IBM 3745 Communication Controller

In this report:

Product Summary

Editor's Note
The 3745 has remained stable during the year. IBM has not added any new models to the family. Price increases are reflected in the Equipment Prices section of the report.

Description
The 3745 line of communications controllers consists of the Models 210 and 410, the original models in the series, and the Models 130, 150, and 170, released in 1989. To keep up with industry demands, IBM incorporated T1 capabilities into the devices. The minimum configuration for a 3745 unit includes 4 megabytes of storage per Central Control Unit (CCU), two low-speed scanners, eight line interface couplers, and one Type 1 line interface coupler unit.

Users can attach the 3745 to a byte multiplexer, block multiplexer, or selector channel. When attached to a block multiplexer channel of a 937X or 3090, the 3745 supports datastreaming mode. Remote communications occur via common carrier or private communication facilities. The 3745 supports data communications between terminal devices directly linked, linked by modem, or attached to an IBM Token-Ring network; between terminal devices and one or more directly connected or remotely connected 4300, 937X, 3033, 308X, or 3090 host processors; or between host processors.

Strengths
Users can control remote 3745 operations from a central site. When connected to a 3745 via a modem and switched communication line, a user-provided control terminal can manage single or multiple 3745s.

Limitations
At this time, the 3745 does not support T3.

Competition
NCR Comten, Amdahl.

Vendor
International Business Machines Corp. (IBM)
Old Orchard Road
Armonk, NY 10504
Contact your local IBM representative.

Price
$20,600 to $213,450.

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Processors

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Analysis

In January 1988, IBM introduced the 3745 Communication Controller. A medium- to high-end member of the IBM Communication Controller family, the 3745 originally came in two versions: Model 210 and Model 410. The Model 210 has a single Central Control Unit (CCU) and is field upgradable to the Model 410. The Model 410 has two independent CCUs, each capable of running a separate Network Control Program (NCP). The Model 410 supports three modes of operation: twin dual, twin standby, and twin backup. The Model 410 offers twice the processing power of the Model 210. In 1989, IBM added the 3745 Models 130, 150, and 170, which support fractional T1 services leased in increments of 64K bits per second.

The 3745 supports IBM Communications Network Management (CNM), NetView, IBM Modems Link Problem Determination Aids (LPDAs) enhancements, IBM/Communications Systems, and the X.25 interface. In conjunction with up to five 3746 Expansion Units, the 3745 features modular growth capabilities that accommodate support for up to 16 host attachments, 512 line attachments, 8 high-speed line attachments to T1 and CEPT channels, and 8 IBM Token-Ring attachments.

In May 1989, at the International Communications Association's Conference and Exposition in Dallas, IBM announced low-end and midrange models for the 3745, as well as enhancements to the existing models. The enhanced models accommodate fractional T1 services and can now support up to 896 low-speed lines.

Competitive Position

Before its introduction, analysts predicted that the IBM 3745's capabilities would match those of the NCR Comten 5660, which supports 1,056 ports and T1 and has 16M bytes of internal storage. The 3745 supports only 512 lines, however, and 8M bytes of internal storage. Analysts have also questioned whether the 3745 can actually run eight T1

lines. The processor memory is also needed to handle machine functions, further reducing the amount of memory available for T1 lines. The general belief is that, with its present capabilities, the 3745 will be capable of running two or three T1 lines efficiently.

NCR has fortified its position in the communication processor market by introducing the 5655, 5665, and 5675 processors, which also compete against the IBM 3745 Models 210 and 410. The 5655 and 5665 can support 16 T1 lines and 64 token-ring LANs. The top-of-the-line model, the 5675, can support 24 T1 lines, as well as 1,024 full-duplex lines. The 5665 also supports 1,024 full-duplex lines. In the third quarter of 1989, NCR increased the 5675's support from 8 to 16 mainframes. IBM's claim that the 3745 is the only IBM or IBM-compatible communications controller that is offered with an option of two engines or internal central control units is not all that unique, according to the competition. While NCR Comten does not offer dual control units, it offers backup (redundancy) by attaching two processors through its Modem Interface Modules (MIMs). Both units run NCP and can be used if problems occur on the main processor.

Questions also arise about the efficiency of this dual backup method. If both CCUs are fully configured and running simultaneously, and one suddenly goes down, the remaining CCU does not have the capacity to handle all the applications of the downed CCU. A choice must be made as to the most critical applications to be run from each.

The 3745 will take an active role in IBM's plans to open its network architecture to other vendors without losing network control. The 3745 performs numerous routing functions in an SNA network, which will be of increasing importance as IBM migrates SNA from a hierarchical to a peer-to-peer network.

The use of ASIC chip technology, compatibility with NetView, and the ability to configure the IBM 3745 as a PU 2.1 device within an SNA network all indicate that IBM is building its communications controllers for the future.

Decision Points

The IBM 3745 rounds out the 37XX Communication Controller family. Unlike the older technology of the 3720 and the 3725, the 3745 is based on

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Company Profile
IBM Corporation

Corporate Headquarters
Old Orchard Road
Armonk, NY 10504

In Canada
IBM Canada Ltd.,
Markham
3500 Steeles Avenue E.
Markham, ON L3R 2Z1
(416) 474-2111

Offices located in other
cities throughout Canada

Officers
Chairman/CEO: John Akers
Vice Chairman: Jack D. Kuehler
Sr. VP/Gen. Mgr.: Terry Lautenbach

Company Background
Year Founded: 1914
No. Employees: 400,000
worldwide

IBM is one of the oldest
manufacturers of computing equipment in the
world. It started out in
Poughkeepsie, NY as a
small company manufacturing clocks for industrial
use and later introduced
punched card equipment

for business accounting
functions. According to
Business Week and *Fortune*, IBM is among the
top five industrial corporations by sales volume. It
has dominated the mainframe market for over 30
years and has a strong
hold on other industry
sectors.

Business Overview
IBM designs, manufactures, markets, and services mainframe
computer systems and
associated peripherals;
minicomputer systems
and peripherals,
microcomputer/personal
computer systems; computer system software;
data communication controllers and terminals;
other communication
products such as modems, voice response
systems, and voice messaging systems; and local
area network communications products. In addition, IBM provides
specialized products and

services such as communications carrier and limited timesharing services;
the IBM Information Network, a communications
facility with remote storage and computing services; OEM
manufacturing of terminals, disk drives, and
other products; maintenance service and system
supplies; and financial
services through its IBM
Credit Corp. subsidiary.

Since it introduced its PC
line of microcomputers,
IBM has had several
earning periods when
company growth was
much less than anticipated. To compete more
effectively in the small
systems market, IBM has
greatly expanded its software efforts and has entered into agreements
with several independent
software suppliers to provide tools for its entire line
of computer products.

Financial Profile
Operations results for
1989 showed that net
profits fell 35 percent to
$3.76 billion, or $6.47 per
share. Revenues, however, increased 5.1 percent to $62.7 billion over
1988. Fourth-quarter
earnings fell 75 percent to

$591 million, or $1.04 per
share, due to a $2.3 billion
restructuring charge.

In July 1990, IBM reported earnings were up
5.2 percent to approximately $1.41 billion or
about $2.45 per share for
the second quarter. Revenues were up 8.4 percent
to $16.5 billion from
$15.21 billion for the
same quarter a year earlier.

Management Statement
Moving more resources
close to customers is a
cornerstone of IBM's
transformation in the
computer industry. To
that end, in 1988 IBM undertook the most significant restructuring of its
business in more than 30
years, establishing seven
lines of business and a
new organization—IBM
United States. This restructuring continued
through 1989 and will
continue to be dynamic in
order to consistently meet
the needs of its customers.

IBM notes that it is managing for the long term
and, with the steps it has
taken and continues to
take, it remains confident
about the future of its
business.

