test programs that can isolate faults to a specific board. Unlike the larger Comten communications processors, the Comten 5620 does not require computer center conditions and can be set up in an office environment.

The Comten 5620 can operate as a front-end processor in a small network, or it can operate as a data concentrator at remote sites in a large network. The 5620 offers one to four megabytes of main memory, contains a sealed hard disk for ➢



NCR Comten's 5620 Communications Processor is the first member of the company's new generation of communications processors. The 5620 provides the same capabilities as Comten's larger models, the 3650 and the 3690.

PRODUCT ANNOUNCEMENT: The NCR Comten 5620 is designed to handle application switching, polling, switching, error recovery, automated dialing, and multiplexing for up to 32 lines. The Comten 5620 may operate in a dual mode, as both a front-end processor for a local host and as a remote concentrator in a large network. The communications processor features modular architecture and uses VLSI technology for reliability, low power usage, and a small footprint. The Comten 5620 offers all the networking capabilities of NCR Comten's larger communications processors, but at a lower price.

ANNOUNCEMENT DATE: February 1985.

DELIVERY SCHEDULE: Fourth quarter 1985.

PRICE: Will begin at $22,000.

BASIC SPECIFICATIONS

MANUFACTURER: NCR Comten, Inc., 2700 Snelling Avenue North, St. Paul, MN 55113. Telephone (612) 638-7777.

CONFIGURATION: The configuration of a 5620, at sites that do not need host channel attachment, includes the following: a central processing unit, a communications subsystem, and a fixed disk drive. An optional system console for network control capabilities is also available. The system console provides the user with centralized or distributed network control. This configuration offers connections for up to 16 full- or half-duplex communications lines.

A fully configured 5620 has a CPU, two communications subsystems, a 10-megabyte fixed disk drive, and a channel interface unit for host connections. With two communications subsystems, the 5620 can support up to 32 full- or half-duplex communications lines and one or two host computers. IBM, IBM-compatible, or NCR hosts are supported by the Comten 5620 channel interface unit, as are asynchronous, bisynchronous, and SDLC line protocols. The system can accept individual line speeds up to 64K bps, with an automatic baud rate detection (ABRD) capability up to 19.2K bps. The ABRD defines the speed and code set of asynchronous terminals at the time of connection.

The CPU for the 5620 is based on the NCR32 microprogrammable processor chip, has I/O control, uses proprietary VLSI technology to assist interrupt processing, and its memory is designed to use 256K dynamic RAM chips.

The NCR channel interface adapter is Motorola 68000-based. The adapter contains two 14-by-21 logic boards, direct access to 5620 memory, and a standard NCR 16MHz bit serial link channel.

The communications subsystem uses proprietary VLSI technology, provides 1 to 16 lines per cabinet, and is fully programmable for SDLC, HDLC, BSC, Start/Stop, and ECA. The communications subsystem offers two character processor types for different line speeds: muxing character processor for 1 to 8 lines from 50 bps through 19.2K bps, and higher speed processor for 1 line from 19.2K bps through 64K bps.

The communications interfaces supported by the 5620 include RS-232-C, RS-449/422/423, MIL-STD 188-114, CCITT V.35, ➢

NCR Comten 5620 Communications Processor

enhanced load and dump and rapid restart and recovery capabilities, handles both SNA and pre-SNA line products concurrently, and can operate virtually unattended.

RELATIONSHIP TO CURRENT PRODUCT LINE: NCR Comten's line of communications processors includes the 3650 and the 3690 series. The 5620 comes in at the lower end of the scale, but offers the same capabilities as the larger models. The Comten 5620 is designed for the smaller sites where a larger communications processor would not be justified. This smaller version meets the users' needs, as well as their price. Since the 5620 is part of the Comten family, the growth of individual network nodes can be done by upgrading to one of the larger processors. The Comten 3650 handles up to 128 lines and can support one or two hosts. The Comten 3690 handles up to 512 lines and can support up to eight host processors. The same communications software is able to run on all of the communications processors.

MARKETING POSITION: NCR Comten has been in the IBM plug-compatible business since the early 1970s, and after IBM, is the leading vendor of communications processors for the IBM-mainframe environment. In 1983 and 1984, NCR Comten brought out new lines of its 3650 and 3690 models. Currently, NCR Comten processors interconnect over 400,000 terminals and host computers in geographically dispersed private and public data communications networks throughout the world. In studying the communications processor market, NCR Comten has come up with the following reasons why they believe their customers use Comten products: IBM compatibility, performance/number of connections, switching and networking facilities, more diverse end points, configuration and planning tools, and network-based applications and management.

In looking at the market for the Comten 5620, NCR Comten is not putting it up against other processors, but rather is competing against sophisticated, statistical multiplexers. The 5620 is designed for small or remote network sites. If a user had previously had a statistical multiplexer in that setup, the 5620 can provide the user with more extensive application switching and routing functions, polling, more programmability, and an unrestricted choice of communications facilities that includes support for X.25 networks and satellites. The Comten 5620 is designed to reduce network costs by more efficient utilization of lines, hosts, and terminals. NCR Comten also designed the 5620 for the office environment, so that it does not require computer room conditions. □

Bell/WECO 303C, CCITT X.21/X.21 bis, and NCR DLC (in-house). Host Channel interfaces can support one or two host computers in various combinations of the following: IBM 360/370, 303X, 308X, 43XX, compatible host processors, or NCR 8500/8600 VRX host processors.

The physical characteristics of a 5620 component are as follows: Height—8.5 inches, Width—17.5 inches, and Depth—33.0 inches. When the Comten 5620 is fully configured, it weighs 350 pounds.

SYSTEM SOFTWARE: The system runs on NCR Comten COS2-based networking software. The system software for network connectivity consists of Advanced Communication Function/Network Control Program (ACF/NCP), Subarea Routing Manager (SRM), Multiple Access Facility (MAF), MAF with Remote Host Option (MAF/RHO), Communication Networking System (CNS), and the Comten X.25 Interface to Public Data Networks. The control and management software offered by NCR Comten includes Communications Alerting Facility (CAF), and Network Support Services (NSS). Comten's Communications Access Method (CAM) is used for integrated network applications. Programs can be loaded from an attached disk drive, by host channel, or remotely through communications lines.

Comten's CNS is a network trunking program that allows the 5620 to send asynchronous, bisynchronous, and SDLC traffic concurrently over terrestrial lines, microwave, or satellite links. The Comten X.25 software allows users to access X.25 packet switching networks worldwide. This package also permits CNS traffic to be sent over an X.25 network, allowing X.25 circuits to be used for peak traffic loads or as a backup circuit if a leased line fails.

SYSTEM FEATURES: The Comten 5620 offers full-scale communications processor capabilities and can act as a front-end processor in a small network, or as a remote data concentrator processor in a larger network. When used as a nodal processor in an SNA network environment, the 5620 acts like an SNA PU Type 4 via standard SNA trunk protocols. If it is a mixed SNA and non-SNA environment, the 5620 can attach to the network via NCR Comten's proprietary CNS procedures.

The 5620 can be used for application switching, polling, automated dialing, routing, error recovery, and multiplexing. The system runs all of NCR Comten's networking products and supports various terminals and protocols. The architecture of the 5620 is modular in nature and uses VLSI technology.

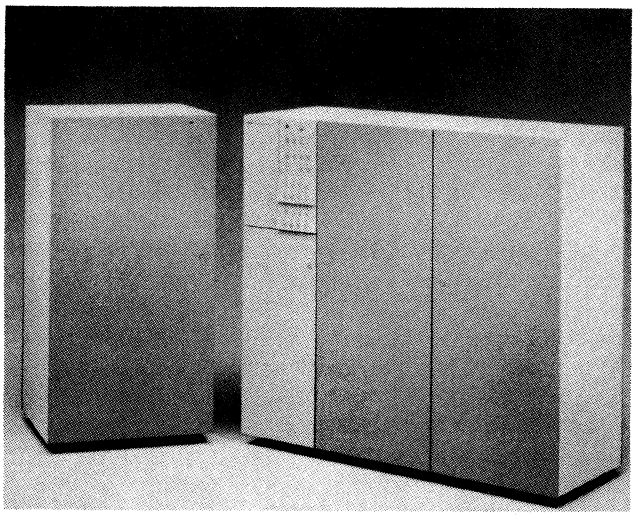
PRICING: The NCR Comten 5620 ranges in price from $22,000 to $54,000 depending on configuration options chosen. ■

NCR Comten 5660 Communications Processor

datapro ANALYSIS

UPDATE: *To maintain an aggressive position in the communications market, NCR Comten has realigned its product line to focus on its communications processors. The high-speed Comten 5660, with approximately three times the processing power of current leading SNA-compatible processors, leads the group, followed by the Comten 3695 and the 5620XP. The company has also withdrawn from the modem and the private X.25 network equipment market.*

NCR Comten, a subsidiary of NCR Corporation since 1979, designs, manufactures, services, and markets a variety of data communications equipment, including data communications processors and networking software. The company has specialized in data communications systems since 1968 and is second only to IBM in offering communications processors for the IBM-mainframe environment. The company's first IBM-compatible communications processor was delivered in 1972, and since that time, NCR Comten has installed over 5,000 systems worldwide. NCR Comten offers such communications processors as the 3695, the 5620, and the 5660. NCR Comten operates over 100 sales and service facilities in the United States and Canada. Its products are also marketed in Western Europe, Latin America, the Far East, the Middle East, Australia, and Africa.



The Comten 5660 Communications Processor, from NCR Comten, offers state-of-the-art logic functions, approximately three times the processing power of leading SNA-compatible communications processors, and support for up to eight mainframes.

VENDOR: NCR Comten, Inc., 2700 Snelling Avenue North, St. Paul, Minnesota 55113. Telephone (612) 638-7777.
CANADIAN DISTRIBUTION: NCR Comten, 515 Consumers Road, Suite 100, Willowdale, Ontario M2J 4Z2. Telephone (416) 496-1300.
MODEL: NCR Comten 5660.
FUNCTION: Front-end processor (FEP), remote concentrator, or both.
HOST COMPUTERS SUPPORTED: IBM and compatible mainframes.
ARCHITECTURE SUPPORTED: SNA, X.25, proprietary trunk protocol.
OPERATING SOFTWARE: Communications Operating System 2 (COS2) Release 4 and above.
COMPETITION: IBM.
PRICING: Prices range from $310,000 to $1,700,000.

REPORT HIGHLIGHTS: **PAGE**

In May 1986, NCR Comten broke new ground by introducing the Comten 5660 Communications Processor, which supports twice as many lines (1,024) as any other current communications processor, has four times the main storage capacity, and is considered to be three times more powerful. The newest member of the Comten family is fully compatible with IBM and IBM-compatible mainframes operating in SNA and non-SNA environments, mainframes that support BSC 3270-type devices, and NCR mainframes via a communications line. Plans for channel-attachment support for NCR mainframes are on the drawing board.

