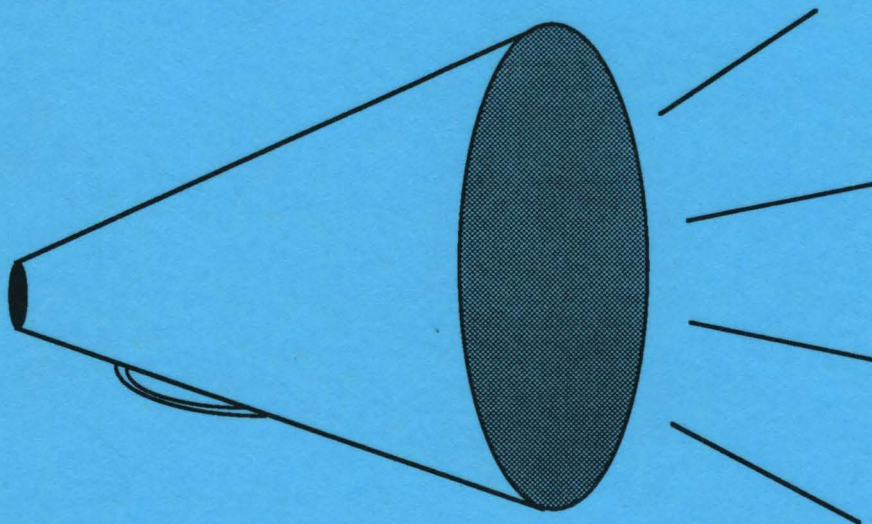# IBM Token-Ring
Product Guide

Interface Coupler

PC Adapter II

RT Adapter

NETBIOS

APPC/PC

**ARCHITECTURE
TECHNOLOGY
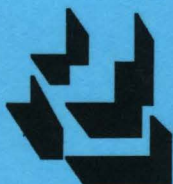CORPORATION**
SPECIALISTS IN COMPUTER ARCHITECTURE

IBM Token-Ring Product Guide

August 1986

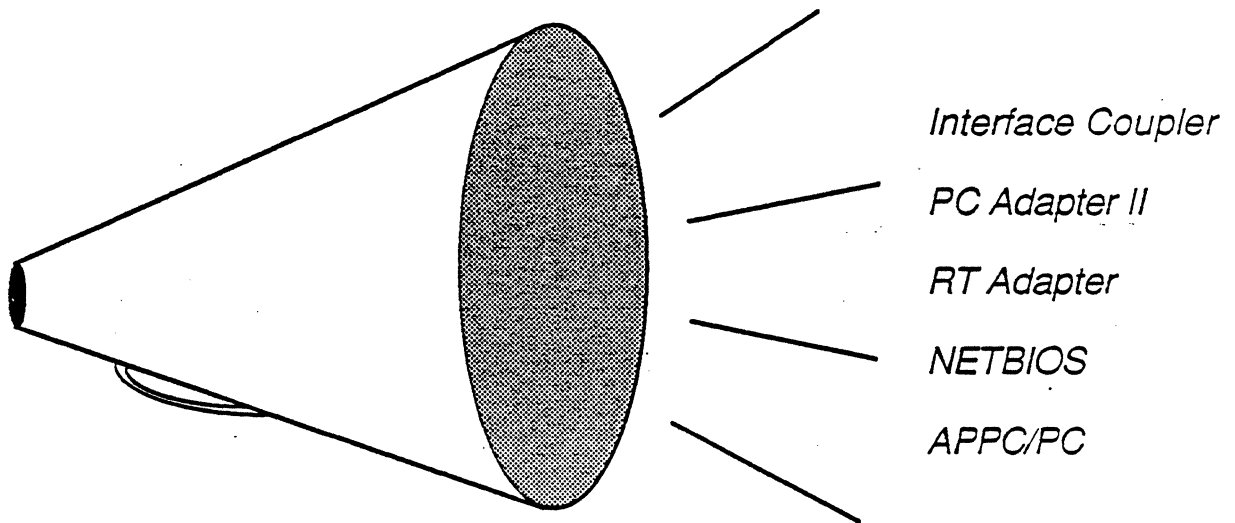Interface Coupler

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FOREWORD

The purpose of this guide is to provide insight into the set of products available through IBM to run on its Token-Ring (TR) Local Area Network (LAN). Both a summary of these products and their historical evolution are provided.

In 1984, IBM began to announce products designed to provide the user with token ring functionality and capability. In late 1985, the announcements continued. By mid-1986, the stream of announcements became a torrent of information. This guide was prepared to help keep the products in perspective.

Architecture Technology has included in this guide, all of the IBM products we felt were significant to Token-Ring local area networks. To that end, we have included a number of products that are not specific to the Token-Ring, such as NETBIOS related products. In some cases, a few products may have not been included because they don't deal directly with the Token-Ring (such as the Series/1 channel attach to the PC, allowing it to use virtual disks on the Series/1) or because the products are only available through the IBM authored software program (although we have included such titles as "Magic Menu Network").

The function of the guide is to provide an overview of the products and their associated relationships. The guide is broken into three major chapters covering wiring, token ring interconnection capabilities, and token ring-specific software. Whenever possible, the products are related to the overall products strategy of IBM.

This edition and future editions will follow, in summary form, all IBM products announced for the TR and periodically gather the current product descriptions together into a guide.

Table of Contents

List of Figures

1. Wire

1.1. Summary of Evolution

The announced products are summarized in Figure 1-1 and described in the section below.

1.2. IBM Cabling System Concept

The IBM Cabling System permits traditional types of connections to be made between devices with a common cable consisting of twisted pairs of copper conductors. The cabling system connects wall outlets in offices to wiring closets. Called a star-wired system, the cable fans out from each closet to special outlets. The outlets are installed in the walls to connect to data devices and, optionally, telephones. Most currently available IBM products, including workstations and small and intermediate computers, can be plugged into the outlets.

Each office wall outlet is connected by standard cable to a distribution panel (Figure 1-2) located in a wiring closet. A panel can accept up to 64 cables from different devices, and any two devices can be connected easily using patch cables at the closets where cables converge. Wiring closets in the same building or different buildings on a campus can be connected with either twisted pair or optical fiber cable.

1.3. Components - May 1984

The basic elements of the IBM Cabling System are the transmission cables, the faceplates and connectors, the distribution panels, and the device attachment cables and accessories.

1.3.1. Transmission Cables

- Type 1: For use between faceplates in work areas and wiring closets in the same or different buildings; contains two balanced, twisted pairs for data transmission. (See Figure 1-3 for pictorial depiction of the various types of IBM transmission cables.)

- Type 2: For use between faceplates in work areas and wiring closets in the same building; contains two twisted pairs for data transmission and four twisted pairs for voice transmission.

- Type 5: For use between wiring closets in the same or different buildings; contains two optical fibers for data transmission.

1

IBM CABLE SYSTEM EVOLUTION

May, 1984

Type 1
Type 1 Plenum
Type 2
Type 5 100/140 Micron Fiber
Type 6
Data Connector
Patch Panels
Baluns
Face Plates

October, 1985

Type 3
Type 3 Filter
Type 8 Undercarpet

April, 1986

Type 9 Plenum
Copper-to-Copper Repeater
Copper-to-Fiber Repeater

Cable and cable products are available through authorized distributors, not from IBM direct.

Figure 1-1: IBM Cabling System Evolution
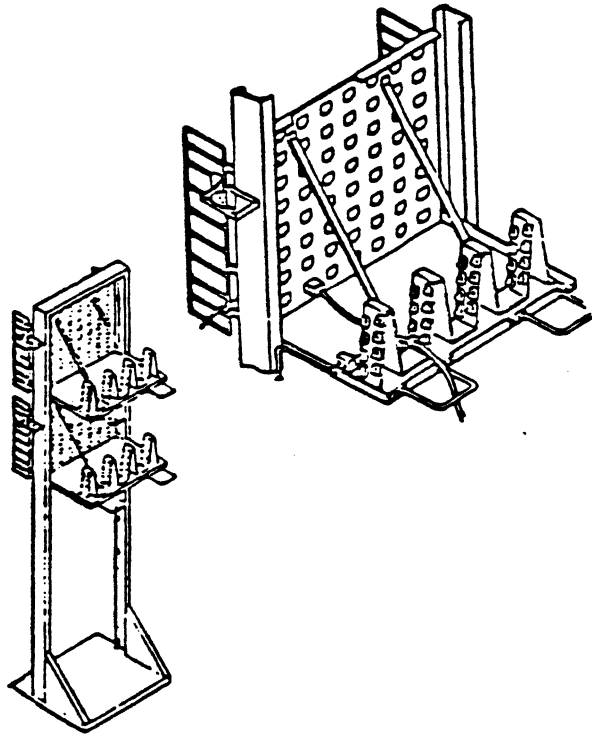
Figure 1-2: Distribution Panel, IBM Cabling System

Type 1 Plenum
Braided cable shield around two twisted pairs of #22 American Wire Gauge (AWG) conductors for data communication.