IBM's new line of Application Specific Integrated
Circuit (ASIC) chips, which hold up to 40,000 circuits each, almost three times the capacity of previous IBM ASIC logic chips. Although the Model
410 offers performance up to four times that of the
3725 and supports twice the connectivity of the
3725, the 3745 is not intended to replace the 3725,

but to serve as a high-end model in the communications controller product line. The 3725 is the
medium- to high-end model.

The 3745 offers features that were not incorporated into the 3725, such as support for T1 and
other high-speed digital network facilities; hot-pluggable Line Interface Couplers (LICs) that allow

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LICs to be placed anywhere within the 3745 while the machine is running; dual Central Control Units (CCUs); and increased storage facilities.

The Model 210 supports about 1.6 to 4.0 times as many lines as the 3725. In 9600 bps full-duplex, multipoint SDLC lines with interactive traffic, Model 210 can support about 1.6 times as many lines; in 56K bps, full-duplex, point-to-point SDLC lines with batch traffic to the host, the Model 210 can support about 2.4 times as many; in 256K bps, full-duplex, point-to-point SDLC lines with batch traffic between NCP nodes, the Model 210 can support about 4.0 times as many lines. For batch traffic between Network Control Program (NCP) nodes on full-duplex, point-to-point SDLC lines, the Model 210 can process up to six times the data traffic of the 3725.

In terms of performance, the Model 410 offers twice the transaction processing power of the Model 210.

The newest models in the 3745 family, Models 130, 150, and 170, support fractional T1 services that are leased in increments of 64K bits per second. Each of the three models offers 4M bytes of main storage.

Users can benefit from the manner in which IBM has incorporated dedicated power supplies into each component of the 3745. A problem in any of the following devices will impact only its own functionality: CCU, LIC unit, Channel Adapter with Two Processor Switch (CATPS), Maintenance and Operator Subsystem (MOSS), and every pair of adapters.

Within the 3745, IBM has incorporated improved maintenance capabilities over those of the 3725, having added new facilities to MOSS. The MOSS subsystem performs an automatic analysis of Box Event Records (BERs). It also allows users to tap into the Remote Support Facility (RSF), which enables IBM product specialists at a centrally located support station to make contact with the 3745. After remotely monitoring the machine's operation, examining the BERs, and running diagnostic programs, the product specialists can make corrections and adjustments.

The "hot" pluggability of the LICs improves operation by allowing customers to place LICs anywhere within the 3745 while the machine is running. Users can reconfigure LICs or remove failing ones without disrupting traffic on other interfaces.

Another improvement over the 3725, the Automatic Scanner re-Initial Microcode Load (re-IML) enhances the availability of the scanner in the machine. If a scanner fails, the MOSS subsystem performs a dump of the scanner memory and IMLs without operator intervention. After completion of these routines, MOSS notifies the host of the outcome. If successful, the host reactivates the lines; if unsuccessful, manual intervention must occur. In the 3725, every installed LIC undergoes scanning; in the 3745, a selective scanning process takes place in which the scanner ignores LICs with no lines activated.

When using the 3745, customers can take advantage of an access area that enables them to install or change LICs. This arrangement enables customers to perform configuration upgrades or to replace faulty LICs without the assistance of a service person. In addition, customers can connect or disconnect all external cables of the 3745, except those for channel adapters.

IBM has included internal clocks as standard features in the 3745, and any LIC port can provide internal clocking when necessary. The customer no longer has to rely on IBM service personnel to set the clocks for directly attached terminals. In addition, the clocks can be assigned on a line-by-line basis, rather than through the method required by the 3725—the LIC basis. The control program now specifies the clock values for all types of attachments that require internal clocking.

Operating procedures allow users to remotely control 3745 operations from a central site. A user-provided control terminal, when attached to each 3745 via a modem and switched communication line, can serve as a remote operator console to manage single or multiple 3745s.

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Characteristics

Models: Model 210 and 410; Models 130, 150, and 170.

Date of Announcement: Models 210 and 410—January 1988; Models 130, 150, and 170—May 1989.

Date of First Delivery: Model 210—March 1988; Model 410—September 1988; Models 130, 150, and 170—May 1989.

Number Installed: Information not available.

Configuration

The minimum configuration for a basic 3745 consists of 4 megabytes of storage per Central Control Unit (CCU), two low-speed scanners, eight line interface couplers, and one Type 1 line interface coupler unit.

IBM has equipped the models 210 and 410 with two sets of buses—Bus Group 1 and Bus Group 2—both of which link the channel adapters and communication line adapters to the CCUs.

IBM's newest models, the 130, 150, and 170, all run the same releases of the Network Control Programs (NCPs) as the Models 210 and 410. Users can upgrade the new models from one to another, but they cannot upgrade these models to the existing 210 and 410.

The Maintenance and Operator Subsystem (MOSS), the 3745's service processor, performs an automatic analysis of Box Event Records (BERs). If a failure occurs, the MOSS supplies a reference code for use by the customer and IBM's service organization to determine the cause. In addition, IBM offers the Remote Support Facility (RSF), which allows IBM product specialists at central support locations to establish a connection with the 3745. The port of the RSF modem supplied with the 3745 operates in BSC protocol at 2400 bps.

A customer-provided terminal serves as a local operator and service console. This terminal can be a directly attached 3151 (without modem) in native mode; or a 3151 Model 310/360 or 410/460 running in 3101 Model 23 emulation mode; or a 3161 Model 11/21 or 12/22 or 3163 Model 11/21 or 12/22 running in 3101 Model 23 emulation mode; or a 3727; or an equivalent terminal running in 3101 Model 23 mode at 2400 bps.

Users attach consoles to the 3745 via two MOSS communication ports. Only one console can be active at a time. The local console, acting as an operator and service unit, must be directly attached without a modem.

The alternate console is an optional, directly attached unit that cannot be used with the remote console. The remote console is an optional, modem-attached unit that manages one or multiple 3745s when attached to each 3745 via modems and a switched telecommunication line.

IBM modems suitable for use with the 3745 are listed in a table later in the report. Other IBM modems with an interface compatible with 3745 Line Interface Couplers (LICs) can also be used.

Models

Model 210: The basic Model 210 consists of a single CCU with its power supply, 4 megabytes of main storage with direct memory access (DMA) and 16K bytes of cache storage, two bus groups and bus switch, two low-speed scanners, eight LICs, one LIC Unit Type 1, and a Maintenance and Operator Subsystem (MOSS). Optional expansion features include one 4M-byte storage increment; up to eight channel adapters (CAs) or up to four channel adapters with two processor switch (CATPS), or a combination of CAs and CATPSs; one LIC Unit Type 1 or LIC Unit Type 2; and up to 24 optional LICs.

Model 410: The Model 410 includes the same elements as the Model 210, but IBM has equipped the Model 410 with two independent CCUs (CCU A and CCU B), each capable of running its own NCP. It offers twice the 210's transaction processing power.

Users can operate the Model 410 in dual, twin standby, and twin backup modes.

Twin-dual mode: The two CCUs of the Model 410 run independently, functioning as two separate subareas, each with its own active NCP. In this mode, Bus Group 1 connects to CCU A, and Bus Group 2 to CCU B. If one CCU stops, only its subarea is interrupted, and no bus switching occurs.

Twin-standby mode: In this mode, the active CCU controls the whole configuration, and Bus Group 1 and Bus Group 2 connect to the active CCU. The second CCU—the hot standby CCU—takes control if the first CCU cannot perform. The second CCU assumes control automatically if a hardware failure occurs or on command from the 3475 operator console.

Twin-backup mode: Under normal operating conditions, this method functions like the twin-dual mode. However, if one CCU stops, the other CCU takes control of its adapters. The active CCU may recover all or part of the traffic, depending on customer requirements. The switching between CCUs disrupts operation only for the sessions previously established on the stopped CCU. During backup status, Bus Group 1 and Bus Group 2 connect to the active CCU. When the other CCU is ready to resume processing, the appropriate Bus Group can revert to normal status via an operator command at the 3745 console.

Model 130: This model supports two T1 lines, four host channel links, and four 4M bps or 16M bps IBM Token-Ring interfaces.