The Comten 5660 uses extensive VLSI and ECL macrocell logic functions in the system architecture. It also uses a cache memory that allows for faster operation, as the processor does not need to routinely access the main memory for data. These features give the Comten 5660 almost three times the processing power of the IBM 3725, as well as enabling it to support up to eight mainframes and 1,024 full-duplex communications lines.

NCR Comten 5660 Communications Processor

The Comten 5660 operates with existing NCR Comten hardware and software products, such as the Comten Communications Operating System 2 (COS2), which allows for easier integration into an existing network. The four-port design of the Comten 5660's main memory permits the communications processor to carry out instructions faster than single-port designs. One port can be accessing data while other ports are being filled with data. The Comten 5660's main storage capacity is 16 megabytes of memory. The processor can accept data speeds up to 256K bps through direct connections or up to 1.544M bps when using an optional multiplexer supplied by the user. The multiplexer breaks down T1 rate data to 256K bps, then transmits it to the processor. The Comten 5660 can process up to 3.5 million instructions per second (MIPS), about three times faster than the Comten 3695.

New features found on the Comten 5660 include a Service Subsystem for better reliability and maintainability. The Comten 5660's Service Subsystem is a separate, integrated component with its own microprocessor and memory. A 29-megabyte disk supports the Service Subsystem, which is used to pinpoint hardware errors to the exact board level and automatically log them on an error log. An integrated modem allows problem diagnosis through dial-up capabilities within the subsystem.

An environmental monitor reports to the Service Subsystem. This monitor tracks temperature, cooling fan directions, speeds and voltages, and warns operators of any unusual activities. The environmental monitor provides a 12-hour battery backup for retaining error data for fault determination during a power loss.

The Comten 5660 includes a console that provides users with access to a wide variety of system control utility programs and maintenance facilities and allows for centralized or distributed network control. This console is the user interface to the Comten 5660 and connects to an RS-232-C connector on the Service Subsystem. A printer is also available for connection to the Service Subsystem and to produce a hard copy of operator console data.

PRODUCT EVALUATION

NCR Comten's integrity is enforced in its products. Users have found the products dependable and easily expanded. This remains true with the Comten 5660, along with its compatibility with existing Comten hardware/software.

The Comten 5660's size suits varying requirements. For users with large networks, this processor is a cost saver. For a small network with no plans to expand, the Comten 5660 is too large and too expensive. Users should know that NCR Comten designed the 5660 for very large networks, which previously had to use multiple processors to achieve the same effect as a single Comten 5660. This processor was designed according to requests from Comten users.

Another system advantage is its speed: it offers faster throughput of information with improved terminal response time. Processor efficiency is also seen in its quad-bank main storage, which can support large numbers of attached devices while decreasing response time. Centralized network control from the system console, which allows the operator to control from one to all NCR Comten communications processors in the network, is another advantage.

MARKET POSITION

For 18 years, NCR Comten has been developing, manufacturing, marketing, and servicing data communications systems and networking software. After IBM, NCR Comten is the leading vendor of communications processors for the IBM environment. NCR Comten has introduced new communications processors every year since 1983.

New versions of the Comten 3650 and 3690 were introduced in 1983 and 1984, respectively. A low-end communications processor, the Comten 5620 was introduced in 1985. The 5660, a high-end communications processor, was introduced last year. It has three times the processing power of any other current communications processor. 1986 also saw the introduction of the Comten 3695 Communications Processor, which is another member of the 3600 family.

With the introduction of the Comten 5660, NCR Comten now offers a complete range of communications processors, from the Comten 5620, which supports 32 lines, to the Comten 5660, supporting 1,024 lines. The Comten 5660 supports the same number of mainframes as the older Comten 3690, but accommodates twice as many lines and has four times the storage capacity of the 3690. Since the Comten 5660 uses Comten software and is compatible with the existing Comten processors, users will find it easy to migrate to or integrate a Comten 5660 into their networks. Multiple Comten 3695s can be used to back up a Comten 5660 system.

The enormous power and connectivity of the Comten 5660 result in fewer communications processors to run a large network. This saves on personnel and software, since every time another communications processor is added to the system, another system generation is required. NCR Comten did not arbitrarily decide that users needed a bigger and more powerful processor; in fact, it was the reverse. In listening to its users, the company found that they wanted a processor that could handle their growing networks; different types of traffic such as graphics and PCs; new and faster data rates; more complex protocols; a

NCR Comten 5660 Communications Processor

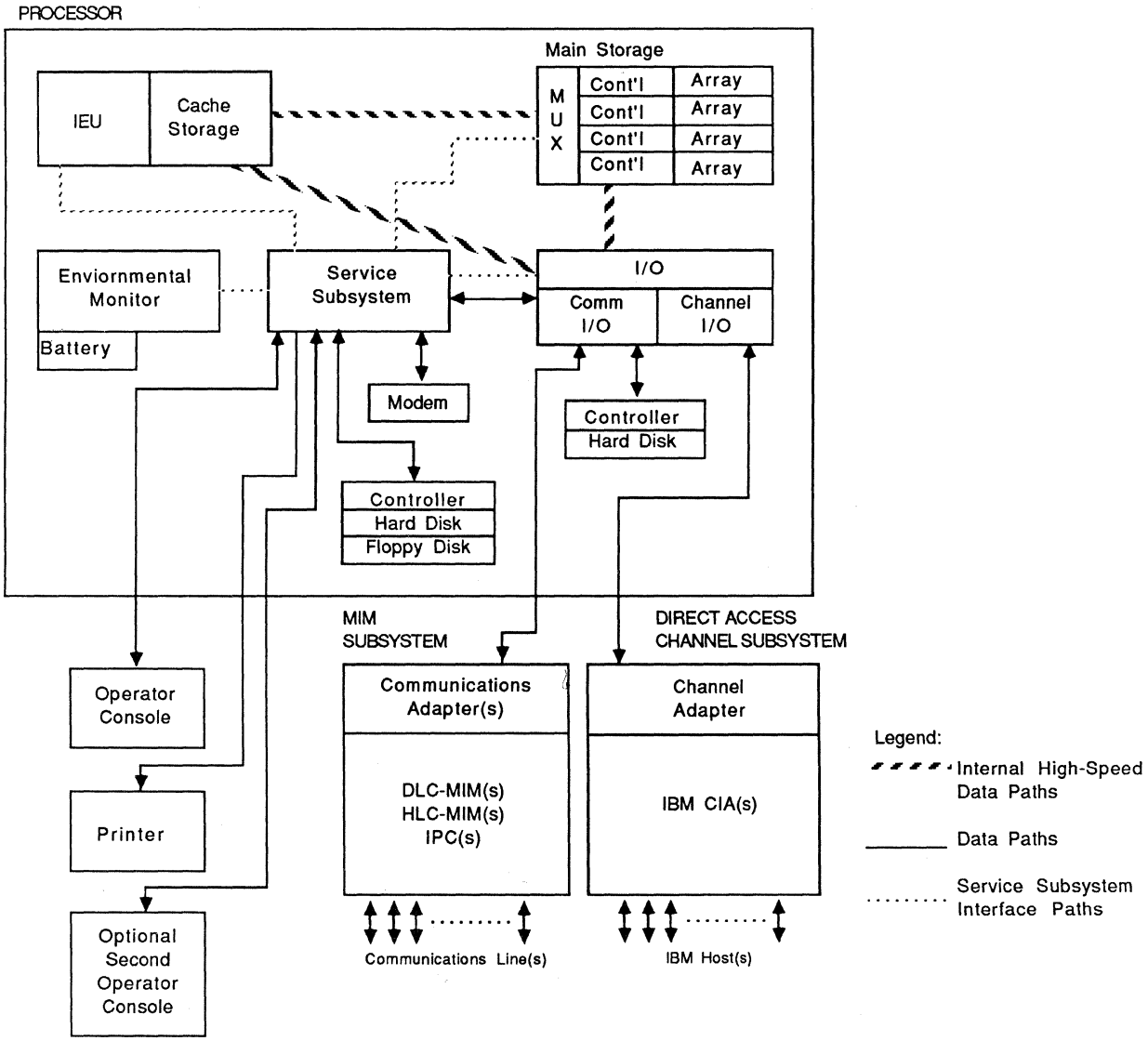


Figure 1. A block diagram of the Comten 5660 Communications Processor.

variety of network applications, such as message reformatting, transaction routing, gateways, protocol conversion, and architectural translation; and simplified operations. The Comten 5660 handles this last request by offering just one processor to do the job, therefore requiring only one generation start-up with one set of software, and providing a smaller footprint and fewer interconnects.

No other products, including IBM's, directly compete against the 5660 in terms of processing power. Like the Comten 5660, the IBM 3725 can support up to eight mainframes, but it can support only 256 communications lines and 3M bytes of main storage. Multiple 3725s can be linked to achieve the processing capabilities of the Comten 5660, but the cost and logistics of connecting the processors do not make it a viable alternative.

Through ACF/NCP releases, beginning with Version 2, the Comten processors support various VTAM 3.1.1 and NetView capabilities, although only ACF/NCP Version 4.2 supports all of these capabilities. Since NCR Comten is committed to full IBM compatibility, as NetView and VTAM capabilities continue to be developed, Comten will provide support for them. This is seen in the recent introduction of Version 4.0 of ACF/NCP.

At this point, NCR Comten appears to lead in offering a communications processor with more power, speed, and line connectivity than any other currently available product. Time will tell how IBM decides to answer the challenge.

NCR Comten 5660 Communications Processor

SPECIFICATIONS

MODEL: NCR Comten 5660.
DATE OF ANNOUNCEMENT: May 1986.
DATE OF FIRST DELIVERY: 1986.
NUMBER DELIVERED TO DATE: Information not available.
SERVICED BY: NCR Comten.

MODELS

The Comten 5660 is three times more powerful than any other communications processor in the industry. The system supports high-speed lines including T1 and handles other tasks, such as performance modeling and analysis support for evaluating migration possibilities. Backup options ensure network availability. A single Comten 5660 can totally back up another Comten 5660 or partially back up several Comten 5660s. Multiple Comten 3695s can be used to back up a Comten 5660 system.

The 5660 is currently the only model in this line of high-level communications processors. It can be configured in several different ways, such as a front-end processor (FEP), a remote communications processor (RCP), or as both in dual mode.

When configured as a front-end processor, the Comten 5660 can manage both local and remote data communications for its host, route data traffic to the correct application programs in the host, support a wide variety of terminals and communications equipment, and more.

As an RCP, the Comten 5660 offers flexible application switching and routing of data traffic. It also supports polling for remote nodes, programmability, error control and recovery, and traffic management.

In dual mode configuration, the Comten 5660 can operate concurrently as both a remote communications processor and a front-end processor. This dual functionality does not restrict the processor's features or operation in either one of the modes.