Type 1 Outdoor
Corrugated metallic cable shield around two twisted pairs of #22 AWG conductors for data communications. Type 1 outdoor cable is suitable for aerial installation or placement in conduit underground.
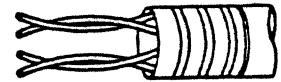
Type 2 Plenum
Same as type 1 cable with the addition of four twisted pairs of #24 AWG telephone conductors.

Type 5 (non-plenum only)
Two optical fiber conductors. Type 5 cable is suitable for installation indoors or for aerial installation or placement in conduit underground.

Type 6
Two twisted pairs of #26 AWG stranded conductors for data communication. Type 6 cable is for use only as patch cables.

**Type 8
(not available from IBM)**
Two parallel pairs of #26 AWG solid conductors for data communication. Type 8 cable is for use only under carpeting.
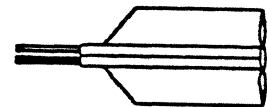
Figure 1-3: Cable Types, IBM Cabling System

- Type 6:   For use as patch cables in wiring closets; contains two twisted pairs for data transmission.

- Type 8:   For use under carpeting; two parallel pairs of #26 AWG solid conductors for data communication; not sold by IBM. (This type of cable was never officially announced. It debuted from IBM in Canada.)

1.3.2. Faceplates and Connectors

- Faceplates. (see Figure 1-4) for mounting on electrical outlet boxes installed in work areas.

- Data connector and telephone connector (see Figure 1-5) for installation in the faceplate; data connector allows termination of two data-grade twisted pairs.

1.3.3. Distribution Panels

- Cable junction panel (see Figure 1-6) mounted on a rack in a wiring closet; each panel allows connection of up to 64 data cables.

- Patch cable for making panel cross-connections.

1.3.4. Device Attachment Cables and Accessories

For use in attaching a device to the cabling system; the attachment cable (see Figure 1-7) is terminated with a workstation connector at one end and a cabling system connector at the other end; it includes an impedance matching device when required (BALUN).

1.4. Components - October 1985

When the cabling system was announced in May 1984, Type 1 and 2 wire were specified to run at 4 Mbps. In October 1985, they were re-specified to run at 16 Mbps and a new type of wire, Type 3, was announced to run at 4 Mbps.

The IBM Cabling System Type 3 specified media, an extension of the IBM Cabling System, refers to unshielded, twisted-pair telephone wire designed for the physical interconnection of voice and data communications equipment. The IBM Token-Ring Network can be installed using the Type 3 specified media when used with appropriate accessories. Most IBM 3270 Information Display System devices (Category A) can use the Type 3 specified media for point-to-point interconnection using the 3270 Coax-to-Twisted Pair Adapter (3270 CTPA) BALUN cable.
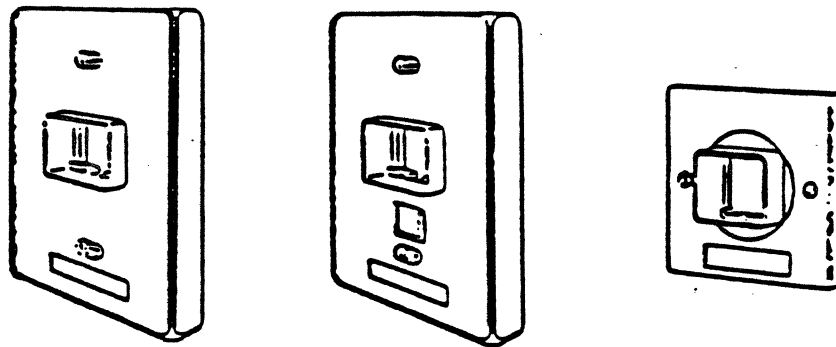
Figure 1-4: Faceplates, IBM Cabling System
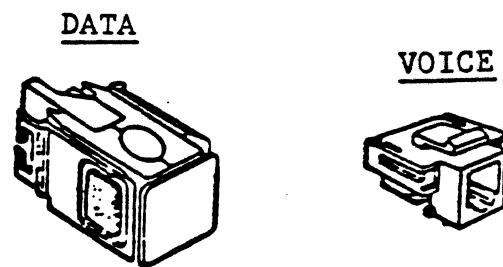
DATA

VOICE

Figure 1-5: Data and Voice Connectors, IBM Cabling System
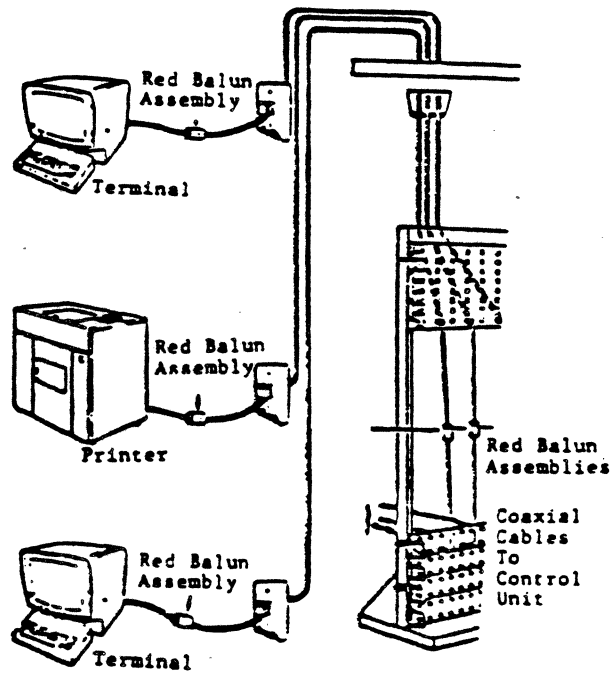
Figure 1-6: Cable Junction Panel, IBM Cabling System
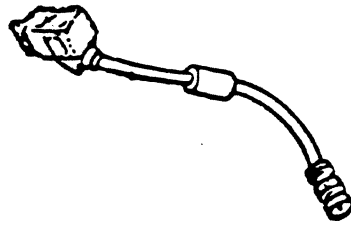
Figure 1-7: Patch Cable, IBM Cabling System

In addition to operating on the IBM Cabling System Type 1 and Type 2 (data grade) cable, the 4 Mbps IBM Token-Ring Network will operate on media meeting the IBM Cabling System Type 3 media specification (telephone twisted-pair media) using components manufactured to IBM specifications and available from IBM Cabling System distributors.

A Type 3 media filter (not available from IBM) is required to interface the IBM Token-Ring Network PC Adapter to the telephone twisted-pair media.

A Type 3 media jumper cable (not available from IBM) is required to interface the telephone twisted-pair media to an IBM Token-Ring Network Multistation Access Unit. Figure 1-8 outlines the principal differences between the Type 1/Type 2 data grade cable and the Type 3 telephone wire specification.

The items offered for the IBM Token-Ring Network using the IBM Cabling System Type 3 media specifications are:

● Type 3 Media Filter (Onan Power Electronics, part number 3-50174, or equivalent)

   The Type 3 media filter is used to attach an IBM Personal Computer to Type 3 media. The Type 3 media filter is contained in a D shell connector, which has thumb screws for attachment to the IBM Token-Ring Network PC Adapter. A 2-1/2 meter (8-foot) Type 3 specified media (telephone twisted pair) is attached to the D shell connector at one end and a male standard six-pin modular plug at the other end. The Type 3 media filter is designed to be compatible with ROLMlink wiring, IBM Cabling System Type 2 Cable, and media which meets the Type 3 media specifications.

● Type 3 Media Jumper Cable (Brand Rex, part number BR 1100-29-1, or equivalent)

   Type 3 media jumper cables are used to attach the Type 3 specified media to an IBM Token-Ring Network Multistation Access Unit. The Type 3 media jumper cable is a 4-meter (13-foot) cable which has four, non-terminated wires on one end, to be inserted in a telephone termination (punch-down) block and an IBM Cabling System Data Connector on the other end, to be attached to an IBM Token-Ring Network Multistation Access Unit.