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Model 150: This model supports 16 ports at data rates up to 256K bps, two 4M bps or 16M bps IBM Token-Ring interfaces, and one T1 line.

Model 170: The Model 170, the largest of the three most recent processors, supports up to 112 lines at data rates up to 256K bps. The machine also supports two 4M or 16M bps IBM Token-Ring interfaces and two T1 lines.

The following table presents an overview of 3745 features.

Specifications	IBM 3745
Number of CCUs	One or two
Storage (bytes)	4M or 8M per CCU
Max. Duplex Line Attachment	528
Max. Line Speed (bps)	1.544M (T1)
Host Attachments	16
Token-Ring Adapters	8
Line Interfaces	EIA RS-232-C, RS-366, V.24, V.25, V.35, X.21, wideband, direct attach
Console Requirements	3151, 3161, 3727 (local), or PC emulating 3101 (remote)
Dimensions (in.)	Base: 69.9 high, 47.5 wide, 29.5 deep
Weight (lb.)	Base: less than 1,411
Power Requirements	208-240 V AC, 3 phase
Operating Environment	60° F; 8% to 80% relative humidity
Heat Output	Base: 3kW (10K Btus/hr.)

Subsystems

The 3745 consists of the Control Subsystem, Communication Subsystem, and Maintenance and Operating Subsystem.

Control Subsystem: This area consists of one or two CCUs with 4 megabytes of basic storage and an optional storage increment of 4 megabytes with direct memory access (DMA) and 16K bytes of cache storage. The Control Subsystem has two bus groups, each consisting of two Input/Output Control (IOC) buses and one DMA switch. This subsystem also has a bus switch and features a power supply per CCU. In addition, the Control Subsystem incorporates a combination of channel adapters (CAs) and/or channel adapters with two processor switches (CATPS). Each CATPS takes the place of two CAs. One power supply for each pair of adapters sustains the host connections.

Communication Subsystem: This subsystem provides three types of attachment to the telecommunications network: Line Interface Couplers, High-Speed Scanners, and Token-Ring Adapters.

Line Interface Couplers (LICs) support asynchronous or synchronous transmission at speeds up to 256K bps and direct or modem-attached data terminal

equipment (DTE) under start/stop, BSC, or SDLC protocols via a Low-Speed Scanner. LIC Types 5 and 6 provide integrated modem and DSU/CSU functions. LIC units are modular enclosures that house up to 16 LICs with their own power supplies.

IBM offers the following Line Interface Couplers:

- LIC Type 1—four ports, up to 19.2K bps; supports EIA RS-232-D/CCITT V.24, EIA RS-366/CCITT V.25, and CCITT X.21 bis.

- LIC Type 3—one port, up to 256K bps; supports CCITT V.35 interface.

- LIC Type 4A—four ports, up to 9.6K bps; supports CCITT X.21 interface.

- LIC Type 4B—one port, above 9.6K bps to 256K bps; supports CCITT X.21/X.24 interfaces.

- LIC Type 5—two integrated modem ports at 4.8K bps, 9.6K bps, or 14.4K bps; attachment to analog lines.

- LIC Type 6—one integrated DSU/CSU or LDM port DSU/CSU attachment to DDS at 9.6K bps, 19.2K bps, or 56K bps, LDM attachment to baseband line at 9.6K bps, 19.2K bps, or 56K bps.

The following IBM modems can be used with the 3745.

Model	Characteristics
3834	4800 bps, sync
3864, Model 2	4800/2400 bps, switched, sync
3865, Models 1, 2	9600/4800 bps, sync
3868, Models 3, 4	9600/4800, bps, sync
3872	2400/1200 bps, sync
5811, Model 20	2400-19,200 bps, sync; 45.5-19,200 bps, async
5812, Model 10	2400-19,200 bps, sync; 45.5-19,200 bps, async
DSU/CSU Model 10	2.4K-56K bps sync
5865, Models 2, 3	9600/7200/4800 bps, sync
5868, Model 52	9600/7200/4800 bps, sync
5866, Models 2, 3	14,400/9600 bps, sync
5868, Model 62	14,400/9600 bps, sync
DSU/CSU 5821, Model 10	2400 to 56,000 bps, sync
5842	1200/2400 bps, sync; 45.5-2400 bps, async
5853	1200/2400 bps switched, sync
7861 and 7868	4800/9600/14,400/19,200 bps, sync
7855 V.32	To 1200 bps, sync/to 19.2K bps, async

Each *High-Speed Scanner* supports the attachment of two (one active at a time) V.35 or X.21 nonswitched SDLC data lines operating at speeds from 56K bps to 2.048M bps.

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The *Token-Ring Adapters* (Type 1 and Type 2) each support attachment of two IBM Token-Ring Networks under standard protocols. Type 1 and Type 2 attach to 4M bps token-rings via the IBM Cabling System or telephone twisted-pair wiring. Type 2 also attaches to 16M bps token-rings via the IBM Cabling System.

Maintenance and Operator Subsystem (MOSS):
The MOSS is functionally separate from the CCU and contains its own power supply. The MOSS operates the 45M-byte disk, the diskette drive, and the control panel of the 3745. Two communication ports support the attachment of 3745 operator consoles. The Remote Service Facility (RSF) port enables the 3745 to be connected to IBM Hardware Central Service. IBM supplies the RSF modem with the 3745.

The MOSS performs IPL functions and machine initialization and also controls the bus switching. It offers system procedures for notification of failures and furnishes the operator with tools to determine problems.

Storage

Disk Storage: In conjunction with the MOSS microcode and 3745 communication programming support, the 45-megabyte disk and disk adapter of the 3745 accommodate up to two NCP load modules, as well as any other communication controller resident programs, and one NCP dump per CCU. One or two NCP load modules per CCU can transfer from the host to the 3745 (local or remote) and be stored on the disk. From the network console, the operator can specify which NCP load module is selected for loading. The NCP transfer does not disrupt 3745 operations. If a CCU/storage-related failure occurs, a dump of the NCP storage is automatically saved on the 3745 disk before the start of the NCP automatic reload sequence. The network operator can request the online transfer of a full or partial dump.

3746 Expansion Unit

The 3746 supplies the 3745 Communication Controller with additional channel adapters, Low-Speed Scanners, and Line Interface Couplers. There are three models.

- **Model A11**—provides up to eight additional channel adapters, or up to four additional channel adapters with two processor switch, and up to 16 additional Low-Speed Scanners.

- **Model A12**—provides up to eight additional Low-Speed Scanners.

- **Models L13, L14, L15**—provide up to 256 additional line attachments provided by each model, with or without integrated modems.

The maximum attachment capacity of the 3745 and its associated expansion units is limited to 512 lines.

Software

ACF/NCP Version 5: The 3745 Communication Controller requires one of the following releases of the ACF/NCP Version 5 licensed program:

- ACF/NCP Version 5, Release 1, which is generated via ACF/SSP V3R3 for MVS/370 and MVS/XA;

- ACF/NCP Version 5, Release 2, which is generated via ACF/SSP V3R4 for MVS/370, MVS/XA, VM/SP, VM/SP HPO, VM/XA, VSE/Advanced Function, or VSE/SP; or

- ACF/NCP Version 5, Release 2.1, which is generated via ACF/SSP V3R4.1 for MVS/370, MVS/XA, VM/SP, VM/SP HPO, VM/XA, VSE/Advanced Function, or VSE/SP.

Network Management: The 3745 supports IBM's Communication Network Management (CNM) by sending information about errors to the NetView program in a host processor, which displays the alerts on the network control terminal. NetView provides alert support for the IBM Token-Ring Network. If NetView is not installed, IBM recommends the installation of a 3745 console near the VTAM console to assist customers in determining and resolving problems.

Support of CCITT X.25 for IBM and non-IBM DTEs:
With the *X.25 NCP Packet Switching Interface (NPSI) Licensed Program*, users can attach the 3745 to data transmission networks supporting X.25 interfaces. With the *X.25 SNA Interconnection (XI) Licensed Program*, users can use the SNA backbone network and the SNA transport facilities to move X.25 traffic between compatible X.25 DTEs.