CONFIGURATION

A Comten 5660's basic configuration includes a central processing unit; a cache memory with a 64K-byte temporary storage buffer; a system hard disk that is attached to the Input/Output (I/O) section of the processor, a Service Subsystem hard disk, and Service Subsystem diskettes that support the subsystem hard disk; I/O control unit;

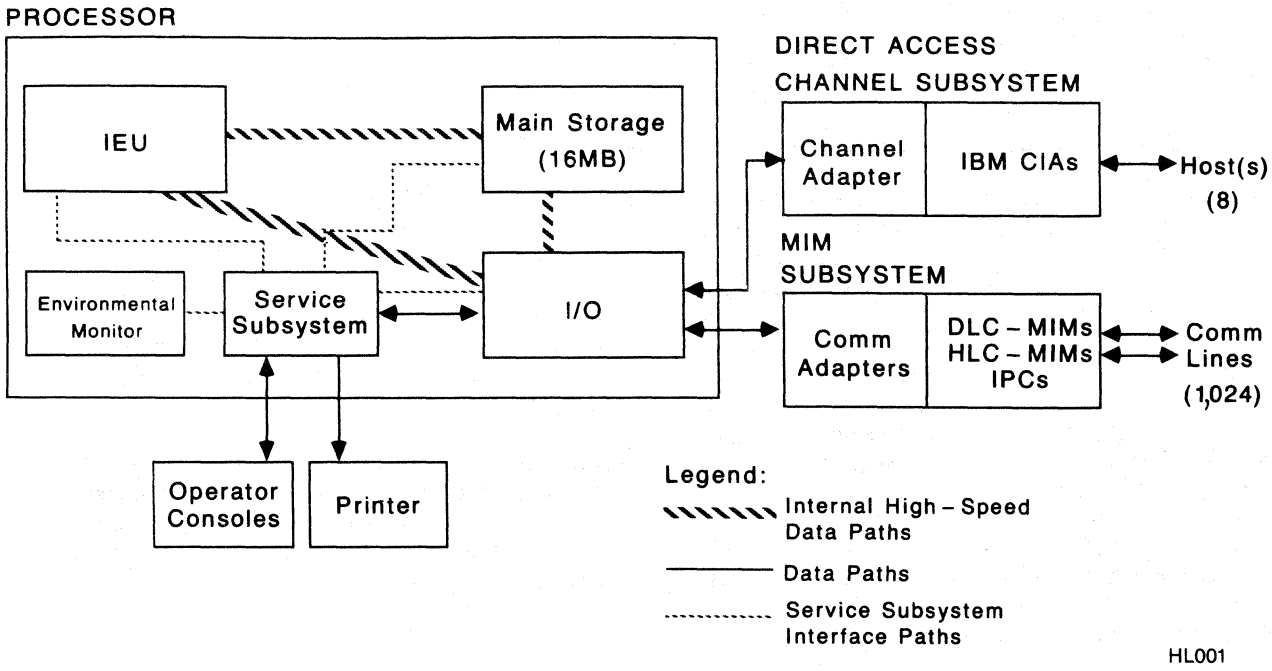


Figure 2. The Comten 5660 configured as a front-end processor.

NCR Comten 5660 Communications Processor

Instruction Execution Unit (IEU); main memory; operator interfaces; and a Service Subsystem that is the central point for maintenance and operation control of the processor. Located in separate cabinets are the IBM Channel Interface Adapter (CIA), the Modem Interface Modules (MIMs), and the Comten Integrated Protocol Converter (IPC). The Comten 5660's pipelined-style architecture is used in conjunction with four-port parallel memory, cache memory, emitter coupled logic, and extensive VLSI technology.

The Comten 5660 can connect up to 1,024 full-duplex communications lines and up to eight IBM or IBM-compatible mainframes running concurrently. The processor executes up to 3.5 million instructions per second (MIPS), allowing for simultaneous support of large amounts of data and high-speed lines. It offers a main storage capacity of up to 16 megabytes and the high-speed cache storage.

The configuration for a Comten 5660, as a FEP, comprises the following components: a processor with up to 16M bytes of main storage; a Direct Access Channel Subsystem with up to eight IBM CIAs; a MIM Subsystem with up to 64 Data Link Control Modem Interface Modules (DLC-MIMs), High-Speed Link Control Modem Interface Modules (HLC-MIMs), and/or IPCs; operator console(s); and a printer.

When the Comten 5660 is configured as a remote communications processor, its components consist of a processor with up to 16M bytes of main storage; a MIM Subsystem with up to 64 DLC-MIMs, HLC-MIMs, and/or IPCs; an operator console; and a printer.

The Service Subsystem operates separately under the control of a microprocessor. This subsystem monitors system activity and can pinpoint hardware errors down to the specific board level. The integrated diagnostic modem works with the Service Subsystem to provide service workers with dial-up diagnostic capabilities.

An integrated hard disk maintains system software loading, remote initial loading, and an automatic load and dump feature. This last feature is optional and can be selected at system generation time. The automatic load and dump feature records errors and automatically stores memory contents on the hard disk for later analysis by the operator. It also reloads system load file data. Another option is available that will expand hard disk size.

The Comten 5660's modular nature makes it easy to divide the processor by physical subdivisions. Components related to processing functions are found in the processor cabinet (see PROCESSING COMPONENTS). The components associated with the channel side of the communications processor are found in the Direct Access Channel Subsystem cabinet (see CONNECTION TO HOST AND PERIPHERALS), and the components connected with the communications side of the 5660 are housed in the Modem Interface Module Subsystem cabinet (see CONNECTION TO THE NETWORK). This relationship is shown in Figure 1.

PROCESSING COMPONENTS

The units that compose the processor subsection of the Comten 5660 include the Instruction Execution Unit; Cache storage; main storage; Input/Output (I/O), which includes a hard disk device; environmental monitor; and a Service Subsystem that includes a modem, a 5¼-inch diskette, and a hard disk.

The ***IEU*** includes sixteen 32-bit general-purpose registers and sixteen 32-bit control registers. Through software, this unit manages the Comten 5660's activities, including processing control for instruction execution, timing functions, interrupt handling, and various other machine-related functions.

Cache Storage includes 32K bytes for instructions and 32K bytes for data. It offers the processor faster data reference than main storage does. The processor can access commands or operands needed by a program from main memory and place this information in Cache storage for future use. It has the same access speed as the IEU.

Main Storage is separated into four arrays with a bank controller in each one that allows overlapping access. The standard size of main memory is 4 megabytes, with optional sizes of 8, 12, or 16 megabytes. Either the IEU or the I/O can access main storage through the storage multiplexer. A storage key unit, included in the main memory, protects specified locations.

The ***Input/Output*** section includes the I/O processor, the Direct Access Channel I/O interface, and the Communications I/O interface. This I/O section does all I/O path transfers to and from the IEU and main storage.

The Communications I/O interface deals with connecting DLC-MIMs, HLC-MIMs, and IPCs to the processor with a possible maximum of 1,024 duplex lines. Connection of the MIMs to the processor is through communications adapters. Each one supports up to eight MIMs or IPCs. The communications I/O interface supports up to 64 DLC-MIMs, each with 16 duplex lines; up to 64 HLC-MIMs, each with 4 duplex lines; and up to 64 IPCs with 16 or less lines, or up to 32 with more than 16 lines. The total cannot exceed 1,024 lines. A hard disk connected to this interface is used for program loading by the host channel or remotely through a communications line. This hard disk has a storage capacity of 29 megabytes and an average seek time of 30 milliseconds.

The Direct Access Channel I/O interface connects IBM-CIAs to the processor, with a maximum of eight hosts.

NCR Comten 5660 Communications Processor

Connection is through the Direct Access Channel adapter that can support up to eight CIAs.

The ***Environmental Monitor*** monitors over- and under-voltage conditions, direction and speed of cooling fans, power control status, temperature at various points, redundant voltage regulator status, and cooling inlet air temperature. The monitor can shut off power to any cabinet that has an overtemperature condition. If a malfunction occurs, a message is flashed on the LCD on the maintenance panel, and a warning indicator lights up on the specific cabinet in question. The Environmental Monitor sends information on problems to the Service Subsystem for storage in the error log.

The ***Service Subsystem*** provides maintenance and operating data to both operator and service personnel. System operators access the data received from these interfaces locally through a console or remotely using the built-in modem. The Service Subsystem is made up of a microprocessor with high-level-language support and an integral asynchronous, dial-in/auto answer-only modem with key lock for security. The Service Subsystem provides RS-232-C connectors for operator consoles, the integral modem, and the printer. It has a hard disk with 29 megabytes of storage capacity and a 5¼-inch diskette with 650K bytes of storage capacity. This system deals mainly with environmental conditions, error recording, line connectivity, initial program loading, remote initial loading, machine check handling, power-up testing, hardware error log maintenance, fault isolation, operation of maintenance programs, and system time of day. The integrated hard disk in the Service Subsystem supports subsystem activities, such as recording of a hardware error log, operating maintenance programs, and isolating hardware faults.

CONNECTION TO HOST AND PERIPHERALS

The Direct Access Channel Subsystem supports up to eight IBM Channel Interface Adapters, and each Direct Access Channel Subsystem cabinet has room for up to eight IBM-CIAs. The IBM-CIAs are attached to the Direct Access Channel Adapters, and these connect to a Direct Access Channel I/O Interface port on the I/O section of the Comten 5660. The Direct Access Channel I/O Interface port can multiplex eight CIAs onto one port.

The IBM-CIAs are microprocessor-controlled devices that connect the Comten 5660 to an IBM or IBM-compatible host and permit information to be sent to and received from the host. They act as interfaces for the 5660 to a standard IBM S/370-byte multiplexer channel or block multiplexer channel, and they also make the Comten 5660 appear to be an IBM peripheral device on an IBM host subchannel. An IBM-CIA can select up to 256 subchannel addresses.

CONNECTION TO THE NETWORK

The Comten 5660's Modem Interface Module Subsystem supports up to 64 Data Link Control Modem Interface Modules, High-Speed Link Control Modem Interface Modules, or Integrated Protocol Converters in a variety of combinations up to a total of 1,024 lines. Each MIM Subsystem cabinet holds up to six MIMs or IPCs.

The ***DLC-MIM***, located between the CP and the modem or a locally attached device, provides control and error-checking facilities for data input/output operations between the CP and the communications lines. It also does the serial-to-parallel conversion of data bytes coming off the communications line, and parallel-to-serial conversion of data being transmitted out over the line. The DLC-MIM handles line speeds up to 64K bps and supports the following protocols and handlers: Start/Stop, Extended Start/ Stop, BSC and Extended BSC, CNS, SDLC, and HDLC with X.25.

The HLC-MIM, physically similar to the DLC-MIM, is also installed between the CP and the modem or locally attached device. The HLC-MIM offers the same line control and data conversion functions as the DLC-MIM, but it can support up to four communications lines and has a maximum line speed of 256K bps. This MIM is designed for high-speed network applications, such as trunks between nodes, bulk file transfers between hosts, high-speed terminal connections, and dedicated X.21 connections to a packet switched data network. The HLC-MIM supports the V.35 interface.