● Type 3 Media Specification

   The Type 3 media specification is 22 AWG or 24 AWG with a minimum of two twists per linear foot. When installing new wire, four twisted pairs are recommended. Type 3 media specifications are stated in the publication, IBM Token-Ring Network Telephone Twisted-Pair Media Guide (GA27-3714).

	TYPE 1 AND 2 DATA GRADE CABLES	TYPE 3 SPECIFIED MEDIUM
DEVICE TYPES SUPPORTED	COAXIAL TWINAXIAL FCS LOOP MC LOOP TOKEN-RING	3270 COAXIAL TOKEN-RING
VOICE SUPPORTED	TYPE 2	YES
SPEED: TESTED DATA RATES	16 MPBS	4 MBPS
SUPPORTS IBM TOKEN-RING NETWORK AT 4 MBPS	YES	YES
MAXIMUM DEVICES PER TOKEN-RING	260	72
T-R DRIVE DISTANCE: CLOSETS PER RING WORK AREA TO 1 WC WC TO WC	MAX OF 12 MAX OF 300M MAX OF 200M	MAX OF 2 MAX OF 100M MAX OF 120M
3270 DRIVE DISTANCE	2000 FEET	900 FEET
TYPE 8 UNDER CARPET CABLE SUPPORT	YES	NO

Figure 1-8: Cabling Types Compared

Use of flat cable, undercarpet cable, or non-twisted pair cabling is not supported with the Type 3 media specification. Different types of media cannot be intermixed between the work area and wiring closet. Type 1 cable is required between wiring closets when Type 3 specified media is used between the work are and the wiring closet.

The maximum number of punch-down connections between the IBM Token-Ring Network PC Adapter and the IBM Token-Ring Network Multistation Access Unit is two.

Coexistence

IBM Token-Ring Network, ROLMlink, 3270 CTPA, and Telephone: Four pairs of Type 3 specified media can be included in the same sheath. Two pairs can be used for the IBM Token-Ring attachment, one pair for 3270 Coax-to-Twisted Pair (CTPA) attachment, and the remaining pair for ROLMlink and/or other telephone (digital or analog) attachment. The media pairs should be separated at the first punch-down/cross-connect.

Existing Twisted Pair Cable: Existing telephone twisted-pair media may or may not be suitable for use with the IBM Token-Ring Network depending on many variables. The telephone wire must meet the Type 3 media specifications as stated in the publication, IBM Token-Ring Network Telephone Twisted Pair-Media Guide (GA27-3414). The existing telephone twisted-pair media must have two spare pairs that can be dedicated for use by the IBM Token-Ring.

1.5. Components - May 1986

The IBM Cabling System Type 9 specified media is offered as a potentially lower cost alternative to Type 1 plenum cable. It is an extension of the IBM Cabling System. The specification describes a shielded cable that contains two twisted-pairs of #26 AWG copper wire designed for the physical interconnection of data communication equipment. The IBM Token-Ring Network will also operate on Type 9 specified media.

Type 9 specified media is offered as a potentially lower cost alternative to Type 1 plenum cable. It can be used to interconnect almost all devices and will support the IBM Token-Ring Network. Cable that meets the Type 9 specification has a smaller diameter than Type 1 plenum cable. Drive distance is dependent upon data rate. At data rates between 1 Mbps and 4 Mbps, the maximum drive distance for Type 9 cable is equal to two-thirds of the distance specified for Type 1 cable in the IBM Cabling System Planning and Installation Guide (GA27-3361-6). Actual performance will vary depending on actual transmission rate. For further drive distance limitations, including those for data rates under 1 Mbps, see Using the IBM Cabling System with Communication Products (GA27-3620-1). Some examples of products that operate under 1 Mbps include members of the IBM

8100 Information System family on the MC Loop and IBM 3600/4700 Finance Communication System terminals.

Cable manufactured to this specification will meet requirements for data communications use in spaces used for environmental air when applicable local electrical codes allow. All IBM Cabling System accessories may be combined within a single wiring system to meet user requirements and to provide flexibility when using Type 9 specified media.

1.6. Miscellaneous Components

To help manage the cable system, IBM offers educational courses, on site cable inspection (for Type 3 cable), and a database management program for cable system administration.

2. Token-Ring Connectivity

2.1. Connectivity Overview

IBM has announced a number of products designed to connect devices to the Token-Ring. These products are summarized in Figure 2-1 and described below.

2.2. Multistation Access Unit

The IBM 8228 Multistation Access Unit (MAU) is a wiring concentrator that connects up to eight stations to the ring via drop cables called lobes. It was first announced in October of 1985. The design and operation of the MAU is what gives the network's physical topology its "star-wired ring" name. A ring in jack on the left hand side of the device and a ring out jack on the right hand side of the device provide for a daisy chain connection to other MAUs. The MAU provides for insertion/bypass of lobe segments and associated attaching devices. In addition, it also facilitates write fault detection by an attached device, such as the IBM PC Token-Ring Adapter.

The MAU can be used in many different physical configurations of the ring. Figure 2-2 shows a network with a single MAU and one with multiple MAUs. A device attaches to the MAU using a Type 6 cable. If the MAU is in a wiring closet as illustrated in Figure 2-3, then a patch panel is needed to jumper from Type 1 or 2 cable to Type 6. If Type 3 wire is used, a special filter jumper is required.

The attached device (i.e., PC Token-Ring Adapter), is responsible for activating a relay within the MAU to switch itself into the ring. This is done by maintaining a "phantom" voltage component on the lobe wire. This voltage charges a capacitor on the relay which then inserts the lobe into the network. When the device fails or is turned off, the relay will de-energize and latch out the device. A look at the operation inside the MAU is shown in Figure 2-4. Note the automatic wrapping feature of unconnected jacks.

The MAU can be rack or wall mounted, as illustrated in Figure 2-5. The wall mount feature requires an optional wall mount housing, available from IBM. For very small networks (eight or fewer nodes) a single wall mount MAU can be used with a maximum of 150 meters of Type 6 cable going directly to the device or wall plate.

Though the relays automatically latch when devices are inserted/ removed, it is possible during shipment of the MAU, for a sudden movement (dropping it) to cause a relay to be latched in the wrong state. IBM provides a testing tool with the MAU. Insertion of the tool into the connected ring tests whether all relays contained are wrapping. If an anomaly is detected, the tool can
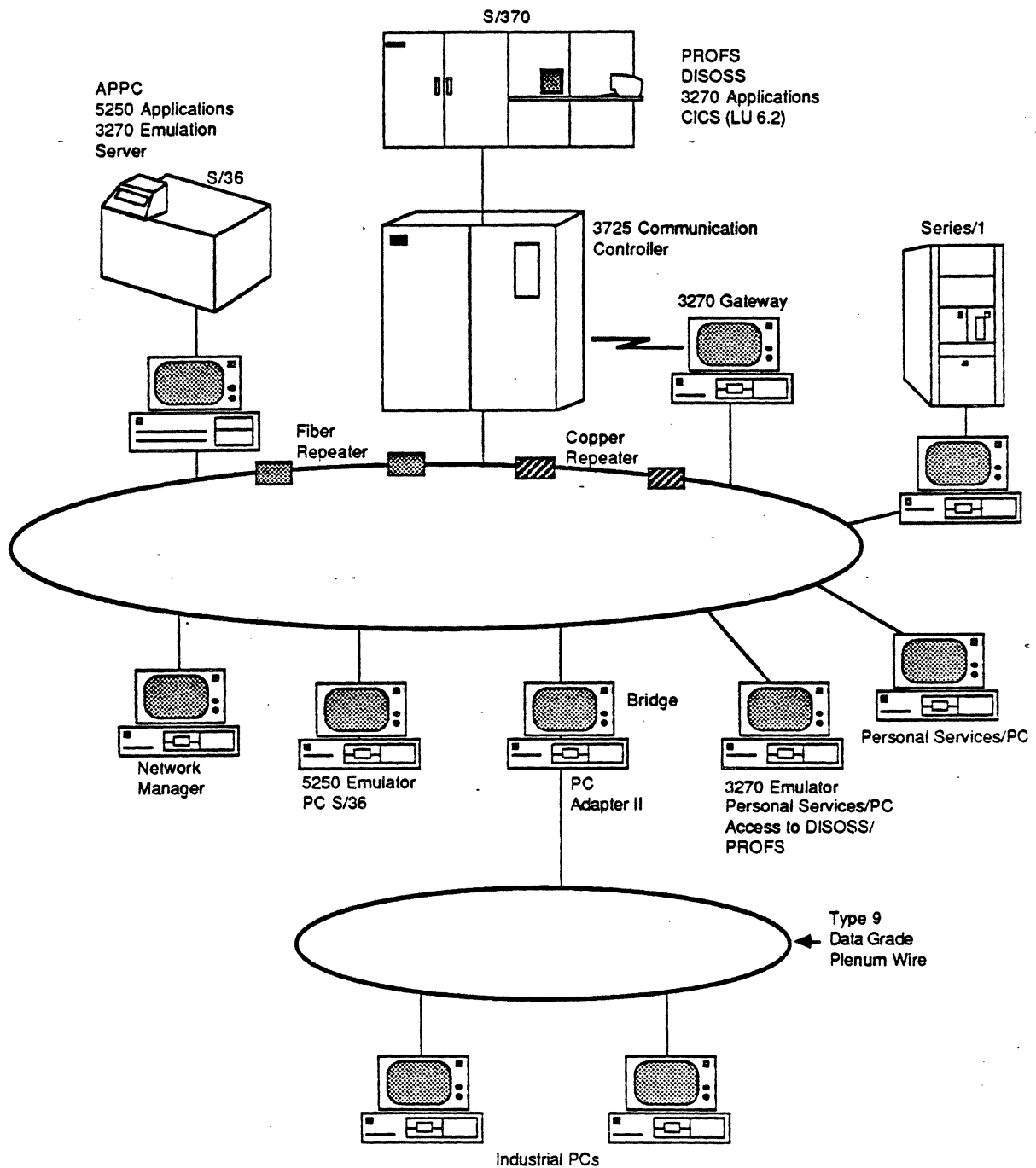
Figure 2-1: Token-Ring Connectivity