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Equipment Prices

3745 Communication Controller		Purchase Price ($)	Monthly Rental ($)
Model 210	Single CCU	141,900	14,180
Model 410	Base dual CCU	213,450	21,340
Model 130	—	20,600	2,060
Model 150	—	30,380	3,035
Model 170	—	25,750	2,575

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IBM 3745 Communication Controller

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ANALYSIS

In January 1988, IBM introduced the 3745 Communication Controller. A medium-to-high end member of the IBM Communication Controller family, the 3745 originally came in two versions: Model 210 and Model 410. The Model 210 has a single Central Control Unit (CCU) and is field upgradable to the Model 410. The Model 410 has two independent CCUs, each capable of running a separate Network Control Program (NCP). The Model 410 supports three modes of operation: twin dual, twin standby, and twin backup. The Model 410 offers twice the processing power of the Model 210.

The 3745 supports IBM Communications Network Management (CNM), NetView, IBM Modems Link Problem Determination Aids (LPDAs) enhancements, IBM/ Communications Systems, and the X.25 interface. In conjunction with up to five 3746 Expansion Units, the 3745 features modular growth capabilities that accommodate support for up to 16 host attachments, 512 line attach-

VENDOR: International Business Machines Corp. (IBM), Old Orchard Road, Armonk, New York 10504. Contact your local IBM representative.
CANADIAN DISTRIBUTION: IBM Canada, 3500 Steeles Avenue, East Markham, Ontario L3R 2Z1. Telephone (416) 474-2111.
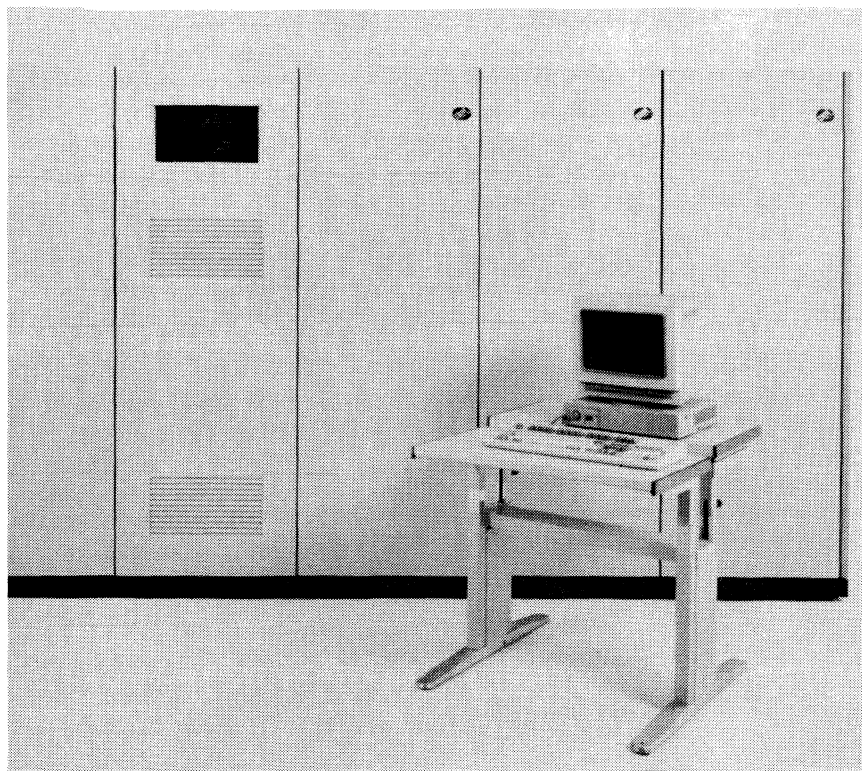MODELS: Models 210 and 410; Models 130, 150, and 170.
HOST COMPUTERS SUPPORTED: IBM and plug-compatible mainframes.
ARCHITECTURE SUPPORTED: SNA.
COMPETITION: NCR Comten, Amdahl.
PRICE: Model 210—$137,800; Model 410—$207,250.

The IBM 3745 Communication Controller is the high-end model in IBM's communications controller product line. The 3745 supports CNM, NetView, LPDA, X.25 interface, and IBM/Rolm Communications systems.

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TABLE 1. IBM 3745 FEATURES OVERVIEW

Specifications	IBM 3745
Number of CCUs	One or two
Storage	4MB or 8MB per CCU
Max. Duplex Line Attachment	528
Max. Line Speed	1.544M bps (T1)
Host Attachments	16
Token-Ring Adapters	8
Line Interfaces	EIA RS-232-C, RS-366, V.24 V.25, V.35, X.21, wideband, direct attach
Console Requirements	3151, 3161, 3727 (local), or PC emulating 3101 (remote)
Dimensions	Base—69.9" high, 47.5" wide, 29.5" deep
Weight	Base: less than 1.411 lb.
Power Requirements	208-240 V AC, 3 phase
Operating Environment	60 degrees F; 8% to 80% relative humidity
Heat Output	Base: 3kW (10k Btu/h)

ments, 8 very high speed line attachments to T1 and CEPT channels, and 8 IBM Token-Ring attachments.

In May 1989 at the International Communications Association's Conference and Exposition in Dallas, IBM announced low-end and midrange models for the 3745, as well as enhancements to the existing models. The enhanced models accommodate fractional T1 services and can now support up to 896 low-speed lines.

PRODUCT EVALUATION

The IBM 3745 rounds out the 37XX Communication Controller family. Unlike the older technology of the 3720 and the 3725, the 3745 is based on IBM's new line of Application Specific Integrated Circuitry (ASIC) chips, which hold up to 40,000 circuits each, almost three times the capacity of previous IBM ASIC logic chips. Although the Model 410 offers a performance that is up to four times that of the 3725 and supports twice the connectivity of the 3725, the 3745 is not intended to replace the 3725, but to serve as a high-end model in the communications controller product line. The 3725 is the medium-to-high end model.

The 3745 offers features that were not incorporated into the 3725, such as support for T1 and other high-speed digital network facilities; hot-pluggable Line Interface Couplers

(LICs), dual Central Control Units (CCUs) that provide backup and fault tolerance, and increased storage facilities.

The number of lines supported by the Model 210 is about 1.6 to 4.0 times those of the 3725. In 9600 bps full-duplex, multipoint SDLC lines with interactive traffic, Model 210 can support about 1.6 times as many lines as the 3725; in 56K bps, full-duplex, point-to-point SDLC lines with batch traffic to the host, the Model 210 can support about 2.4 times as many lines as the 3725; in 256K bps, full-duplex, point-to-point SDLC lines with batch traffic between NCP nodes, the Model 210 can support about 4.0 times as many lines as the 3725. For batch traffic between Network Control Program (NCP) nodes on full-duplex, point-to-point SDLC lines, the Model 210 can process up to six times the data traffic of the 3725.

In terms of performance, the Model 410 offers twice the transaction processing power of the Model 210.

The newest models in the 3745 family, Models 130, 150, and 170, support fractional T1 services that are leased in increments of 64K bits per second. Each of the three models offers 4M bytes of main storage.

Users can benefit from the manner in which IBM has incorporated dedicated power supplies into each component of the 3745. A problem in any of the following devices will impact only its own functionality: CCU, LIC unit, Channel Adapter with Two Processor Switch (CATPS), Maintenance and Operator Subsystem (MOSS), and every pair of adapters.

Within the 3745, IBM has incorporated improved maintenance capabilities over those of the 3725, having added new facilities to MOSS. The MOSS subsystem performs an automatic analysis of Box Event Records (BERs). It also allows users to tap into the Remote Support Facility (RSF), which enables IBM product specialists at a centrally located support station to make contact with the 3745. After remotely monitoring the machine's operation, examining the BERs, and running diagnostic programs, the product specialists can make corrections and adjustments.