The ***IPC*** allows for the direct attachment of asynchronous terminals and personal computers to the Comten 5660 without the need for a modem between the line and the IPC. The host sees it as an IBM 3274 cluster controller and permits terminals to emulate 3278 display stations. The IPC also offers operators the most commonly used 3270 functions. It can convert asynchronous ASCII protocol to appear as BSC protocol, which allows users' non-SNA terminals and PCs to access BSC and SNA host applications. Other IPC features include its capability of automatically detecting the baud rate of incoming data and supporting line speeds from 300 to 9600 bps; allowing for the attachment of 43 predefined and 3 user-defined asynchronous terminal models; supporting X-on/X-off flow control; and permitting the direct connection of bi-synchronous 3284-type printers. Also, it can be configured for 8, 16, 24, or 32 lines.

Communications adapters also reside in the MIM Subsystem. The communications adapter connects to a Communications I/O interface port on the I/O section of the processor; it can multiplex up to eight MIMs or IPCs onto one port. Since the MIM Subsystem cabinet is not directly fastened to the processor cabinet, it can be physically located up to 100 feet from the processor.

NCR Comten 5660 Communications Processor

OPERATOR INTERFACE

The system console is the primary operator interface to the Comten 5660. A second console and 120 cps printer are optional. From the console, users can access the various system control utility programs and maintenance facilities. The console also allows for centralized or distributed network control.

TRANSMISSION SPECIFICATIONS

The Comten 5660 Communications Processor handles T1 lines and processes data at rates up to 256K bps. The speed for lines attached to a Comten DLC-MIM is 64K bps, while a line attached to an HLC-MIM can support speeds up to 256K bps. Determining the maximum speed for any line is dependent on the maximum number and type of lines attached to the MIM. The system console supports 19.2K bps transfer rates. The integral modem, located in the Service Subsystem, offers selectable rates from 300 to 1200 bps.

Interfaces supported by the Comten 5660 include RS-232-C, RS-366, RS-449, V.24/X.21 bis, V.35, V.36, X.21, DDS, WECO 303 Series, MIL-188C, and DDS (Wide Band). Protocols supported include BSC, Extended BSC, SDLC, HDLC with X.25, Comten's CNS trunk protocol, or Async codes.

The 5660 IBM-CIA connects to the IBM host through the host's byte multiplexer or block multiplexer channel. A bisynchronous 3270 cluster controller, supported by a non-IBM host, can be link attached to the 5660 through a communications line.

PHYSICAL SPECIFICATIONS

The Comten 5660's physical characteristics are as follows: height—67 inches, width—70 inches, and depth—28 inches (main processor). The main processor weighs 2,000 pounds. The CIA cabinet dimensions are as follows: height—67 inches, width—34 inches, and depth—28 inches. The CIA cabinet weighs 900 pounds. This cabinet can be placed up to 50 cable feet from the main processor.

SOFTWARE

SYSTEM SOFTWARE: The Comten 5660 operates with existing NCR Comten hardware and software products. It uses the Comten Communications Operating System (COS 2 Release 4 or higher) upon which Comten network software for the Comten 3600 and 5600 Communications Processors is based. COS2 is made up of a family of system control programs that runs in the 5660, and it provides an interface for Comten products so that the software products are not dependent upon specific hardware architecture. This compatibility with existing Comten products allows for an easier integration of the 5660 into the existing Comten network.

Software products that are supported by the Comten 5660 include ACF/NCP3 Release 2E, ACF/NCP Version 2 Release 1E, CAM3 Release 2E, CNG Release 1E, CNS3 Release 1E, CAF1 Release 1E, EP4 Release 5E, MAF3 Release 3E, NSS1 Release 2E, NTO2 Release 1E, NTO2 Release 2E, SRM1 Release 4E, and X.25 I/F Version 2.

Comten's Advanced Communications Function/Network Control Program (ACF/NCP) performs data routing functions and network control for devices in an SNA communications network, relieving the host processor of some of these network control functions. This is accomplished through an exchange of buffered data and control information; network operation supervised by host communications or Comten's CP-resident access methods is then controlled by ACF/NCP.

The Comten Communications Networking System (CNS) operates data network trunks. The network is formed by connecting Comten CPs in various locations with high-speed, full-duplex trunks. CNS software, which operates in the Comten CP, concentrates data onto a single trunk, eliminating the need for separate and more costly lines to each remote device in the network.

The Comten Multiple Access Facility (MAF) and MAF/Remote Host Option (MAF/RHO) offer increased access to a variety of host computer applications for Comten 5660 CP users in an Emulation Processing (EP) environment. MAF provides a more flexible emulation system by permitting terminals attached to IBM 3270 cluster controllers access to various host subchannels and different application programs in a host computer that has an emulation-type access method. MAF and MAF/RHO offer basically the same functions, but MAF/RHO offers an additional connectivity option. With this option, a Comten 5660 can be attached by a communications line to any host computer that supports remote IBM BSC 3271, 3274, or 3276 cluster controllers. Using both MAF and MAF/RHO, terminals in an MAF network can access applications on line-attached and channel-attached host processors.

The Subarea Routing Manager (SRM) works with Comten ACF/NCP to offer switching that permits SNA 3270 and BSC devices to selectively communicate with various host computer access methods in an SNA network. SRM differs from IBM's Multisystem Networking Facility (MSNF) in that SRM resides in a Comten 5660 CP, thereby reducing the demands on a host computer's memory and processing time. SRM supports ACF/VTAM and ACF/TCAM access methods. With the addition of Comten MAF, SRM offers resource sharing and coexistence between non-SNA and SNA environments.

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Comten's Communications Access Method (CAM), a telecommunications access method that supports communications application programs, is lodged in a Comten 5660 CP. CAM offers a central point for the control of network activities and also works with Comten ACF/NCP to provide network communications services. CAM can also be used as a platform for developing application programs for NCR Comten CPs.

The Comten Network Gateway (CNG) works in a Comten 5660 CP and links two or more independent SNA networks. The SNA networks connected by CNG keep their own network addressing scheme, allowing any additions or deletions of resources within the network to have little, if any, effect on other interconnected networks.

The Network Terminal Option (NTO) works with ACF/NCP to permit specific non-SNA devices to access SNA host computers and application programs. NTO resides in a Comten 5660 CP and provides numerous non-SNA devices with the same connectivity capabilities as SNA devices.

Comten's Emulation Processing (EP) permits a Comten 5660 CP to replace one or more IBM communications devices and perform network control jobs for a non-SNA data communications network. Comten EP can emulate hardware adapter functions, as well as allow the Comten 5660 to perform various terminal handling functions. Since these functions are in EP software, network changes can be done without extensive hardware modifications or reprogramming.

The X.25-1 Interface to Packet Switched Data Networks (X.25) consists of software modules for Comten CPs that allow X.25 packet switched data networks (PSDNs) to be integrated into a data communications network, replacing or supplementing conventional circuits. X.25-1 supports virtual circuits, offering a wide range of Comten 5660 CP capabilities and features. CCITT Recommendation X.25 is implemented, providing an interface to numerous network vendors/administrations. It includes a feature that allows the Comten 5660 to appear as a packet switched network to attached devices.

Comten's Communications Alerting Facility (CAF) offers a realtime display on the status of all the communications lines that are physically attached to the CP in which they reside.

PRICING

The NCR Comten 5660 costs from $310,000 to $1,733,000, depending on configuration options chosen. The manufacturer's suggested retail price for the processor and memory expansions is shown in the following pricing charts. Leasing prices as well as maintenance costs are also given. NCR Comten offers training courses that address Comten's COS2. It also offers a variety of maintenance agreements for the Comten 5660, depending on the level desired by the user. The company provides a software maintenance program that includes both central and local support.

EQUIPMENT PRICES

		Purchase Price ($)	3-Year Lease ($)	Monthly Lease ($)	Monthly Maint. ($)
MODELS					
T-5660-A1	FEP Processor, 4MB memory	300,000	10,135	15,000	623
T-4062-A1	Console w/stand	6,350	254	318	53
T-4062-B1	Console w/out stand	5,655	226	283	53
F-4017-A1	Console stand	695	28	35	0
F-3066-A1	Remote Peripheral Cabinet Adapter	5,000	200	250	4
F-6308-A2	29MB Disk Drive	1,500	60	75	35
F-5601-A1	4 to 8MB Memory Expansion	70,000	2,800	3,500	304
F-5602-A1	8 to 12MB Memory Expansion	70,000	2,800	3,500	608
F-5602-B1	4 to 12MB Memory Expansion	140,000	5,600	7,000	608
F-5603-A1	12 to 16MB Memory Expansion	70,000	2,800	3,500	912
F-5603-B1	8 to 16MB Memory Expansion	140,000	5,600	7,000	912
F-5603-C1	4 to 16MB Memory Expansion	210,000	8,400	10,500	912
F-3062-A1	IBM CIA	7,000	280	350	16
F-2271-A1	Communication Adapter I/F	3,500	140	175	8 □

NCR Comten 5660 Communications Processor

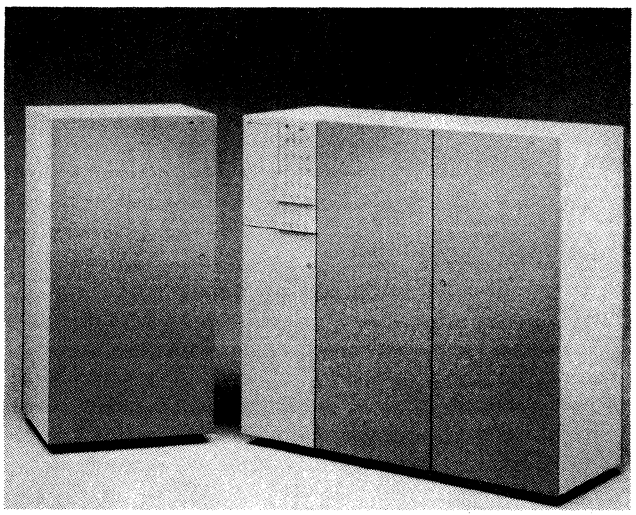
MANAGEMENT SUMMARY

A subsidiary of NCR Corporation since 1979, NCR Comten designs, manufactures, services, and markets a variety of data communications equipment, including data communications processors; modems; and networking software for connectivity, network control and management, and integrated network applications. The company has specialized in data communications systems since 1968 and is second only to IBM in offering communications processors for the IBM-mainframe environment. The company's first IBM-compatible communications processor was delivered in 1972, and since that time, NCR Comten has installed over 4,000 systems worldwide. Communications processors offered by NCR Comten include the 3600 Series, the 5620, and the 5660. NCR Comten operates over 80 sales and service facilities in the United States and Canada. The company also markets its products in Western Europe, Latin America, the Far East, the Middle East, Australia, and Africa.