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SINGLE STAR-WIRED NETWORK
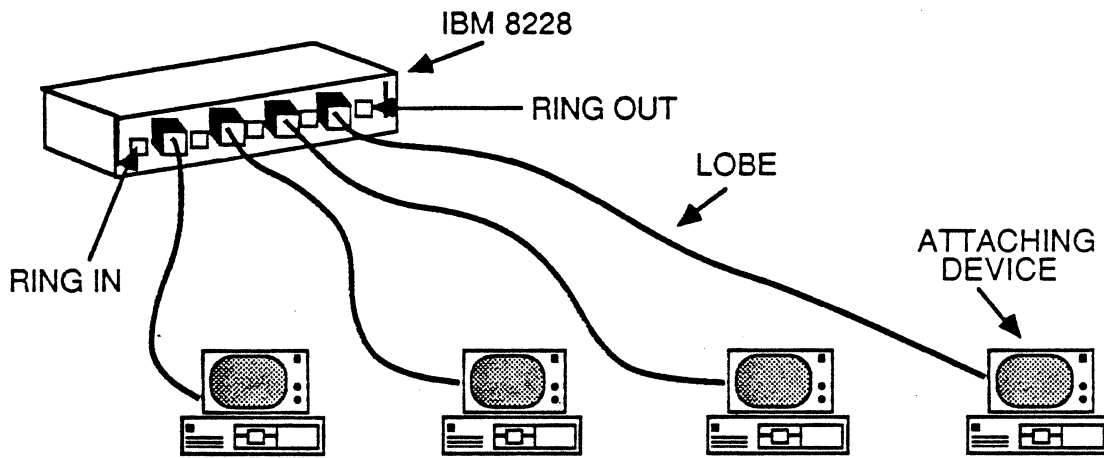
MULTIPLE STAR-WIRED NETWORK
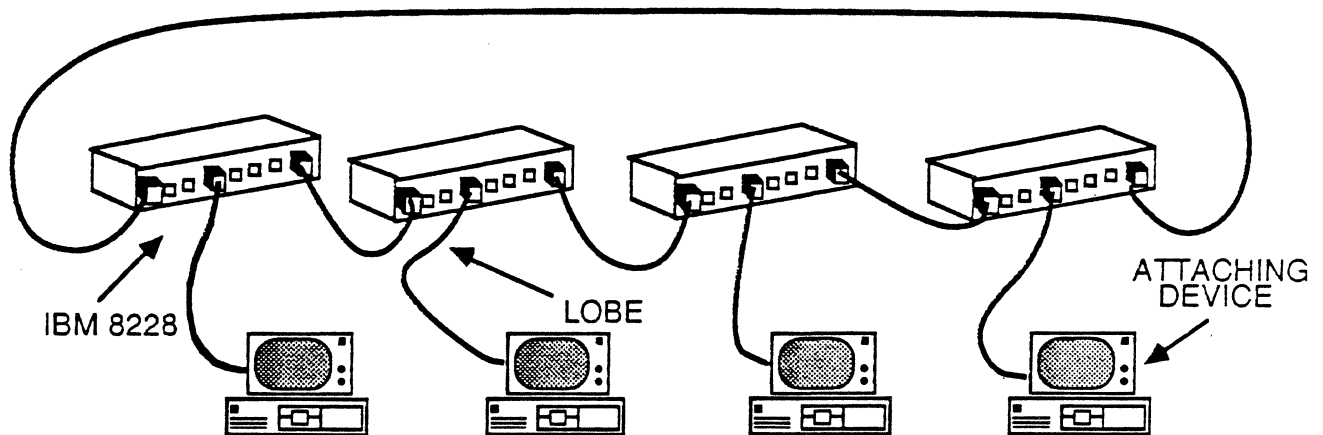
Figure 2-2:   MAU Configurations