The "hot" pluggability of the LICs improves operation by allowing customers to place LICs anywhere within the 3745 while the machine is running. Users can reconfigure LICs or remove failing ones without disrupting traffic on other interfaces.

Another improvement over the 3725, the Automatic Scanner re-Initial Microcode Load (re-IML), enhances the availability of the scanner in the machine. If a scanner fails, the MOSS subsystem performs a dump of the scanner memory and IMLs without operator intervention. After completion of these routines, MOSS notifies the host of the outcome. If successful, the host reactivates the lines; if unsuccessful, manual intervention must occur. In the 3725, every in-

IBM 3745 Communication Controller

stalled LIC undergoes scanning; in the 3745, a selective scanning process takes place in which the scanner ignores LICs with no lines activated.

When using the 3745, customers can take advantage of an access area that enables them to install or change LICs. This arrangement enables customers to perform configuration upgrades or to replace faulty LICs without the assistance of a service person. In addition, customers can connect or disconnect all external cables of the 3745, except those for channel adapters.

IBM has included internal clocks as standard features in the 3745 and has enabled any LIC port to provide internal clocking when necessary. The customer no longer has to rely on IBM service personnel to set the clocks for directly attached terminals. In addition, the clocks can be assigned on a line-by-line basis, rather than through the method required by the 3725—that of an LIC basis. The control program now specifies the clock values for all types of attachments that require internal clocking.

New operating procedures now allow users to remotely control 3745 operations from a central site. A user-provided control terminal, when attached to each 3745 via a modem and switched communication line, can serve as a remote operator console to manage single or multiple 3745s.

MARKET POSITION

Before its introduction, analysts predicted that the IBM 3745's capabilities would match those of the NCR Comten 5660, which supports 1,056 ports and T1 and has 16M bytes of internal storage. The 3745 supports only 512 lines, however, and 8M bytes of internal storage. Analysts have also questioned whether the 3745 can actually run eight T1 lines. The processor memory is also needed to handle machine functions, further reducing the amount of memory available for T1 lines. The general belief is that, with its present capabilities, the 3745 will be capable of running two or three T1 lines efficiently.

NCR has fortified its position in the communication processor market by introducing the 5655, 5665, and 5675 processors, which also compete against the IBM 3745 Models 210 and 410. The 5655 and 5665 can support 16 T1 lines and 64 token-ring LANs. The top-of-the-line model, the 5675, can support 24 T1 lines, as well as 1,024 full-duplex lines. The 5665 also supports 1,024 full-duplex lines. In the third quarter of 1989, NCR increased the 5675's support for

TABLE 2. IBM MODEMS FOR USE WITH 3745

Model	Characteristics
Modem 3834	4800 bps, sync
Modem 3864, Model 2	4800/2400 bps, switched, sync
Modem 3865, Models 1,2	9600/4800 bps, sync
Modem 3868, Models 3, 4	9600/4800, bps, sync, rack mounted
Modem 3872	2400/1200 bps, sync
Modem 5811, Model 20	2400 to 19,200 bps sync; 45.5 to 19,200 async
Modem 5812, Model 10	2400 to 19,200 bps sync; 45.5 to 19,200 async; rack mounted
DSU/CSU Model 10	2.4 to 56K bps sync, rack mounted
Modem 5865, Models 2, 3	9600/7200/4800 sync
Modem 5868, Model 52	9600/7200/4800, sync, rack mounted
Modem 5866, Models 2, 3	14,400/9600, sync
Modem 5868, Model 62	14,400/9600, sync rack mounted
DSU/CSU 5821, Model 10	2400 to 56,000, sync
Modem 5842	1200/2400, sync; 45.5 to 2400 async
Modem 5853	1200/2400 switched, sync
Modems 7861 and 7868	4800/9600/14400/19200 sync

8 mainframes to 16. IBM's claim that the 3745 is the only IBM or IBM-compatible communications controller that is offered with an option of two engines or internal central control units is not all that unique, according to the competition. While NCR Comten does not offer dual control units, it offers backup (redundancy) by attaching two processors through its Modem Interface Modules (MIMs). Both units run NCP and can be used if problems occur on the main processor.

Questions also arise about the efficiency of this dual backup method, since, if both CCUs are fully configured and running simultaneously and one suddenly goes down, the remaining CCU does not have the capacity to handle all the applications of the downed CCU. A choice must be made as to the most critical applications to be run from each.

The 3745 will take an active role in IBM's plans to open its network architecture to other vendors without losing network control. The 3745 performs numerous routing functions in an SNA network, which will be of increasing importance as IBM migrates SNA from a hierarchical to a peer-to-peer network.

The use of ASIC chip technology, compatibility with NetView, and the ability to configure the IBM 3745 as a PU 2.1 device within an SNA network all indicate that IBM is building its communications controllers for the future. Forthcoming enhancements will support this position.

SPECIFICATIONS

MODELS: Model 210 and 410; Models 130, 150, and 170.
DATE OF ANNOUNCEMENT: January 1988.
DATE OF FIRST DELIVERY: Model 210—March 1988;
Model 410—September 1988; Models 130, 150, and 170—
May 1989.
NUMBER INSTALLED: Information not available.

OVERVIEW

The 3745 consists of medium- and high-end communication controllers that operate under the Advanced Communication Function/Network Control Program (ACF/NCP) Licensed Program. The 3745 controls the following types of data communications: between terminal devices that are directly linked, linked by modem, or attached to an IBM Token-Ring Network; between terminal devices and one or more directly connected or remotely connected 4300, 937X, 3033, 308X, or 3090 host processors; or between host processors. Users can attach the 3745 to a byte multiplexer, block multiplexer, or selector channel. When attached to a block multiplexer channel of a 937X or 3090, it supports datastreaming mode. Remote connection can occur via common carrier or private communication facilities.

The minimum configuration for a basic 3745 consists of 4M bytes of storage per Central Control Unit (CCU), two low-speed scanners, eight line interface couplers, and one Type 1 line interface coupler.

IBM has equipped both models with two sets of buses: Bus Group 1 and Bus Group 2, both of which link the channel adapters and communication line adapters to the CCUs.

IBM's newest models in the series, the 130, 150, and 170, all run the same releases of Network Control Programs (NCPs) as the Models 210 and 410. Users can upgrade the new models from one to another, but they cannot upgrade these models to the existing 210 and 410.

For additional line attachment and channel adapter expansion, IBM offers the 3746 Expansion Units. In conjunction with up to five 3746 Expansion Units, the 3745 supports modular growth for up to 16 host attachments, 512 line attachments (with optional modem integration for up to 416 of them), 8 high-speed line attachments to T1 and CEPT channels, and 8 IBM Token-Ring attachments.

The Maintenance and Operator Subsystem (MOSS), which is the service processor of the 3745, performs an automatic analysis of Box Event Records. If a failure occurs, the MOSS supplies a reference code for use by the customer and IBM's service organization to determine the cause. In addition, IBM offers the Remote Support Facility (RSF), which allows IBM product specialists at central support locations to establish a connection with the 3745. IBM supplies an RSF modem with the 3745. The RSF port operates in BSC protocol at a speed of 2400 bps.

A customer-provided terminal is required as a local operator and service console. This terminal should be a directly attached 3151 (without modem) in native mode; or a 3151 Model 310/360 or 410/460 running in 3101 Model 23 emulation mode; or a 3161 Model 11/21 or 12/22 or 3163 Model 11/21 or 12/22 running in 3101 Model 23 emulation mode; or a 3727; or an equivalent terminal running in 3101 Model 23 mode at 2400 bps.

Users attach consoles to the 3745 via two MOSS communication ports. Only one console can be active at a time. The local console must be directly attached without a modem, serving as an operator and service unit. The alternate console is an optional, directly attached unit that cannot be used with the remote console. The remote console is an optional, modem-attached unit that manages one or multiple 3745s when attached to each 3745 via modems and a switched telecommunication line.