In May 1986, NCR Comten broke new ground with the introduction of the Comten 5660 Communications Processor, which supports twice as many lines (1,024) as any other communications processor currently on the market, has four times the main storage capacity, and is considered to be three times more powerful. The newest member of the Comten family is fully compatible with IBM and IBM-compatible mainframes operating in SNA and non-SNA environments, mainframes that support BSC 3270-type devices, and NCR mainframes via a communications line. Plans for channel-attachment support for NCR mainframes are on the drawing board.

NCR Comten's 5660 Communications Processor is designed to support up to eight mainframes running concurrently, to connect up to 1,024 full-duplex communications lines, and to provide up to 16MB of main memory. The 5660 is capable of supporting high-speed T1 lines, as well as large amounts of data at the same time. VLSI technology and ECL macrocell logic are supported, along with a cache memory that provides 64K bytes of storage in a temporary buffer. The 5660 has approximately three times the processing power of the current leading SNA-compatible communications processor on the market. It is compatible with IBM and IBM-compatible mainframes, as well as with other Comten processors and networking software. This compatibility allows for easy migration to and implementation of the Comten 5660.

FUNCTION: Front-End Processor (FEP), Remote Communications Processor (RCP), combination of both.
HOST COMPUTERS SUPPORTED: IBM and compatible mainframes.
ARCHITECTURE SUPPORTED: SNA, X.25, proprietary trunk protocol.
OPERATING SOFTWARE: Communications Operating System 2 (COS2, Release 4 and above).
COMPETITION: IBM.
PRICE: Prices range from $310,000 to $1,600,000.



The Comten 5660 Communications Processor, from NCR Comten, offers state-of-the-art logic functions, approximately three times the processing power of leading SNA-compatible communications processors, and support for up to eight mainframes.

CHARACTERISTICS

VENDOR: NCR Comten, Inc., 2700 Snelling Avenue North, St. Paul, MN 55113. Telephone (612) 638-7777.

DATE OF ANNOUNCEMENT: May 1986.

DATE OF FIRST DELIVERY: 1986.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: NCR Comten.

MODELS

The Comten 5660 is three times more powerful than any other communications processor in the industry. The system supports high-speed lines including T1, and handles other tasks, such as performance modeling and analysis support for evaluating migration possibilities. Backup options ensure network availability. A single Comten 5660 can totally back up another Comten 5660 or partially back up several Comten 5660s. Multiple Comten 3690s can be used to backup a Comten 5660 system.

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The Comten 5660 uses extensive VLSI and ECL macrocell logic functions in the system architecture. It also uses a cache memory that allows for faster operation, as the processor does not need to routinely access the main memory for data. These features give the Comten 5660 almost three times the processing power of the IBM 3725, as well as enabling it to support up to eight mainframes and 1,024 full-duplex communications lines.

The Comten 5660 operates with existing NCR Comten hardware and software products, such as the Comten Operating System (COS2), which allows for easier integration into an existing network. The four-port design of the Comten 5660's main memory permits the communications processor to carry out instructions faster than single-port designs. One port can be accessing data while other ports are being filled with data. The main storage capacity of the Comten 5660 provides up to 16 megabytes of memory. The processor can accept data speeds up to 256K bps through direct connections or up to 1.544M bps when using an optional multiplexer. The multiplexer for the Comten 5660 transmits data into the processor at T1 rates, which the processor then breaks down and handles at 256K bps. It can process up to 3.5 million instructions per second (MIPS), which is about three times faster than the Comten 3690.

New features found on the Comten 5660 include a service subsystem for better reliability and maintainability. The Comten 5660's service subsystem is a separate, integrated component with its own microprocessor and memory. A 29-megabyte disk supports the service subsystem, which is used to pinpoint hardware errors to the exact board level and automatically log them on an error log. An integrated modem allows for diagnosing problems through dial-up capabilities within the subsystem.

An environmental monitor reports to the service subsystem. This monitor tracks temperature, cooling fan directions, speeds and voltages, and warns operators of any unusual activities. The environmental monitor provides a 12-hour battery backup for retaining error data for fault determination during a power loss.

The Comten 5660 includes a console that provides users with access to a wide variety of system control utility programs and maintenance facilities and allows for centralized or distributed network control. This console is the user interface to the Comten 5660 and connects to an RS-232-C connector on the Service Subsystem. A printer is also available for hard copy of operator console data and also connects to the Service Subsystem.

COMPETITIVE POSITION

For eighteen years NCR Comten has been developing, manufacturing, marketing, and servicing data communications processors, modems, and networking software for connectivity, integrated network applications, and network control and management. After IBM, NCR Comten is the leading vendor of communications processors for the IBM environment. Since 1983, NCR Comten has introduced

The 5660 is currently the only model in this line of high-level communications processors. It can be configured in several different ways, such as a Front-End Processor (FEP), a remote communications processor, or as both in dual mode.

When configured as a front-end processor, the Comten 5660 can manage both local and remote data communications for its host, route data traffic to the correct application programs in the host, support a wide variety of terminals and communications equipment, and more.

As a Remote Communications Processor (RCP), the Comten 5660 offers flexible application switching and routing of data traffic. It also supports polling for remote nodes, programmability, error control and recovery, and traffic management.

In dual mode configuration, the Comten 5660 can operate concurrently as both a remote communications processor and a front-end processor. This dual functionality does not restrict the processor's features or operation in either one of the modes.

CONFIGURATION

The basic configuration for a Comten 5660 includes a central processing unit; a cache memory with a 64K-byte temporary storage buffer; a system hard disk that is attached to the I/O section of the processor, a service subsystem hard disk, and service subsystem diskettes that support the subsystem hard disk; I/O control unit; Instruction Execution Unit (IEU); main memory; operator interfaces; and a service subsystem that is the central point for maintenance and operation control of the processor. Located in separate cabinets are the IBM Channel Interface Adapter (CIA), the Modem Interface Modules (MIMs), and the Comten Integrated Protocol Converter (IPC). The architecture of the Comten 5660 is a pipelined style that is used in conjunction with four-port parallel memory, cache memory, emitter coupled logic, and extensive VLSI technology.

The Comten 5660 can connect up to 1,024 full-duplex communications lines and up to eight IBM or IBM-compatible mainframes running concurrently. The processor can execute up to 3.5 million instructions per second (MIPS), allowing for simultaneous support of large amounts of data and high-speed lines. It offers a main storage capacity of up to 16 megabytes and the high-speed cache storage.

The configuration for a Comten 5660, as a FEP, is made up of the following components: a processor with up to 16MB of main storage; a Direct Access Channel Subsystem with up to eight IBM CIAs; a MIM Subsystem with up to 64 Data Link Control Modem Interface Modules (DLC-MIMs), High-Speed Link Control Modem Interface Modules (HLC-MIMs), and/or IPCs; operator console(s); and a printer.

When the Comten 5660 is configured as an remote communications processor, its components consist of a processor with up to 16MB of main storage; a MIM Subsystem with up to 64 DLC-MIMs, HLC-MIMs, and/or IPCs; an operator console; and a printer.

The service subsystem operates separately under the control of a microprocessor. This subsystem monitors system activity and can pinpoint hardware errors down to the specific board level. The integrated diagnostic modem works with the service subsystem to provide service workers with dial-up diagnostic capabilities.

An integrated hard disk maintains system software loading, remote initial loading, and an automatic load and dump feature. This last feature is optional and can be selected at

NCR Comten 5660 Communications Processor

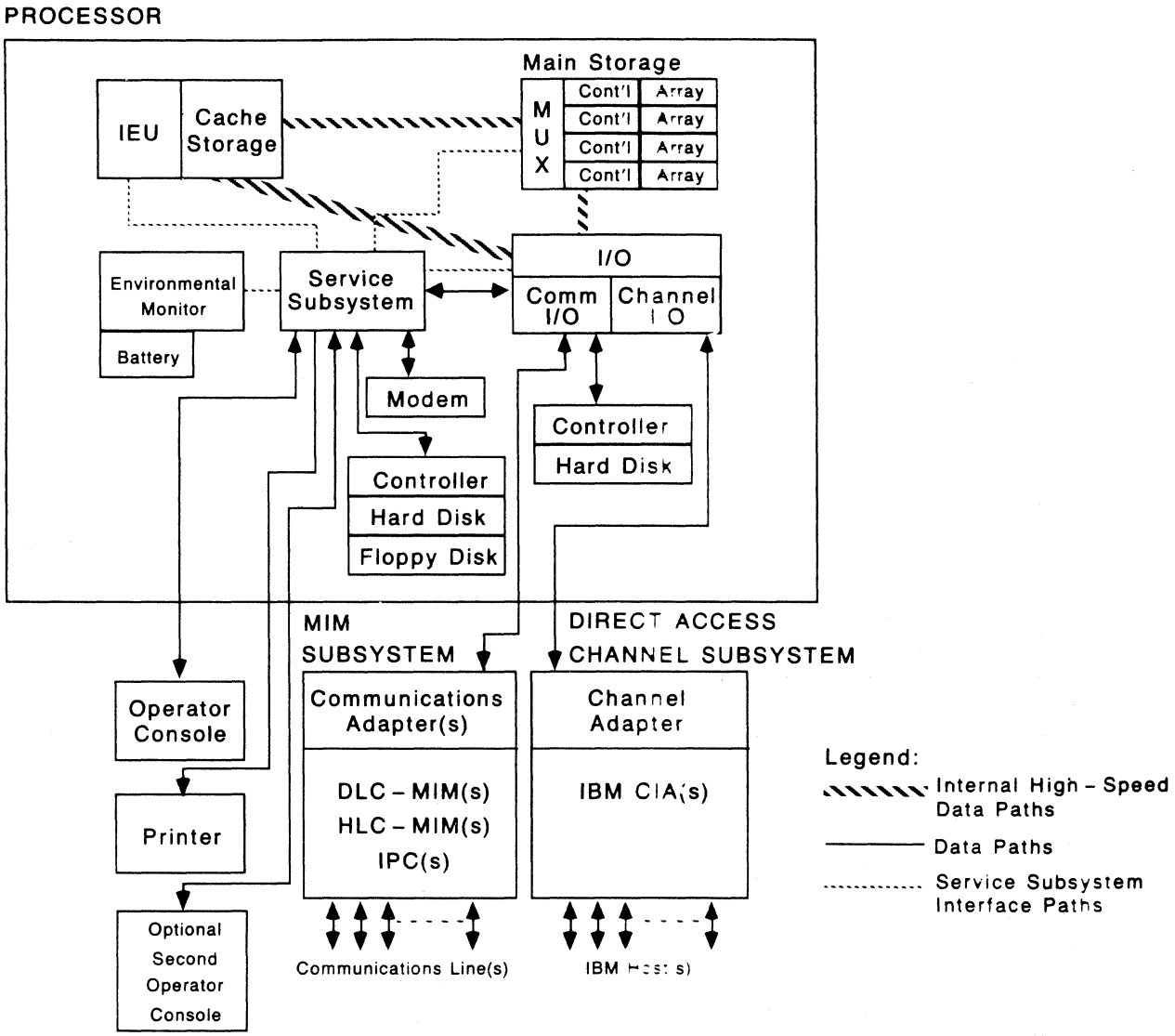

Figure 1. A block diagram of the Comten 5660 Communications Processor.

new communications processors every year. New versions of the Comten 3650 and 3690 were introduced in 1983 and 1984, respectively. A low-end communications processor, the Comten 5620, was introduced in 1985. Last year saw the introduction of a high-end communications processor, the 5660, which has three times the processing power of any other communications processor currently on the market. 1986 also saw the introduction of the Comten 3695 communications processor, which is another member of the 3600 family.