17
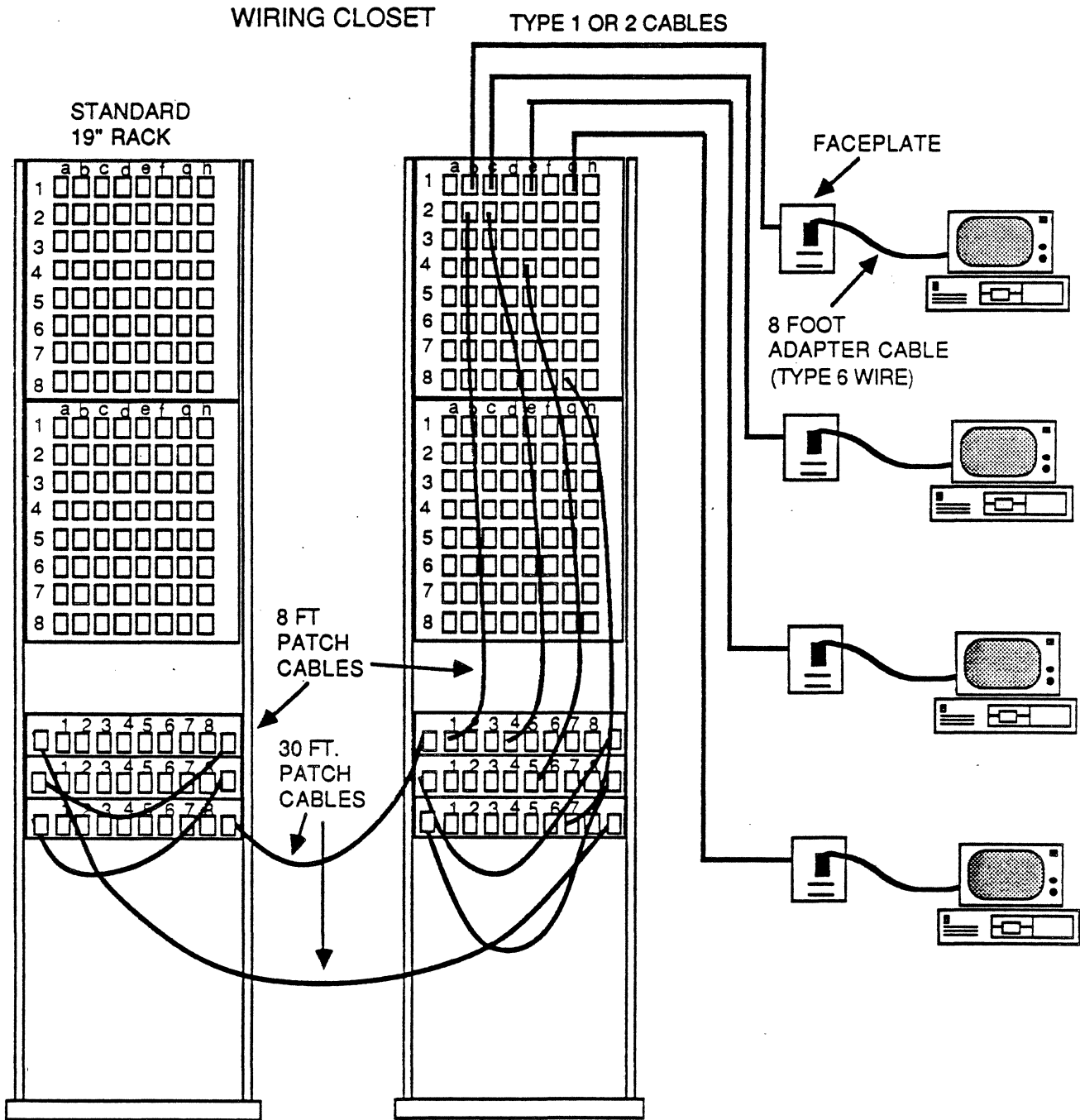
Figure 2-3: MAU Rack Configuration
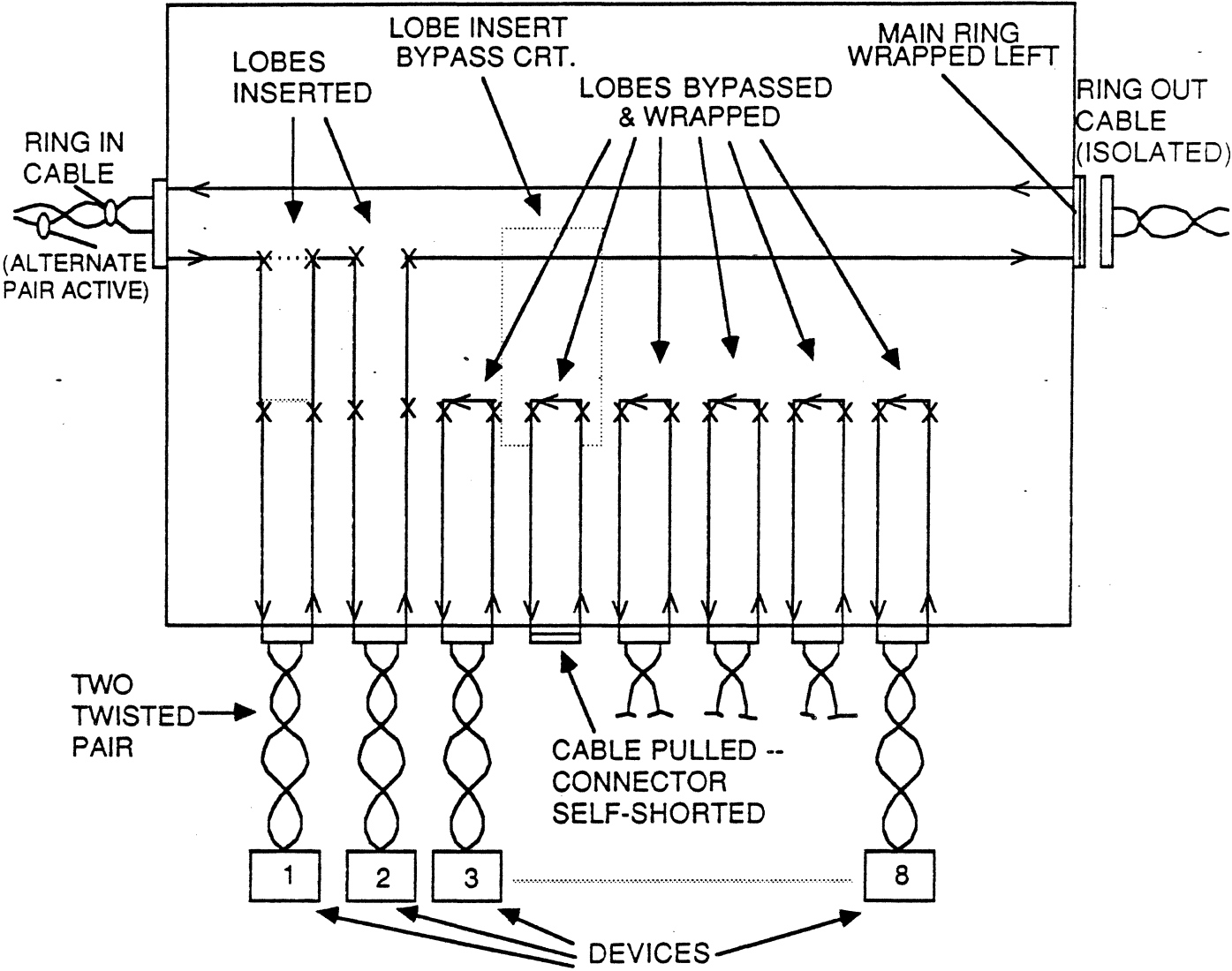
Figure 2-4: MAU Insertion/Bypass

254 MM
(10 IN.)

305-1067 MM
(12-24 IN.)
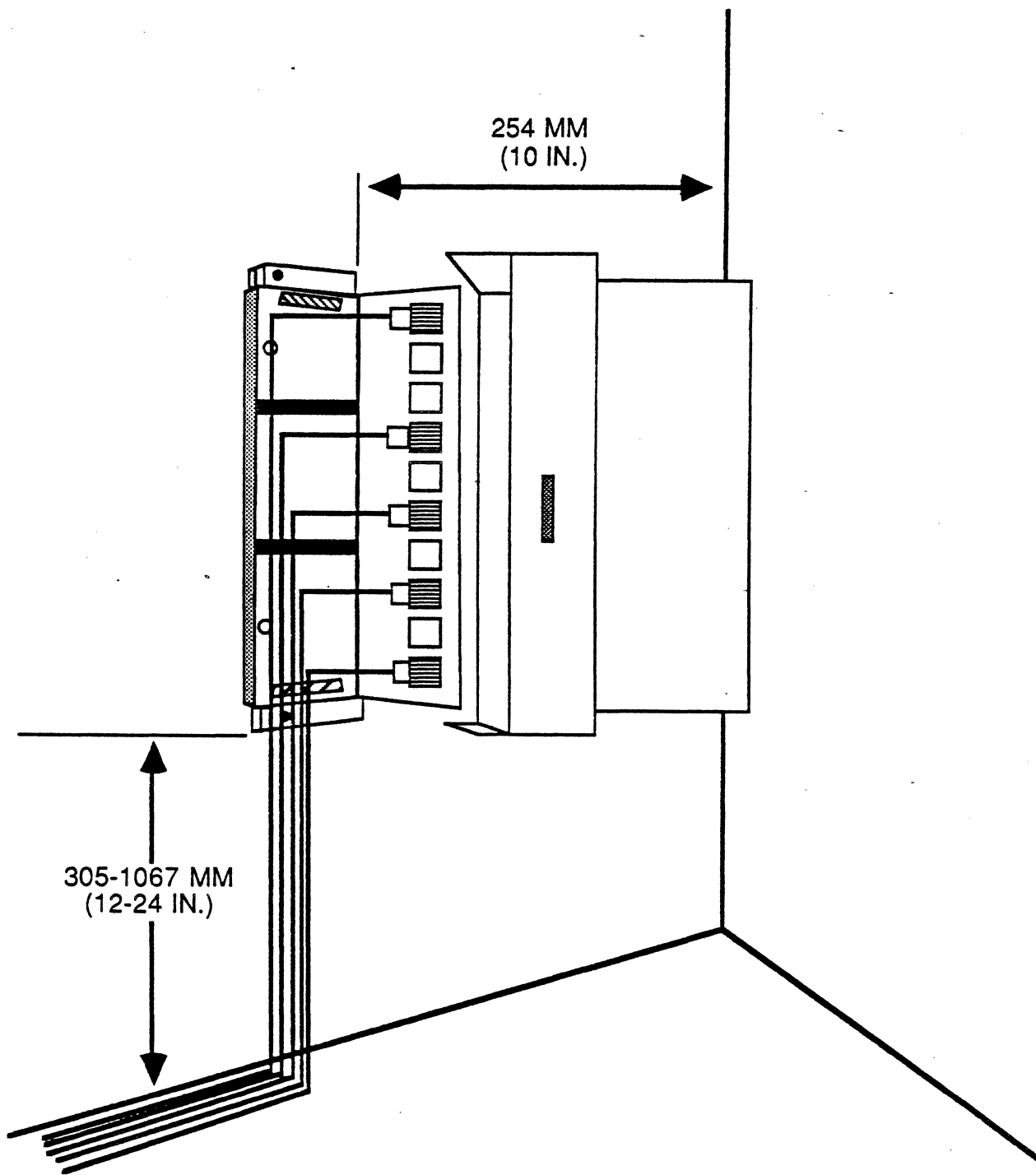
Figure 2-5:   MAU Wall Mounting

be inserted into each lobe connection to test the associated relay's status.