For a list of IBM modems for use with the 3745, refer to Table 1. Other IBM modems with an interface compatible with the 3745 LICs can also be used.

MODELS

Model 210: The basic Model 210 consists of a single CCU with its power supply, 4M bytes of main storage with Direct Memory Access (DMA) and 16K bytes of cache storage, two bus groups and bus switch, two low-speed scanners, eight LICs, one LIC Unit Type 1, and Maintenance and Operator Subsystem (MOSS). Optional features to expand the configuration include one 4M-byte storage increment; up to eight channel adapters (CAs) or up to four Channel Adapters with Two Processor Switch (CATPS), or a combination of CAs and CATPSs; one LIC Unit Type 1 or LIC Unit Type 2; and up to 24 optional LICs.

The performance of the Model 210 exceeds that of IBM's 3725 under the following conditions:

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- In 9600 bps full-duplex, multipoint SDLC lines with interactive traffic, Model 210 can support about 1.6 times more lines than the 3725.

- In 56K bps full-duplex, point-to-point SDLC lines with batch traffic to the host, Model 210 can support about four times the number of lines of the 3725.

- In 256K bps full-duplex, point-to-point SDLC lines with batch traffic between Network Control Program (NCP) nodes, Model 210 can support about four times more lines than the 3725.

- In T1 applications in which batch traffic between NCP nodes is traveling on full-duplex, point-to-point SDLC lines, Model 210 can process up to six times the data traffic of the 3725.

Model 410: The Model 410 includes the same elements as the Model 210, but IBM has equipped the Model 410 with two independent CCUs (CCU A and CCU B), each capable of running its own NCP. It offers twice the transaction processing power of the Model 210.

Users can operate the Model 410 in any of the three following modes: twin dual, twin standby, and twin backup.

Twin-dual mode: The two CCUs of the Model 410 run independently, functioning as two separate subareas, each with its own active NCP. In this mode, Bus Group 1 connects to CCU A, and Bus Group 2 to CCU B. If one CCU stops, only its subarea is interrupted, and no bus switching occurs.

Twin-standby mode: In this mode, only the active CCU controls the whole configuration, and Bus Group 1 and Bus Group 2 connect to the active CCU. The second CCU—the hot standby CCU—takes control if the first CCU cannot perform. The second CCU assumes control automatically if a hardware failure occurs or on command from the 3475 operator console.

Twin-backup mode: Under normal operating conditions, this method functions similarly to the twin-dual mode. However, if one CCU stops, the other CCU takes control of its adapters. The active CCU may recover all or part of the traffic, depending on customer requirements. The switching between CCUs disrupts operation only for the sessions previously established on the stopped CCU. During backup status, Bus Group 1 and Bus Group 2 connect to the active CCU. When the other CCU is ready to resume processing, the appropriate Bus Group can revert to normal status via an operator command at the 3745 console.

Model 130: This model supports two T1 lines, four host channel links, and four 4M bps or 16M bps Token-Ring interfaces.

Model 150: This model supports 16 ports at data rates up to 256K bps, two 4M bps or 16M bps Token-Ring interfaces, and one T1 line.

Model 170: The Model 170, the largest of the three new processors, supports up to 112 lines at data rates up to 256K bps. The machine also supports two 4M or 16M bps Token-Ring interfaces and two T1 lines.

SUBSYSTEMS

The 3745 contains three functional areas: Control Subsystem, Communication Subsystem, and Maintenance and Operating Subsystem.

Control Subsystem: This area consists of one or two CCUs with 4M-byte basic storage and an optional storage increment of 4M bytes with Direct Memory Access (DMA) and 16K-byte cache storage. The Control Subsystem has two bus groups, each one consisting of two Input/Output Control (IOC) buses and one DMA switch. This subsystem also has a bus switch and features a power supply per CCU. In addition, the Control Subsystem incorporates a combination of Channel Adapters (CAs) and/or Channel Adapters with Two Processor Switch (CATPS). Each CATPS takes the place of two CAs. One power supply for each pair of adapters sustains the host connections.

Communication Subsystem: This subsystem provides three types of attachment to the telecommunications network: Line Interface Couplers, High-Speed Scanners, and Token-Ring Adapters.

The *Line Interface Couplers (LICs)* support asynchronous or synchronous transmission at speeds up to 256K bps and direct or modem-attached data terminal equipment (DTE) under Start/Stop, BSC, or SDLC protocols via a Low-Speed Scanner. LIC Types 5 and 6 provide integrated modem and DSU/CSU functions. LIC units are modular enclosures that house up to 16 LICs with their own power supplies.

IBM offers the following Line Interface Couplers:

- LIC Type 1—four ports, up to 19.2K bps; supports EIA 232D/CCITT V.24, EIA RS-366/CCITT V.25, and CCITT X.21 bis.

- LIC Type 3—one port, up to 256K bps; supports CCITT V.35 interface.

- LIC Type 4A—four ports, up to 9.6K bps; supports CCITT X.21 interface.

- LIC Type 4B—one port, above 9.6K bps, up to 256K bps; supports CCITT X.21/X.24 interfaces.

- LIC Type 5—two integrated modem ports at 4.8K bps, 9.6K bps, or 14.4K bps; attachment to analog lines.

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- LIC Type 6—one integrated DSU/CSU or LDM port DSU/CSU attachment to DDS at 9.6K bps, 19.2K bps, or 56K bps LDM attachment to baseband line at 9.6K bps, 19.2K bps, or 56K bps.

Each *High-Speed Scanner* supports the attachment to two (one active at a time) V.35 or X.21 nonswitched SDLC data lines operating at speeds ranging from 56K bps to 2.048M bps. Users of the 3745 can take advantage of AT&T's DACS service by selecting network communication terminal equipment compatible with this service, such as Network Equipment Technologies' IDNX or Verilink's 551 VCC.

The *Token-Ring Adapters* (Type 1 and Type 2) each support the attachment of two IBM Token-Ring Networks under standard protocols. Type 1 and Type 2 attach to 4M bps Token-Rings via the IBM Cabling System or telephone twisted-pair wiring. Type 2 also attaches to 16M bps Token-Rings via the IBM Cabling System.

Maintenance and Operator Subsystem (MOSS): The Maintenance and Operator Subsystem (MOSS) is functionally separate from the CCU and contains its own power supply. MOSS operates the 45M-byte disk, the diskette drive, and the control panel of the 3745. Two communication ports support the attachment of the 3745 operator consoles. The Remote Service Facility (RSF) port enables the 3745 to be connected to IBM Hardware Central Service. IBM supplies the RSF modem with the 3745.

MOSS performs IPL functions and machine initialization and also controls the bus switching. It offers system procedures for notification of failures and furnishes the operator with tools to determine problems.

STORAGE

Disk Storage: In conjunction with MOSS microcode and 3745 communication programming support, the 45M-byte disk and disk adapter of the 3745 accommodate up to two NCP load modules, as well as any other communication controller resident programs, and one NCP dump per CCU. One or two NCP load modules per CCU can be transferred from the host to the 3745 (local or remote) and stored on the disk. From the network console, the operator can specify which NCP load module is selected for loading. The NCP transfer does not disrupt 3745 operations. If a CCU/storage-related failure occurs, a dump of the NCP storage is automatically saved on the 3745 disk before the start of the NCP automatic reload sequence. The network operator can request the online transfer of a full or partial dump.

3746 EXPANSION UNIT

The 3746 Expansion Unit supplies the 3745 Communication Controller with additional channel adapters, Low-Speed Scanners, and Line Interface Couplers. There are three models:

- **Model A11**—provides up to eight additional Channel Adapters, or up to four additional Channel Adapters with Two Processor Switch, and up to 16 additional Low-Speed Scanners;

- **Model A12**—provides up to eight additional Low-Speed Scanners; and

- **Models L13, L14, L15**—provide up to 256 additional line attachments provided by each model, with or without integrated modems.

The maximum attachment capacity of the 3745 and its associated expansion units is limited to 512 lines.