With the introduction of the Comten 5660, NCR Comten now offers a complete range of communications processors, from one supporting 32 lines (Comten 5620) on up to the Comten 5660 supporting 1,024 lines. The Comten 5660 supports the same number of mainframes as the older Comten 3690, but accommodates twice as many lines and has four times the storage capacity of the 3690. Since the Comten 5660 uses Comten software and is compatible with the existing Comten processors, users will find it easy to

system generation time. The automatic load and dump feature records errors and automatically stores memory contents on the hard disk for later analysis by the operator. It also reloads system load file data. Another option is available that will expand the size of the hard disk.

The modular nature of the Comten 5660 makes it easy to divide the processor by physical subdivisions. Components related to processing functions are found in the Processor cabinet (see Processing Components). The components that are associated with the channel side of the communications processor are found in the Direct Access Channel Subsystem cabinet (see Connection to Host and Peripherals), and the components that are connected with the communications side of the 5660 are housed in the Modem Interface Module Subsystem cabinet (see Connection to the Network). This relationship in shown in *Figure 1*.

PROCESSING COMPONENTS

The units that make up the processor subsection of the Comten 5660 include the Instruction Execution Unit; Cache storage; main storage; Input/Output (I/O), which includes a hard disk device; environmental monitor; and a service

NCR Comten 5660 Communications Processor

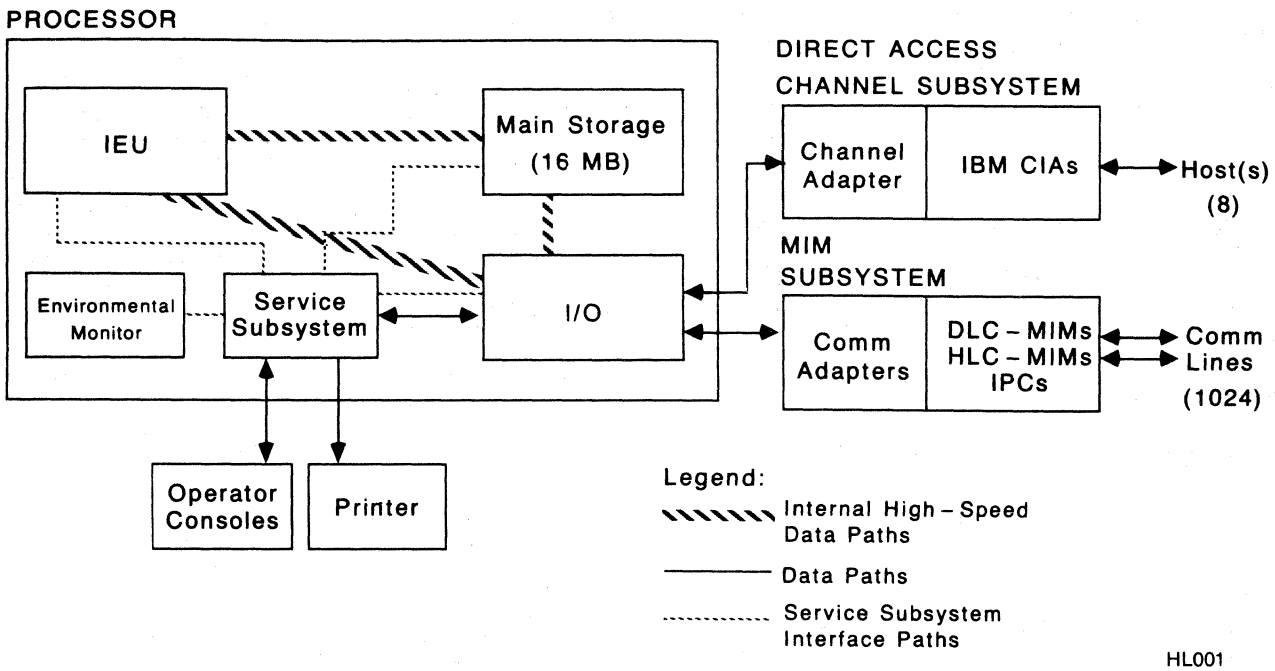

Figure 2. The Comten 5660 configured as a Front-End Processor.

migrate to or integrate a Comten 5660 into their network. Multiple Comten 3690s can be used to back up a Comten 5660 system.

The enormous power and connectivity of the Comten 5660 means that fewer communications processors are needed to run a large network. This can result in a savings on manpower and software, since every time another communications processor is added to the system, another system generation has to be done. NCR Comten did not arbitrarily decide that users needed a bigger and more powerful processor; in fact, it was the reverse. The company, in listening to its users, found that they wanted a processor that could handle the growing networks; the different types of traffic such as graphics and PCs; the new and faster data rates available; the more complex protocols; the variety of network applications, such as message reformatting, transaction routing, gateways, protocol conversion, and architectural translation; and simplified operations. The Comten 5660 handles this last request by offering just one processor to do the job, only one generation start-up needed and one set of software, a smaller footprint, and fewer interconnects.

There does not appear to be any other product that directly competes against the 5660 in terms of processing power, including systems from IBM. Like the Comten 5660, the IBM 3725 can support up to eight mainframes, but it can support only 256 communications lines and 3M bytes of main storage. Multiple 3725s can be linked together to achieve the processing capabilities of the Comten 5660, but the cost and logistics of connecting the processors do not make it a viable alternative.

Through ACF/NCP releases, beginning with Version 2, various VTAM 3.1.1 and Netview capabilities are support-

subsystem that includes a modem, a 5¼-inch floppy disk, and a hard disk.

The *IEU* includes sixteen 32-bit general-purpose registers as well as sixteen 32-bit control registers. This unit, through software, manages the actions of the Comten 5660, including managing processing control for instruction execution, timing functions, interrupt handling, and various other machine-related functions.

***Cache Storage* includes 32KB for instructions and 32KB for data. It offers the processor faster data reference than what is provided by main storage. The processor can access commands or operands needed by a program from main memory and place this information in Cache storage for future use. It has the same access speed as the speed of the IEU.**

***Main Storage* is separated into four arrays with a bank controller in each one that allows overlapping access. The standard size of main memory is four megabytes, with optional sizes of 8, 12, or 16 megabytes. Either the IEU or the I/O can access main storage through the storage multiplexer. A storage key unit, included in the main memory, is used to protect specified locations.**

The *Input/Output* section includes the I/O processor, the Direct Access Channel I/O interface, and the Communications I/O interface. This I/O section does all I/O path transfers to and from the IEU and main storage.

The Communications I/O interface deals with connecting DLC-MIMs, HLC-MIMs, and IPCs to the processor with a possible maximum of 1,024 duplex lines. Connection of the MIMs to the processor is through communications adapters, with each one having the capability of supporting up to eight MIMs or IPCs. The communications I/O interface supports up to 64 DLC-MIMs, each with 16 duplex lines; up to 64 HLC-MIMs, each with four duplex lines; and up to 64 IPCs with 16 or less lines, or up to 32 with more than 16 lines. The total cannot exceed 1,024 lines. A hard disk that is connected to this interface is used for program loading by the host channel or remotely through a communications line.

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ed by the Comten processors, although only ACF/NCP Version 4.2 supports all of these capabilities. Since NCR Comten is committed to full IBM compatibility, as NetView and VTAM capabilities continue to be developed, Comten will provide support for them. This is seen in the recent introduction of Version 4.0 of ACF/NCP.

At this point, NCR Comten appears to have the lead in offering a communications processor with more power, speed, and line connectivity than any other currently available product. Time will tell how IBM decides to answer the challenge.

ADVANTAGES AND RESTRICTIONS

The integrity of NCR Comten systems is seen throughout the product line. Users have found the products to be dependable and easily expanded. This remains true with the Comten 5660, along with its compatibility with existing Comten hardware/software.

One feature of the Comten 5660 that can be viewed as either an advantage or a disadvantage is the size of the system. For users with large networks, this processor can be a cost saver and an effective piece of equipment. For a small network, with no plans to expand, the Comten 5660 is too large and too expensive. Users should be aware that it was designed for very large networks, which previously had to use multiple processors to achieve the same effect as a single Comten 5660. This processor was designed according to requests from Comten users.

Another advantage of the system is its speed: it offers faster throughput of information with improved terminal response time. The efficiency of the processor is also seen in its quad-bank main storage, which can support large numbers of attached devices while decreasing response time. Centralized control of the network from the system console, which gives the operator the ability to control from one to all NCR Comten communications processors in the network, is yet another advantage.

Since the Comten 5660 is in its first year of production, possible problems or disadvantages have yet to appear. When this report is next updated, we may find that the system has or has not run as smoothly as it currently appears to be doing. With NCR Comten's track record though, the Comten 5660 appears to be a winner.

CASE STUDY

One advantage of being part of a users group is that you can often hear about new equipment, before anyone else does. This was the case with our user of the Comten 5660. He has worked with NCR Comten for over 15 years and is a member of the Comten Users Group. When he heard about the proposed new communications processor, he volunteered his workplace for a beta test site, and thus got some ground floor insight into the workings of the Comten 5660. The Comten 5660 was installed in June 1986 and ran beta tests through August of that year. It has since been incorporated into the network. Its primary application, at this site,

This hard disk has a storage capacity of 29 megabytes and an average seek time of 30 milliseconds.

The Direct Access Channel I/O interface is used to connect IBM-CIAs to the processor, with a possible maximum of eight hosts. Connection is through the Direct Access Channel adapter that can support up to eight CIAs.

The *Environmental Monitor* is used to monitor over- and under-voltage conditions, direction and speed of cooling fans, power control status, temperature at various points, redundant voltage regulator status, and cooling inlet air temperature. The monitor can shut off power to any cabinet that has an over-temperature condition. If a problem occurs, a message is flashed on the LCD on the maintenance panel and a warning indicator lights up on the specific cabinet in which the malfunction happened. Information on problems can be sent by the Environmental Monitor to the Service Subsystem for storage in the error log.