2.3. IBM Token-Ring PC Adapter

The Token-Ring adapter card (#3391) for the IBM Personal Computer is a full size (4.2 inches by 13.2 inches) card that works with the standard PC model, the PC XT, and the PC AT. Figure 2-6 illustrates the layout of components contained on the adapter. Each component will be detailed in this chapter. It was first announced in October 1985.

Because it works with all models, the Token-Ring adapter does not take advantage of the extended 16-bit bus available in the AT. This does not appear to detract from performance, as the adapter utilizes a shared memory interface and not a direct memory access (DMA) channel. Utilization of a shared memory interface overcomes the 8-bit DMA deficiency of the AT (in 8-bit mode, it actually operates slower than an XT). By using shared memory, scarce DMA channels are not taken, instead a block of "reserved" memory is used.

The adapter functions as an intelligent communications processor. It contains five custom analog and VLSI devices that handle the protocols and interface to the two twisted pair. The non-analog devices were developed by IBM Burlington, using a new, high-density, high-speed bipolar technology. An on-board 16-bit processor aids in initial diagnostics, on-going diagnostics, and communications functions. Although IBM claims the processor is proprietary, it has the Motorola symbol on it, and looks like a 68000. In reality, it may be a semi-custom 68000 chip like the one employed in the PC/370 line.

The microprocessor executes resident (on-board) microcode (32K 16-bit words arranged as two 32 K by 8-bit EPROMS) which provides the host access to the data link functions per IEEE 802.2 or physical link functions per IEEE 802.5. The initial release of the adapter supports the 4 Mbps data rate as specified by 802.5.

When the PC is turned on for the first time, built-in diagnostics perform a power-on-self-test (POST) procedure. This will check all the internal operations of the adapter, including the on-board timers. The adapter also checks the lobe cabling (up to the MAU and back) with loop-back tests to ensure that the cable is performing properly.

A single chip functions as a front-end for the adapter. It is essentially an analog device which performs differential Manchester encoding/decoding, data synchronization, and physical insertion/removal from the ring. The chip is transformer coupled to electrically isolate the adapter from the cable.

The two-chip (one for transmit, one for receive) protocol handler performs parallel-to-serial conversion, encoding/decoding of data

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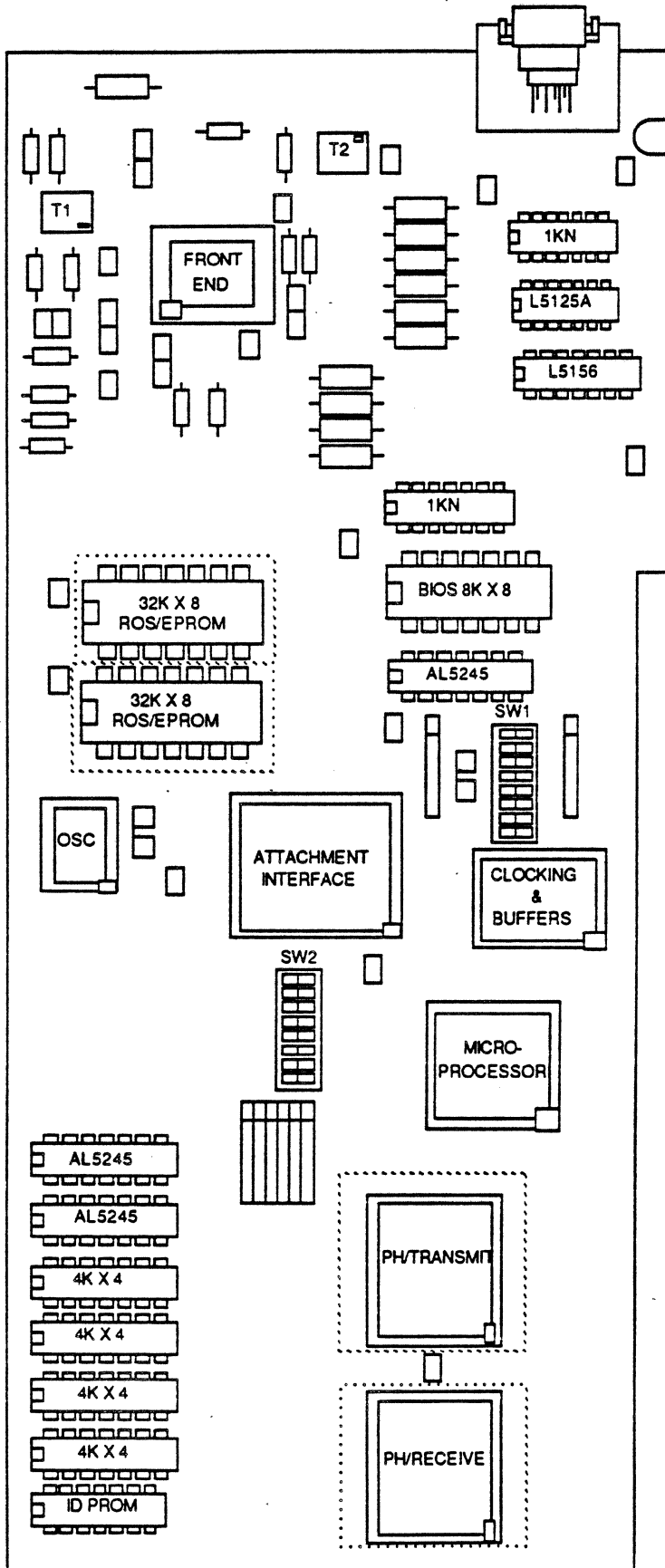
Figure 2-6: PC Adapter Component Layout

(from the front-end), cyclic redundancy check (CRC) generation and checking (removal), DMA-to-shared memory monitor function, and detection of ring errors. An interesting note is that the protocol handlers can operate up to speeds of 40 Mbps, meaning they could easy accommodate ring bit rates higher than 4 Mbps.

The shared memory is organized as four banks of 4K by 4 bit static RAM. It can be accessed as 8K by 8 from the host, or 4K by 16 from the adapter's microprocessor. The shared memory starting address is programmable by the host, eliminating the need to set switches. Any 8K boundary can be programmed and certain areas of the shared memory can be protected (set to read-only) from corruption by the host. Figure 2-7 illustrates how the shared memory can be mapped into the PC memory domain, and how one might protect certain areas.

The adapter board has been engineered to accommodate future IBM personal computers. In addition to the high-speed protocol processors and 16-bit microprocessor, IBM has chosen high-speed static RAMs operating in the sub-65 nano-second access time range, which more than satisfies the AT or future PC memory requirements. This also allows for interleaving, such that the host and the adapter can appear to be accessing memory at the same time.

In addition to the shared memory interface (also referred to as the memory-mapped input/output (MMIO) interface), certain functions are controlled by the programmable I/O (PIO) interface via an I/O location in the PC's I/O space. The address of this I/O location is set via a dip switch on the adapter. This I/O port gives access to one of sixteen 8-bit control registers. Functions provided by the control registers include bi-directional interrupt and status; the PC-shared RAM starting address; the PC-shared RAM management (i.e., setting protected areas); timer control which provides millisecond (ms) level timing; and the PC timer value register.

Five timers are provided by the adapter to supply interval and dead-man timings. The interval timers ensure proper token operation of the ring, as well as a general-purpose 10 ms timer accessible by the host PC. The dead-man timer is a 120 ms timer which checks if the adapter code is executing. If the timer expires, a procedure is initiated to get the bad adapter physically off the ring.