SOFTWARE

ACF/NCP Version 5: The 3745 Communication Controller requires one of the following releases of the ACF/NCP Version 5 licensed program:

- ACF/NCP Version 5, Release 1, which is generated via ACF/SSP V3R3 for MVS/370 and MVS/XA;

- ACF/NCP Version 5, Release 2, which is generated via ACF/SSP V3R4 for MVS/370, MVS/XA, VM/SP, VM/SP HPO, VM/XA, VSE/Advanced Function, or VSE/SP; or

- ACF/NCP Version 5, Release 2.1, which is generated via ACF/SSP V3R4.1 for MVS/370, MVS/XA, VM/SP, VM/SP HPO, VM/XA, VSE/Advanced Function, or VSE/SP.

Network Management: The 3745 supports IBM's Communication Network Management (CNM) by sending information about errors to the NetView program running in a host processor. NetView displays the alerts generated for the 3745 on the network control terminal. NetView provides alert support for the IBM Token-Ring Network. If NetView is not installed, IBM recommends the installation of a 3745 console in the vicinity of the VTAM console to assist customers in determining and resolving problems.

Support of CCITT X.25 for IBM and non-IBM DTEs: With the *X.25 NCP Packet Switching Interface (NPSI) Licensed Program*, users can attach the 3745 to data transmission networks supporting X.25 interfaces. With the *X.25 SNA Interconnection (XI) Licensed Program*, users can take advantage of the SNA backbone network and the SNA transport facilities to move X.25 traffic between compatible X.25 DTEs.

IBM 3745 Communication Controller

EQUIPMENT PRICES

		Purchase Price ($)	Monthly Rental ($)	Annual Min. Maint. ($)
3745 Communication Controller				
Model 210	3745 base single CCU	137,800	13,775	3,825
Model 410	Base dual CCU	207,250	20,725	5,885
Model 130		20,000	—	—
Model 150	Including peripherals	29,500	—	—
Model 170		25,000	—	—
#1561	Channel Adapter	11,020	1,102	191
#1562	CATPS	15,430	1,543	227
#4720	Low-Speed scanner	15,430	1,543	202
#4740	High-Speed scanner	24,250	2,425	348
#4760	Token-Ring Adapter	18,740	1,874	362
#4900	LIC Unit	10,470	1,047	109
#4911	LIC Type 1	2,865	286	28
#4931	LIC Type 3	2,865	286	28
#4941	LIC Type 4A	2,865	286	28
#4942	LIC Type 4B	2,865	286	28
#7100	Storage Increment 4MB	11,020	1,102	85
3746 Expansion Unit				
A11	Expansion Unit	18,740	1,874	55
A12	Expansion Unit	18,740	1,874	55
L13	Expansion Unit	18,740	1,874	55
L14	Expansion Unit	18,740	1,874	55 ∎

IBM 3745 Communications Controller

datapro
ANALYSIS

In late January, 1988, IBM introduced the 3745 Communications Controller, ending speculation concerning its arrival and capabilities. The IBM 3745, a medium-to-high end member of the IBM Communications Controller family, comes in two versions, the Model 210 and the Model 410. The Model 210 has a single Central Control Unit (CCU) and is field upgradable to the Model 410. The Model 410 has two independent CCUs, each capable of running a separate Network Control Program (NCP). Three modes of operation are available on the Model 410: twin dual, twin standby, and twin backup. The 3745 supports IBM Communications Network Management (CNM), NetView, IBM Modems Link Problem Determination Aids (LPDAs) enhancements, IBM/Rolm Communications systems, and the X.25 interface.

Four 3746 Expansion Units are available for additional line attachment and channel adapter expansion. These units support a variety of devices and offer a number of options that include the following:

VENDOR: International Business Machines (IBM), Old Orchard Road, Armonk, New York 10504. Contact your local IBM representative.
FUNCTION: Front-end processor, remote processor.
DATE ANNOUNCED: January 1988.
SCHEDULED DELIVERY: Model 210—March 1988, Model 410—September 1988.

- A second Central Control Unit

- 16 channel adapters

- Eight high-speed scanners with interfaces for 16 T1 lines

- Eight Token-Ring adapters

- 4M bytes of additional memory per CCU

- 30 additional low-speed scanners

- 120 additional line interface couplers
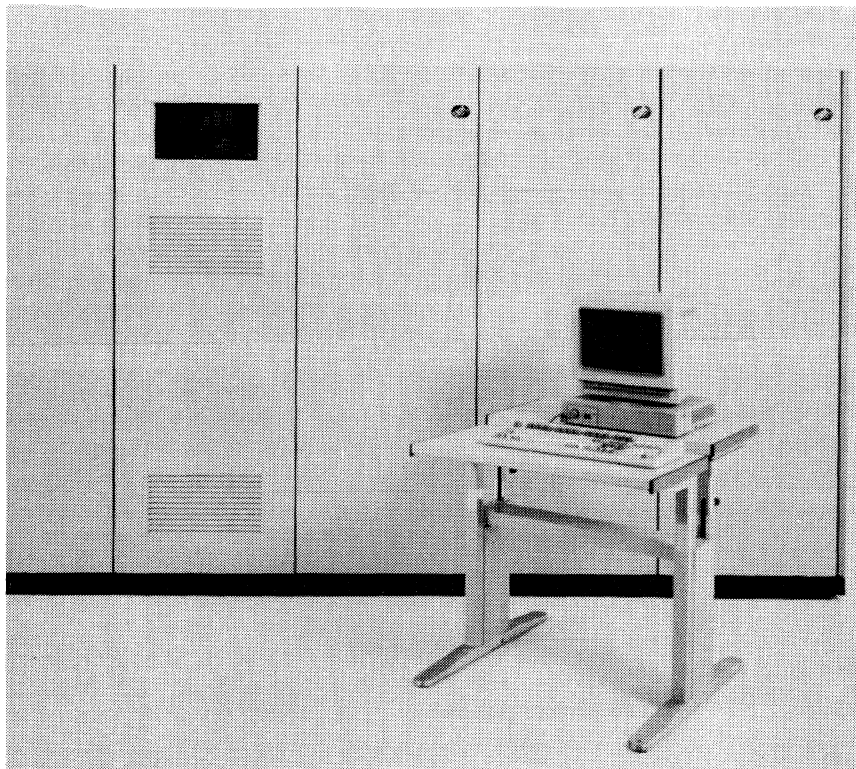
The IBM 3745 Communications Controller is the high-end model in IBM's communications controller product line. The 3745 is available in two versions, the Model 210 and the Model 410. The 3745 supports CNM, NetView, LPDA, X.25 interface, and IBM/Rolm Communications systems.

IBM 3745 Communications Controller

TABLE 1. IBM 3745 FEATURES OVERVIEW

Specifications	IBM 3745
Number of CCUs	One or two
Storage	4MB or 8BM per CCU
Max. duplex line attachment	528
Max. line speed	1.544M bps (T1)
Host attachments	16
Token-Ring Adapters	8
Line Interfaces	EIA RS-232-C, RS-366, V.24, V.25, V.35, X.21, wideband, direct attach
Console Requirements	3151, 3161, 3727 (local), or PC emulating 3101 (remote)
Dimensions	Base—69.9" high, 47.5" wide, 29.5" deep
Weight	Base: less than 1,411 lbs.
Power Requirements	208-240 V AC, 3 phase
Operating Environment	60 degrees F; 8% to 80% relative humidity
Heat Output	Base: 3kW (10k Btu/h)

Other 3745 features include automatic Box Event Records (BER) analysis and scheduled power-ups in the Maintenance and Operations Subsystem (MOSS); concurrent diagnostics and maintenance on 3745 components; buses/switch within the box, eliminating the need for a matrix switch; a smaller footprint; and a remote console. The channel adapters (CAs) on the 3745 are no longer hardwired but are now microprocessor based and use two cards rather than the four cards needed on the older 3725 controller.