The *Service Subsystem* provides maintenance and operating data to both operator and service personnel. The data received from these interfaces can be accessed locally through the operator console or remotely using the built-in modem. The Service Subsystem is made up of a microprocessor with high-level language support and an integral asynchronous, dial-in/auto answer-only modem with key lock for security. The Service Subsystem provides RS-232-C connectors for operator consoles, the integral modem, and the printer. It has a hard disk with 29 megabytes of storage capacity and a 5¼-inch floppy disk with 650KB of storage capacity. This system deals mainly with environmental conditions, error recording, line connectivity, initial program loading, remote initial loading, machine check handling, power-up testing, hardware error log maintenance, fault isolation, operation of maintenance programs, and system time-of-day. The integrated hard disk in the Service Subsystem supports subsystem activities, such as recording of a hardware error log, operating maintenance programs, and isolating hardware faults.

CONNECTION TO HOST AND PERIPHERALS

The Direct Access Channel Subsystem can support up to eight IBM Channel Interface Adapters, and each Direct Access Channel Subsystem cabinet has room for up to eight IBM-CIAs. The IBM-CIAs are attached to the Direct Access Channel Adapters and these connect to a Direct Access Channel I/O Interface port on the I/O section of the Comten 5660. The Direct Access Channel I/O Interface port can multiplex eight CIAs onto one port.

The IBM-CIAs are microprocessor-controlled devices that are used to connect the Comten 5660 to an IBM or IBM-compatible host and permit information to be sent to and received from the host. It acts as an interface for the 5660 to a standard IBM S/370-byte multiplexer channel or block multiplexer channel and it can also be used to make the Comten 5660 appear to be an IBM peripheral device on an IBM host subchannel. Up to 256 subchannel addresses can be selected by an IBM-CIA.

CONNECTION TO THE NETWORK

The Modem Interface Module subsystem on the Comten 5660 has the capability of supporting a total of 64 Data Link Control Modem Interface Modules, High-Speed Link Control Modem Interface Modules, or Integrated Protocol Converters in a variety of combinations up to a total of 1,024 lines. Up to six MIMs or IPCs can be housed in each MIM Subsystem cabinet.

The *DLC-MIM* is located between the CP and the modem or a locally attached device and is used to provide control and error-checking facilities for data input/output opera-

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is to relieve the host of large-scale, front-end processing. It supports two hosts, the IBM 3081 and 3090, and serves 475 terminals/work stations. Speeds supported range from 1200 bps to 56K bps.

To get a general feeling for how the Comten 5660 has been performing, we asked the user to rate the processor, with the understanding that it had been in operation for less than a year. An Excellent rating was given for Overall Performance, Ease of Operation, Quality of Manufacturer's Maintenance Service, and Quality of Manufacturer's Technical Support. Ease of Installation received a Good, as did Quality of Manufacturer's Firmware/Software and Ease of Programming. Ease of Expansion was not applicable, and the user felt that it was really too soon to rate Hardware Reliability, although he did comment that so far, there were "virtually no hardware problems since it went into production." Since this processor was installed for testing, the user said that it was put together with baling wire. He went on to explain that remark by saying that as problems were found or kinks were worked out, a quick wiring or rewiring was done to keep the processor going. These problems are then resolved by NCR Comten in the final product that is offered to the public.

In asking this user about strengths or weaknesses of the Comten 5660, the one major strength mentioned was "speed." He said that it is a very large and fast machine and for a small network, it would be overkill. The size and price could be seen as disadvantages for those who purchased the system, but did not really utilize it. The user also liked the additional features that the Comten 5660 offers that are not found on the 3690. He said that with the size of his network, a single 3690 could not run it and still hope for expansion. He would have to use multiple 3690s, which would not be cost effective for him. Currently, he has no plans to add additional hosts to his network. When asked if he would recommend this system to a potential buyer, his comment was "Absolutely." □

tions between the CP and the communications lines. It also does the serial-to-parallel conversion of data bytes coming off the communications line, and parallel-to-serial conversion of data being transmitted out over the line. The DLC-MIM handles line speeds up to 64K bps and supports the following protocols and handlers: Start/Stop, Extended Start/Stop, BSC and Extended BSC, CNS, SDLC, and HDLC with X.25.

The *HLC-MIM* is physically similar to the DLC-MIM, and also like the DLC-MIM, is installed between the CP and the modem or locally attached device. The HLC-MIM offers the same line control and data conversion functions as the DLC-MIM, but it can support up to four communications lines and has a maximum line speed of 256K bps. This MIM is designed for high-speed network applications, such as trunks between nodes, bulk file transfers between hosts, high-speed terminal connections, and dedicated X.21 connections to a packet switched data network. The HLC-MIM supports the V.35 interface.

The *IPC* allows for the direct attachment of asynchronous terminals and personal computers to the Comten 5660 without the need for a modem between the line and the IPC. The host sees it as an IBM 3274 cluster controller and permits terminals to emulate 3278 display stations. The IPC also offers operators the most commonly used 3270 functions. It can convert asynchronous ASCII protocol to appear as BSC protocol, which allows users' non-SNA terminals and PCs to access BSC and SNA host applications. Other features of the IPC include its ability to automatically detect the baud rate of incoming data and support line speeds from 300 to 9600 bps; allow for the attachment of 43 predefined and three user-defined asynchronous terminal models; support X-on/X-off flow control; permit the direct connection of bisynchronous 3284-type printers; and can be configured for 8, 16, 24, or 32 lines.

Communications adapters also reside in the MIM Subsystem. The communications adapter connects to a Communications I/O interface port on the I/O section of the processor, and can multiplex up to eight MIMs or IPCs onto one port. Since the MIM Subsystem cabinet is not directly fastened to the processor cabinet, it can be physically located up to 100 feet from the processor.

OPERATOR INTERFACE

The system console is the primary operator interface to the Comten 5660. A second console is optional. A 120-cps printer can also be attached. From the console, users can access the various system control utility programs and maintenance facilities. The console also allows for centralized or distributed network control.

TRANSMISSION SPECIFICATIONS

The Comten 5660 communications processor can handle T1 lines and process data at rates up to 256K bps. The speed for lines attached to a Comten DLC-MIM is 64K bps, while a line attached to an HLC-MIM can support speeds up to 256K bps. Determining the maximum speed for any line is dependent on the maximum number and type of lines attached to the MIM. The system console can support 19.2K bps transfer rates. The integral modem, located in the Service Subsystem, offers selectable rates from 300 to 1200 bps.

Interfaces supported by the Comten 5660 include RS-232-C, RS-366, RS-449, V.24/X.21 bis, V.35, V.36, X.21, DDS, WECO 303 Series, MIL-188C, and DDS (Wide Band.) Protocols supported include BSC, Extended BSC, SDLC, HDLC with X.25, Comten's CNS trunk protocol, or Async codes.

The 5660 IBM-CIA connects to the IBM host through the host's byte multiplexer or block multiplexer channel. A bisynchronous 3270 cluster controller, supported by a non-IBM host, can be link attached to the 5660 through a communications line.

PHYSICAL SPECIFICATIONS

The physical characteristics of the Comten 5660 are as follows: (main processor) Height—67 inches, Width—70 inches, and Depth—28 inches. The main processor weighs 2,000 pounds. The CIA cabinet dimensions are as follows: Height—67 inches, Width—34 inches, and Depth—28 inches. The CIA cabinet weighs 900 pounds. This cabinet can be placed up to 50 cable feet from the main processor.

SOFTWARE

SYSTEM SOFTWARE: The Comten 5660 operates with existing NCR Comten hardware and software products. It uses the Comten Communications Operating System (COS 2 Release 4 or higher) upon which Comten network software for the Comten 3600 and 5600 communications processors is based. COS2 is made up of a family of system control programs that run in the 5660, and it provides an interface for Comten products so that the software products are not

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dependent upon specific hardware architecture. This compatibility with existing Comten products allows for an easier integration of the 5660 into the existing Comten network.

Software products that are supported by the Comten 5660 include ACF/NCP3 Release 2E, ACF/NCP Version 2 Release 1E, CAM3 Release 2E, CNG Release 1E, CNS3 Release 1E, CAF1 Release 1E, EP4 Release 5E, MAF3 Release 3E, NSS1 Release 2E, NTO2 Release 1E, NTO2 Release 2E, SRM1 Release 4E, and X.25 I/F Release 6E.

Comten's Advanced Communications Function/Network Control Program (ACF/NCP) does data routing functions and network control for devices in an SNA communications network, relieving the host processor of some of these network control functions. This is done through an exchange of buffered data and control information, which puts the network operation that is under the supervision of the host communications access method or Comten's CP-resident access method under the control of ACF/NCP.

The Comten Communications Networking System (CNS) is used to operate data network trunks. The network is formed by connecting Comten CPs in various locations with high-speed, full-duplex trunks. CNS software operates in the Comten CP and can concentrate data onto a single trunk, eliminating the need for separate and more costly lines to each remote device in the network.

The Comten Multiple Access Facility (MAF) and MAF/Remote Host Option (MAF/RHO) offer increased access to a variety of host computer applications for users of Comten 5660 CPs in an emulation processing environment. MAF provides a more flexible emulation system by permitting terminals attached to IBM 3270 cluster controllers access to various host subchannels and different application programs in a host computer that has an emulation-type access method. MAF and MAF/RHO offer basically the same functions, but MAF/RHO offers an additional connectivity option. With this option, a Comten 5660 can be attached by a communications line to any host computer that supports remote IBM BSC 3271, 3274, or 3276 cluster controllers. Using both MAF and MAF/RHO, terminals in an MAF network can access applications on line-attached and channel-attached host processors.

The Subarea Routing Manager (SRM) works with Comten ACF/NCP to offer switching that permits SNA 3270 and BSC devices to selectively communicate with various host computer access methods in an SNA network. SRM differs from IBM's Multisystem Networking Facility (MSNF) in that SRM resides in a Comten 5660 CP, thereby reducing the demands on a host computer's memory and processing time. SRM supports ACF/VTAM and ACF/TCAM access methods. With the addition of Comten MAF, SRM offers resource sharing and coexistence between non-SNA and SNA environments.

Comten's Communications Access Method (CAM) is a telecommunications access method that supports communications application programs and is lodged in a Comten 5660 CP. CAM offers a central point for the control of network activities and also works with Comten ACF/NCP to provide network communications services. CAM can also be used as a platform for developing application programs for NCR Comten CPs.

The Comten Network Gateway (CNG) works in a Comten 5660 CP and links two or more independent SNA networks. The SNA networks connected by CNG keep their own network addressing scheme, allowing any additions or deletions of resources within the network to have little, if any, effect on other interconnected networks.

The Network Terminal Option (NTO) works with ACF/NCP to permit specific non-SNA devices to access SNA host computers and application programs. NTO resides in a Comten 5660 CP and provides numerous non-SNA devices with the same connectivity capabilities as SNA devices.