The interface between the adapter and the host is handled by a custom gate array, called the attachment interface. This proprietary gate array was designed by IBM and manufactured by OKI. Complete disclosure as to the exact function performed by this proprietary chip has not been made. Clearly, it handles the contention to shared memory, and probably controls the I/O port assignment and the read/write functions to the port registers which are most likely contained within this chip.
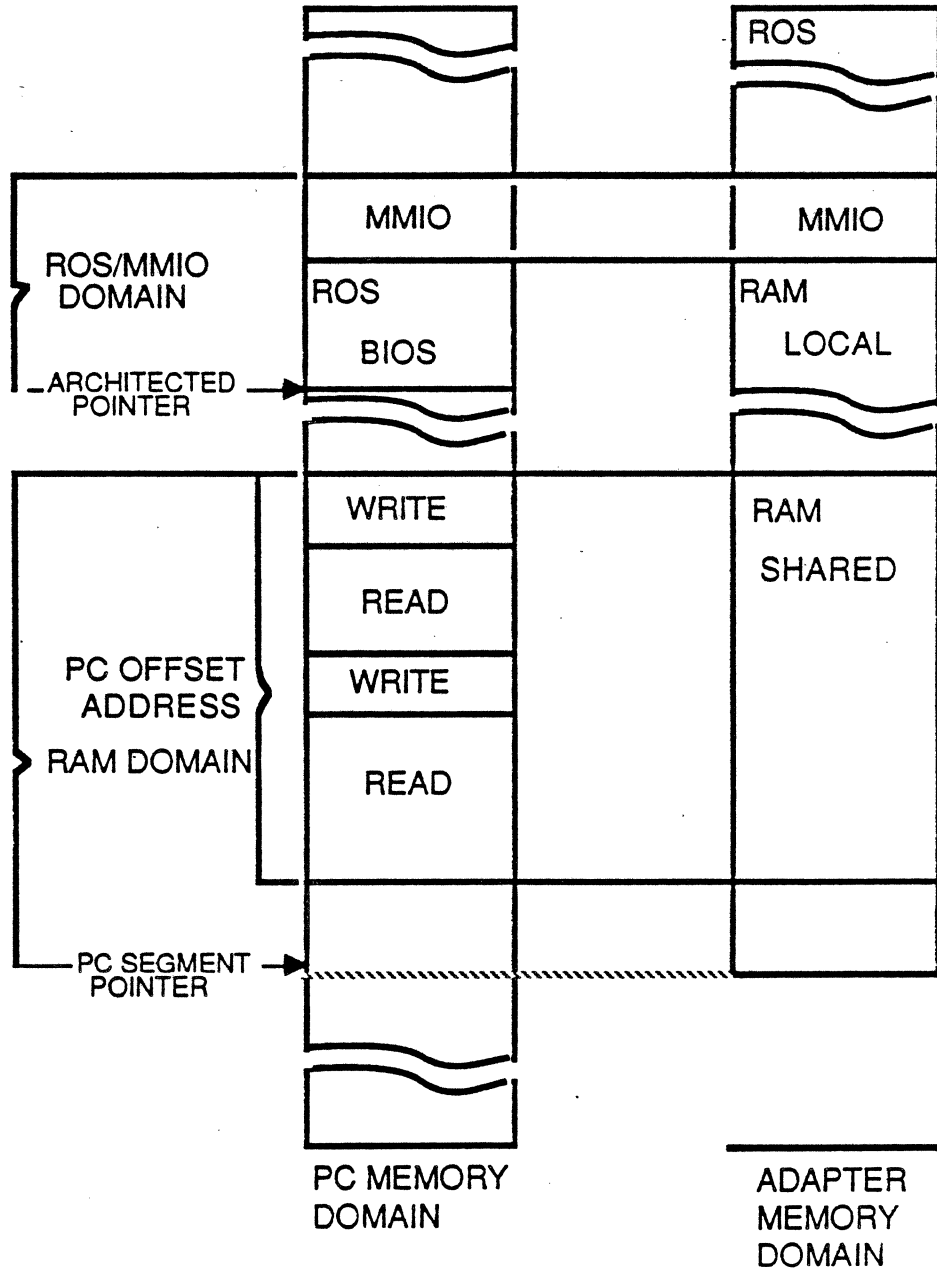
Figure 2-7: PC Adapter Memory Structure

To connect to the network, the adapter card provides a widely available DB-9-type connection to the PC adapter cable. Pins 1 and 6, 5 and 9 are used to connect to the transmit +, transmit -, receive +, and receive -. The adapter cable consists of a flexible 8-foot Type 6 cable for connecting to data grade (Type 1 or 2) media. An optional Type 3 media filter is available for use with Type 3 telephone-type wire.

Lastly, the adapter comes with a diskette which contains the adapter handler (TOKREUI), the adapter diagnostic program, and the ring diagnostic program to assist in locating error conditions during operation of the ring.

2.4. IBM Token-Ring Network PC Adapter II

The IBM Token-Ring Network PC Adapter II (#5063), when operating with the IBM Token-Ring Network Bridge program, provides bridging of IBM Token-Ring Network rings. This PC Adapter II provides attachment for IBM Industrial Computers and is also an alternative for attachment of IBM Personal Computers to the IBM Token-Ring Network.

Two IBM Token-Ring Network PC Adapter IIs operate with the IBM Token-Ring Network Bridge program to support bridging IBM Token-Ring Network rings. This increases the allowable number of attaching devices that communicate on an IBM Token-Ring Network within the establishment. The bridging of multiple rings provides the appearance of one logical ring with transparency to higher level protocols.

The IBM System/36, through the use of a directly-attached Personal Computer AT functioning as a communications controller, attaches to the IBM Token-Ring Network. This Personal Computer AT is attached to the Token-Ring Network PC Adapter II.

The IBM Token-Ring Network PC Adapter II provides an alternative attachment for the IBM Personal Computer to the IBM Token-Ring Network and provides all of the function of the IBM Token-Ring Network PC Adapter with the addition of 8Kb of random access memory (RAM).

The PC Adapter II can be used in devices attached to the ring which require additional RAM for increasing message segment size and/or increasing the number of link stations supported by the adapter. For example, the IBM Token-Ring Network PC Adapter II in a server may improve performance when multiple workstations require simultaneous access to the server.

2.4.1. Hardware Requirements

For attachment of the IBM Personal Computer or IBM Industrial Computer to the network, the IBM Token-Ring Network PC Adapter II requires:

- One full-sized expansion slot in one of the following system units (the adapter is not supported for use in the IBM 5161 Personal Computer System Expansion Unit):

  - IBM 5150 Personal Computer

  - IBM 5155 Portable Personal Computer

  - IBM 5160 Personal Computer XT

  - IBM 5170 Personal Computer AT

  - IBM 5531 Industrial Computer

  - IBM 7531 Industrial Computer

  - IBM 7532 Industrial Computer

- Diskette drive

- IBM Token-Ring Network PC Adapter Cable or Type 3 Media Filter

2.4.2. Software Requirements

For attachment of the IBM Personal Computer or IBM Industrial Computer to the network, the IBM Token-Ring Network PC Adapter II requires:

- IBM PC DOS 3.2

- IBM Token-Ring Network Bridge Program (Optional)

Two application program interfaces are provided with the IBM Token-Ring Network PC Adapter II:

- An IEEE 802.2 data link control programming interface

- An IEEE 802.5 direct physical control programming interface

Memory requirements are 7Kb for the adapter handler program supporting the two adapter programming interfaces, in addition to the DOS memory requirement.

In addition, two high-level programming interfaces are available:

- Advanced Program-to-Program Communications for the IBM Personal Computer (APPC/PC) provides an SNA APPC (LU 6.2) application programming interface to the network.

- The IBM Token-Ring Network Network Basic Input/Output System (NETBIOS) program provides a NETBIOS application programming interface. Examples of programs that utilize this interface

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are the IBM PC 3270 Emulation Program Versions 2.0 and 3.0 and the IBM PC Local Area Network Program Version 1.10.

Figure 2-8 summarizes the evolution of the IBM Token-Ring Adapter.

2.5. IBM 8218 Token-Ring Network Copper Repeater

The 8218 Token-Ring Network Copper Repeater Model 001 is designed to operate on IBM Cabling System data grade media for the IBM Token-Ring Network to extend the allowable distance between IBM 8228 Multistation Access Units up to 750 meters (2,500 feet).

The 8218 Model 001 is a copper repeater for the IBM Token-Ring Network which extends the data transmission path on the IBM Cabling System data grade media. The 8218 can drive the electrical data transmission signals up to 750 meters between 8228s, typically installed in wiring closets. Operating in pairs, 8218s redrive electrical signals on both the main ring path and backup path. Two crossover patch cables are required for each pair of repeaters. An individual 8218 amplifies and reclocks data transmission signals along the Token-Ring.

Typically these units are installed in a standard 19" rack (not supplied by IBM) or attached to flat surfaces such as walls or shelves.

Rack installations require a rack mounting assembly accessory which accommodates up to seven individual IBM 8218s. The 8218s may be installed in or removed from a rack mounting assembly without powering down other 8218s in the same assembly. A single power outlet is required to service a rack mounting assembly with up to seven repeaters. The rack mounting assembly accommodates 8218s, IBM 8219 Token-Ring Network Optical Fiber Repeaters, or a mixture of both.

Flat surface installation requires surface mounting brackets. Individual 8218s snap easily into and out of the bracket.