The two bus groups provide data paths for internal data movement within the 3745. Each bus group offers balanced controller performance and has a channel adapter bus, a line adapter bus, and a direct memory access bus. A switch feature in each bus allows resources attached to it to be connected to either CCU, providing improved configuration and backup flexibility.

RELATIONSHIP TO CURRENT PRODUCT LINE: The IBM 3745 rounds out the 37XX Communications Controller family. Unlike the older technology of the 3720 and the 3725, the 3745 is based on IBM's new line of Application Specific Integrated Circuitry (ASIC) chips. These chips hold up to 40,000 circuits each, almost three times the capacity of previous IBM ASIC logic chips.

The Model 410 offers a performance that is up to four times that of the 3725 and has twice the connectivity of

the 3725. The 3745 is not intended to replace the 3725; however, the 3745 is the high-end model in the communications controller product line, while the 3725 is the medium-to-high end model. The 3745 offers features that were not available in the 3725, such as support for T1 and other high-speed digital network facilities, hot-pluggable Line Interface Couplers (LICs), dual CCUs that provide backup, fault tolerance, and increased storage facilities.

IBM did a comparison of throughput improvements on the 3745 relative to the 3725. For EP BSC interactive traffic, the 3745 is 1.5 times faster; NCP full-duplex SDLC at 9600 bps or at 56K bps in interactive traffic is 1.6 times faster than the 3725. NCP full-duplex SDLC at 256K bps in CA batch traffic is 2.4 times faster. CCU cycle time is 75 nanoseconds on the 3745 and 200 nanoseconds on the 3725.

Recent enhancements to the Advanced Communications Facility/Network Control Program (ACF/NCP) will increase the 3745's switching and routing capabilities. Also, the enhanced NCP will allow the 3745 to offer support and control links for up to 16 T1 ports, eight Token-Ring attachments, 512 lines at 56K bps, and simultaneous connection to 16 host channels. The 3720 and 3725 are also supported by the new version of NCP.

Under NCP, X.25 support has also been enhanced, offering an improved NCP Packet Switching Interface, which works in conjunction with X.25 Interconnection software. The X.25 offering provides a point-to-point physical interface to an X.25 network.

MARKETING POSITION: Analysts predict that the IBM 3745's capabilities will match those of the NCR Comten 5660, which supports 1,056 ports and T1 and has 16M bytes of internal storage. The 3745 supports only 512 lines, however, and 8 megabytes of internal storage. Analysts also question whether the 3745 can actually run eight T1 lines. As one analyst noted, "Horse power is still an issue—it can support 8 megabytes of memory per processor, but eight T1 lines operating at 1.544M bps would require 12 megabytes of memory." The processor memory is also needed to handle machine functions, further reducing the amount of memory available for T1 lines. The general feeling is that, with its present capabilities, the 3745 will be capable of running two or three T1 lines efficiently.

IBM's claim that the 3745 is the only IBM or IBM-compatible communications controller that is offered with an option of two engines, or internal central control units, is not all that unique according to the competition. While NCR Comten does not offer dual control units, it offers backup, or redundancy, by attaching two processors through its Modem Interface Modules (MIMs). Both units run NCP and can be used if problems occur on the main processor.

IBM 3745 Communications Controller

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The use of ASIC chip technology, compatibility with Net-View, and the ability to configure the IBM 3745 as a PU 2.1 device within an SNA network all indicate that IBM is building its communications controllers for the future. Forthcoming enhancements will support this position.

SPECIFICATIONS

CONFIGURATION: The 3745 Model 210 contains a single communications control unit (CCU); two bus groups that have two Input/Output Control buses, a DMA bus, and a bus switch; 4 megabytes of main storage; two low-speed scanners, a LIC unit; eight LICs of various types; and a Maintenance and Operator Subsystem (MOSS).

The 3745 Model 410 has the same components as the Model 210, plus an additional CCU with 4 megabytes of main storage. MOSS communicates with both CCUs in the Model 410.

Each model has a 45M-byte hard disk for storage of the network control program for automatic restart and backup; concurrent maintenance; and online pluggability of line interface components. In conjunction with up to four IBM 3746 Expansion Units, the IBM 3745 offers modular growth for up to 16 host attachments, 512 line attachments, 8 high-speed line attachments to T1 and CEPT channels, and 8 IBM Token-Ring attachments. It also provides interfaces for local and remote consoles and the Remote Support facility.

Each communications controller consists of four subsystems:

- Control subsystem—includes one or two CCUs, each with 4 megabytes of main storage; Direct Memory Access (DMA) and Cache storage (16K bps); and an optional 4M-byte storage increment. Also found in the Control subsystem are two bus groups, a bus switch, one power supply for each CCU, and various CAs and/or CAs with Two Processor Switch (CATPS). One CATPS replaces two CAs and one power supply for each pair of adapters to provide the host connections.

- Communications subsystem—includes three types of microprocessor-based communications scanners: Token-Ring subsystem scanners for connection of IBM Local Area Networks, high-speed scanners for T1 lines, and low-speed scanners for line speeds up to 256K bps. The low-speed scanners offer four types of LICs to handle the different line speeds and interfaces.

- Maintenance and Operator Subsystem (MOSS)—used for problem determination and recovery procedures. It includes a microprocessor, hard disk, diskette drive, and console attachment. The subsystem is functionally separate from the CCU, with its own power supply. The MOSS operates the 3745's hard disk, diskette drive, and control panel.

- Power subsystem—contains one central power system with individual power supplies. It supports individual CCUs or pairs of adapters that permit concurrent maintenance—allowing normal operation while a failing CCU or adapter is being repaired.

SYSTEM FEATURES: The Model 210 has one CCU, but an additional CCU can be added to form the Model 410. The second CCU provides backup and recovery options. The Model 410 has up to four times the power of the 3725 in a single controller and twice the connectivity options. Twin dual, twin standby, and twin backup are the three modes of operation on the Model 410, with each CCU operating independently.

Other features of the 3745 include CCU duplication and automatic backup, LIC "hot pluggability", distributed data buses and power supplies, automatic scanner re-IML, remote support facility (RSF), concurrent maintenance, and automatic analysis of BER. A customer access area is also featured, so that users can go in and change LICs as needed. The 3745 also offers unattended operations features; support of IBM Communications Network Management (CNM), NetView, IBM Modems Link Problem Determination Aids (LPDAs) enhancement, IBM and non-IBM Data Terminating Equipment (DTE) with X.25 interface, and IBM/Rolm communications systems; and reduced floor space and power requirements.

PRICING: The IBM 3745 is available for purchase or lease. Pricing for the two models is given in the following table. IBM offers volume purchase discounts and, for a limited time, the company is offering a special installation option. A one-year warranty is offered on the processors, and IBM on-site repair is available.

IBM 3745 Communications Controller

EQUIPMENT PRICING

		Purchase Price ($)	Monthly Rental ($)	Annual Min. Maint. ($)
3745 Communication Controller				
Model 210	3745 base single CCU	125,000	12,500	3,715
Model 410	Base dual CCU	188,000	18,800	5,715
#1561	Channel Adapter	10,000	1,000	186
#1562	CATPS	14,000	1,400	221
#4720	Low-speed scanner	14,000	1,400	197
#4740	High-speed scanner	22,000	2,200	338
#4760	Token-Ring Adapter	17,000	1,700	352
#4900	LIC Unit	9,500	950	106
#4911	LIC Type 1	2,600	260	28
#4931	LIC Type 3	2,600	260	28
#4941	LIC Type 4A	2,600	260	28
#4942	LIC Type 4B	2,600	260	28
#7100	Storage Increment 4MB	10,000	1,000	83
3746 Expansion Unit				
A11	Expansion Unit	17,000	1,700	54
A12	Expansion Unit	17,000	1,700	54
L13	Expansion Unit	17,000	1,700	54
L14	Expansion Unit	17,000	1,700	54
Model Conversion				
—	3745 Model 210 to Model 410	63,000	—	— □