Comten's Emulation Processing (EP) permits a Comten 5660 CP to replace one or more IBM communications devices and do network control jobs for a non-SNA data communications network. Comten EP can emulate hardware adapter functions, as well as allowing the Comten 5660 to do various terminal handling functions. Since these functions are in EP software, network changes can be done without extensive hardware modifications or reprogramming.

The X.25-1 Interface to Packet Switched Data Networks (X.25) consists of software modules for Comten CPs that allow X.25 packet switched data networks (PSDNs) to be integrated into a data communications network, replacing or supplementing conventional circuits. X.25-1 supports virtual circuits, offering a wide range of Comten 5660 CP capabilities and features. CCITT Recommendation X.25 is implemented, providing an interface to numerous network vendors/administrations.

Comten's Communications Alerting Facility (CAF) offers a realtime display on the status of all the communications lines that are physically attached to the CP in which they reside.

PRICING

The NCR Comten 5660 ranges in price from $310,000 to $1,600,000, depending on configuration options chosen. The manufacturer's suggested retail price for the processor and memory expansions are shown in the following pricing charts. Leasing prices as well as maintenance costs are also given. NCR Comten offers training courses that address Comten's COS2. It also offers a variety of maintenance agreements for the Comten 5660, depending on the level desired by the user. The company offers a software maintenance program that includes both central and local support.

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EQUIPMENT PRICES

		Purchase Price ($)	3-Year Lease ($)	Monthly Lease ($)	Monthly Maint. ($)
MODELS					
T-5660-A1	FEP Processor, 4MB memory	300,000	10,135	15,000	623
T-4060-A1	System Console	5,000	169	250	28
F-6308-A1	29MB Disk Drive	1,500	63	75	35
F-5601-A1	4 to 8MB Memory Expansion	70,000	2,365	3,500	304
F-5602-A1	8 to 12MB Memory Expansion	70,000	2,365	3,500	608
F-5602-B1	4 to 12MB Memory Expansion	140,000	4,730	7,000	608
F-5603-A1	12 to 16MB Memory Expansion	70,000	2,365	3,500	912
F-5603-B1	8 to 16MB Memory Expansion	140,000	4,730	7,000	912
F-5603-C1	4 to 16MB Memory Expansion	210,000	7,095	10,500	912
F-3062-A1	IBM CIA	7,000	236	350	16
F-2271-A1	Communication Adapter I/F	3,500	118	175	8

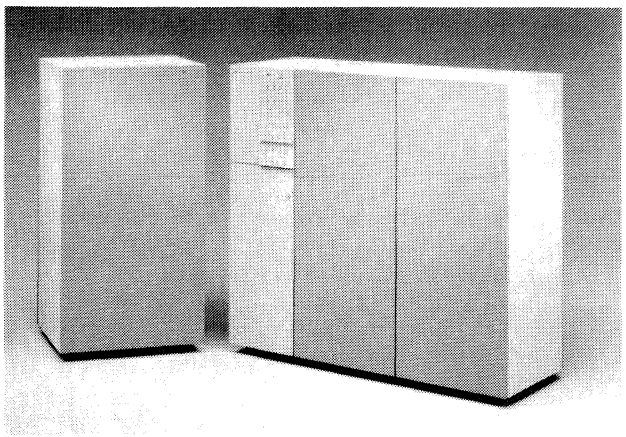
NCR Comten 5660 Communications Processor

OVERVIEW

NCR Comten has broken new ground with the introduction of the Comten 5660 Communications Processor, which supports twice as many lines (1,024) as any other communications processor currently on the market, has four times the main storage capacity, and is considered to be three times more powerful. The new member of the Comten family is fully compatible with IBM and IBM-compatible mainframes operating in SNA and non-SNA environments, mainframes that support BSC 3270-type devices, and NCR mainframes via a communications line. Plans for channel-attachment support for NCR mainframes are on the drawing board.

The Comten 5660 uses extensive VLSI and ECL macrocell logic functions in the system architecture. It also uses a cache memory that allows for faster operation, as the processor does not need to routinely access the main memory for data. The Comten 5660 operates with existing NCR Comten hardware and software products, allowing for easier integration into an existing network. The four-port design of the Comten 5660's main memory permits the communications processor to carry out instructions faster than single-port designs. One port can be accessing data while other ports are being filled with data. The main storage capacity of the Comten 5660 provides up to 16 megabytes of memory.

New features found on the Comten 5660 include a service subsystem for better reliability and maintainability. The Comten 5660's service subsystem is a separate, integrated component with its own microprocessor and memory. A 29 megabyte disk supports the service subsystem, which is used to pinpoint hardware errors to the exact board level and automatically log them on an error log. An integrated modem allows for diagnosing problems through dial-up capabilities within the subsystem.



The Comten 5660, from NCR Comten, is three times faster and offers more power and line connectivity than any other SNA-compatible communications processor available in the market.

PRODUCT ANNOUNCEMENT: The 5660 Communications Processor from NCR Comten is designed to support up to eight mainframes running concurrently, to connect up to 1,024 full-duplex communications lines, and to provide up to 16MB of main memory. The 5660 is capable of supporting high-speed T1 lines, as well as large amounts of data at the same time. VLSI technology and ECL macrocell logic are supported, along with a cache memory that provides 64K bytes of storage in a temporary buffer. The 5660 has approximately three times the processing power of the current leading SNA-compatible communications processor on the market. This new processor is compatible with IBM and IBM-compatible mainframes, as well as with other Comten processors and networking software. This compatibility allows for easy migration to and implementation of the Comten 5660.

ANNOUNCEMENT DATE: May 1986.

DELIVERY SCHEDULE: Fourth quarter 1986.

PRICE: Prices range from $310,000 to $1,600,000.

BASIC SPECIFICATIONS

MANUFACTURER: NCR Comten, Inc., 2700 Snelling Avenue North, St. Paul, MN 55113. Telephone (612) 638-7777.

CONFIGURATION: The basic configuration for a Comten 5660 includes a central processing unit; a cache memory with a 64K-byte temporary storage buffer; a system hard disk that is attached to the I/O section of the processor, a service subsystem hard disk, and service subsystem diskettes that support the subsystem hard disk; I/O control unit; instruction execution unit (IEU); main memory; operator interfaces; and a service subsystem that is the central point for maintenance and operation control of the processor. In a separate cabinet, the IBM channel interface adapter (CIA) can be located, as well as the modem interface modules (MIMs) and the Comten Integrated Protocol Converter (IPC). The architecture of the Comten 5660 is a pipelined style used in conjunction with four-port parallel memory, cache memory, emitter coupled logic, and extensive VLSI technology.

The Comten 5660 can connect up to 1,024 full-duplex communications lines and up to eight IBM or IBM-compatible mainframes running concurrently. The processor can execute up to 3.5 million instructions per second, allowing for sumultaneous support of large amounts of data and high-speed lines.

The service subsystem operates separately under the control of a microprocessor. This subsystem monitors system activity and can pinpoint hardware errors down to the specific board level. The integrated hard disk in the service subsystem supports subsystem activities, such as recording of a hardware error log, operating maintenance programs, and isolating hardware faults. Other components in the system that report to the service subsystem are an environmental monitor and an integrated modem. The integrated diagnostic modem works with the service subsystem to provide service workers with dial-up diagnostic capabilities.

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An environmental monitor reports to the service subsystem. This monitor tracks temperature, cooling fan directions, speeds and voltages, and warns operators of any unusual activities. The environmental monitor provides a 12-hour battery backup for retaining error data for fault determination during a power loss.

The Comten 5660 includes a console that provides users with access to a wide variety of system control utility programs and maintenance facilities and allows for centralized or distributed network control.

RELATIONSHIP TO CURRENT PRODUCT LINE: With the introduction of the Comten 5660, NCR Comten now offers a complete range of communications processors from one supporting 32 lines on up to the Comten 5660 supporting 1,024 lines. Last year the company introduced the lower end of the line with the 5620. The Comten 5660 supports the same number of mainframes as the older Comten 3690, but accommodates twice as many lines and has four times the storage capacity of the 3690. Since the Comten 5660 uses Comten software and is compatible with the existing Comten processors, users will find it easy to migrate to or integrate a Comten 5660 into their network. Multiple Comten 3690s can be used to back up a Comten 5660 system.

MARKETING POSITION: For eighteen years NCR Comten has been developing, manufacturing, marketing, and servicing data communications processors, modems, and networking software for connectivity, integrated network applications, and network control and management. After IBM, NCR Comten is the leading vendor of communications processors for the IBM environment. Since 1983, NCR Comten has introduced new communications processors every year. New versions of the Comten 3650 and 3690 were introduced in 1983 and 1984 respectively. A low-end communications processor, the Comten 5620, was introduced in 1985. This year, 1986, has seen the introduction of a high-end communications processor, the 5660, with three times the processing power of any other communications processor currently on the market.

There does not appear to be any other product that directly competes against the 5660 in terms of processing power, including systems from IBM. Like the Comten 5660, the IBM 3725 can support up to eight mainframes, but it can support only 256 communications lines and 3M bytes of main storage. Multiple 3725s can be linked together to achieve the processing capabilities of the Comten 5660, but the cost and logistics of connecting the processors do not make it a viable alternative. At this point, NCR Comten appears to have the lead in offering a communications processor with more power, speed, and line connectivity than any other currently available product. Time will tell how IBM decides to answer the challenge. □

The integrated hard disk maintains system software loading, remote initial loading, and an automatic load and dump feature. This last feature is optional and can be selected at system generation time. The automatic load and dump feature records errors and automatically stores memory contents on the hard disk for later analysis by the operator. It also reloads system load file data. Another option is available that will expand the size of the hard disk.

The system console is the primary operator interface to the Comtem 5660. A second console is optional. A 120-cps printer can also be attached. From the console, users can access the various system control utility programs and maintenance facilities. The console also allows for centralized or distributed network control.

The physical characteristics of the Comten 5660 are as follows: (Main processor) Height—67 inches, Width—70 inches, and Depth—28 inches. The main processor weighs 2,000 pounds. The CIA cabinet dimensions are as follows: Height—67 inches, Width—34 inches, and Depth—28 inches. The CIA cabinet weighs 900 pounds. This cabinet can be placed up to 50 cable feet from the main processor.

SYSTEM SOFTWARE: The Comten 5660 operates with existing NCR Comten hardware and software products. It uses the Comten Communications Operating System (COS) upon which Comten network software for the Comten 3600 and 5600 communications processors is based. This compatibility with existing Comten products allows for an easier integration of the 5660 into the existing Comten network.

SYSTEM FEATURES: The Comten 5660 is three times more powerful than any other communications processor in the industry. The system supports high-speed lines including T1, and handles other tasks, such as performance modeling and analysis support for evaluating migration possibilities. Backup options ensure network availability. A single Comten 5660 can totally back up another Comten 5660 or partially back up several Comten 5660s. Multiple Comten 3690s can be used to backup a Comten 5660 system.

PRICING: The NCR Comten 5660 ranges in price from $310,000 to $1,600,000 depending on configuration options chosen. ■