The 8218s can operate in an IBM Token-Ring Network environment which has IBM Cabling System Type 3 specified (telephone twisted-pair) media installed. The 8218s are not supported for use on lobe wiring, which is the wiring from the 8228 Multistation Access Unit to the Token-Ring attaching product location. In this environment, two data grade media-to-Type 3 filters are required where 8218s are used between 8228s, and Type 3 specified media is installed from the office to the wiring closet. The Data Grade Media to Type 3 Filters are available from authorized distributors of the IBM Cabling System.

PC Adapter

Announced October, 1985

Workstation PCs

Shared Memory Host Interface
PC/XT/AT

16Kb RAM

5 chip T-R controller

PC Adapter II

Announced April, 1986

Extended Function PCs

Shared Memory Host Interface
PC/XT/AT

32Kb RAM

5 chip T-R controller

Token-Ring Interface Coupler (TIC)

Announced April, 1986

Same chip set as PC Adapter

Plugs into Line and Token-Ring
Attachment Base (LAB Type C)

Base attaches to 3275

Provides 802.2 Functions under ACF/NCP

Up to four TICs per LAB

RT Adapter

Announced June, 1986

Same chip set as PC Adapter

DMA interface

16Kb RAM

Figure 2-8:   IBM Token-Ring Adapter Evolution

2.6. IBM 8219 Token-Ring Network Optical Fiber Repeater

The 8219 Token-Ring Network Optical Fiber Repeater Model 001 is an optical fiber repeater for the IBM Token-Ring Network which extends the allowable distance between IBM 8228 Multistation Access Units up to 2.0 Km (6,600 feet). 8219 Optical Fiber Repeaters operate in pairs to convert data signals from electrical to optical and back. Greater distances are achievable by installing additional pairs of 8219s.

Configuration planning information for determining drive distances for various types of optical fiber cable is supplied in the publication IBM Token-Ring Network Optical Fiber Cable Options (GA27-3747).

These optical fiber repeaters are used in pairs. By operating in pairs, one 8219 converts electrical data transmission signals to optical signals in the main ring path of the network and the second converts the optical signals back to electrical signals. Individual 8219s can convert and redrive data transmission signals on the main ring path or the backup path. The 8219s are not supported for use on lobe wiring, which is the wiring from the 8228 Mulistation Access Unit to the Token-Ring attaching product location.

Typically, these repeaters are installed in a standard 19" rack (not supplied by IBM) or attached to flat surfaces such as walls or shelves.

Rack installations require a rack mounting assembly accessory which accommodates up to seven individual 8219s. The 8219s may be installed in a rack mounting assembly without powering down other 8219s in the same assembly. One power cord per rack mounting assembly plugs into the customer's power outlet. The rack mounting assembly accommodates 8219s, IBM 8218 Token-Ring Network Copper Repeaters, or a mixture of both.

Flat surface installation requires surface mounting brackets. An individual 8219 snaps easily into and out of the bracket. The optical fiber dual socket clip is used as a strain relief for the cables when the 8219 is installed on a flat surface.

The 8219s operate in an IBM Token-Ring Network environment which has IBM Cabling System Type 3 specified (telephone twisted-pair) media installed. A data grade media-to-Type 3 filter is required for each repeater installed in this configuration. See IBM Token-Ring Network Telephone Twisted-Pair Media Guide (GA27-371-4).

The 8219s can also operate in IBM Token-Ring Network environments that have fiber cable other than IBM Cabling System Type 5 cable installed between 8228s. The publication IBM Token-Ring Network Optical Fiber Cable Options (GA27-3747) describes the usage, limitations, and optical fiber accessories required to operate 8219s on fiber sizes such as 62.5/125, 50/125, and 85/125 micron.

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2.6.1. Hardware Requirements

A pair of IBM 8219s requires:

● Crossover patch cable (one per fiber link)

● Two optical fiber BNC-to-biconic patch cables

● Two optical fiber dual socket clips

● Rack mounting assembly or surface mounting brackets

● Optical fiber biconic-to-biconic patch cable (2.5 m or 9.5 m) (optional)

● Data grade media-to-Type 3 filter (Type 3 specified media environment at office wall)

The following list of accessories for the 8219 are available from authorized distributors of the IBM Cabling System.

IBM Specification No.	Description
6339137	Crossover Patch Cable
6165811	Optical Fiber BNC to Biconic Patch Cable - 2.5M/8ft.
6165812	Optical Fiber Biconic To Biconic Patch Cable - 2.5M/8ft.
6165813	Optical Fiber Biconic To Biconic Patch Cable - 9.5M/30ft.
6339106	Optical Fiber Connector
6165847	Optical Fiber Dual Socket Clip
6466943	Data Grade Media to Type 3 Filter

2.7. IBM 3725 Attachment to IBM Token-Ring Network

New special hardware features support direct attachment of the 3725 Communication Controller to the IBM Token-Ring Network using the IBM Cabling System, including Type 3 specified media (telephone twisted pair).

The Token-Ring Subsystem permits attachment of appropriately equipped 3725s and 3726s to IBM Token-Ring Networks. The subsystem consists of the following features:

● LAB Type C (#4774) - The Line and Token-Ring Attachment Base provides a Token-Ring multiplexer and a physical base for up to four Token-Ring Interface Couplers (TICs) (#4991). In addition, each LAB Type C provides a communication scanner and a physical base for up to 16 line attachments. Price is $23,760.

●   TIC (#4991) - The Token-Ring Interface Coupler (TICs) provides one attachment to an IBM Token-Ring Network. It contains a microprocessor operating under control of a resident microcode. Price is $3,000.

It transmits and receives at a speed of 4 Mbps using protocols conforming with IEEE 802.5 and ECMA 89 standards. However, throughput depends on transaction characteristics, network control program path-length, and 3725 capability.

Under control of ACF/NCP, the coupler provides logical link control functions conforming with the IEEE 802.2 standard.

For each TIC (#4991), order one cable group #1666. IBM supplies standard cables 23 meters (75 feet) long. For shorter cables, order the cable group at the required length as specified in the Installation Manual-Physical Planning (GC22-7064). For longer cables up to 250 feet, order cables by P/N 61X3229 at the required length by MES.

TIC cables are installed by IBM customer engineers. TIC cables are made of IBM Cabling System Type 6 cable (shielded twisted pair intended for use in a work area) and terminated on each end with an IBM Cabling System Data Connector. The length of each TIC cable must meet IBM Cabling System specifications.

One LAB Type C (#4774) can be installed in a 3725 Model 1 or 2. In a 3725 Model 1 with a 3726, one LAB Type C can be installed in the 3726 if a LAB Type C is installed in the 3725, or two in the 3726 if no LAB Type C is installed in the 3725.

2.7.1. Hardware Requirements

Machines delivered after general availability will automatically include the MOSS control code and necessary prerequisite engineering change to support the announced hardware.

To support the announced hardware, machines shipped prior to general availability must have 3725 REA 23-30177 or EC 342076 installed.

When a 3725 is to be installed in an IBM Token-Ring Network where IBM Cabling System Type 3 specified media (telephone twisted pair) is used, a data grade media-to-Type 3 filter is required between the IBM 3725 TIC cable and the telephone twisted-pair wiring. This is described in the IBM Token-Ring Network Twisted-Pair Media Guide (GA27-3714).

2.7.2. Software Requirements

ACF/NCP support for MVS of the 3725 attachment to IBM Token-Ring Network will be provided at general availability of 3725 attach-

ment to IBM Token-Ring Network by a then current level of ACF/NCP Version 4.

The 3725 attachment to the IBM Token-Ring Network will now extend connectivity between an IBM Personal Computer and a System/370 for applications utilizing:

- PC 3270 Emulation Program Version 3.0

- Advanced Program-to-Program Communication for the IBM Personal Computer

2.7.3. Compatibility

- Presently available programming support, that is, ACF/NCP Version 4 (MVS) and EP/3725 Release 3, is compatible with the MOSS control code but will not support the newly announced hardware.

- A then current level of ACF/NCP Version 4 (MVS) will support the newly announced hardware.

- A then current level of ACF/NCP Version 4 (MVS) will support existing machines once upgraded as stated in the hardware section above.

2.8. IBM System/36 5360 and 5362 Features

IBM has announced attachment of the IBM System/36 to the IBM Token-Ring Network. The System/36 can be connected to the IBM Token-Ring Network through a directly attached IBM Personal Computer AT functioning as a LAN communications controller. The 5360/62 LAN Attachment Feature is $2,500. The planned availability date is the second quarter of 1987. The Single Line Communications Adapter Feature is $425.

2.8.1. 5360 and 5362 LAN Attachment Feature

The LAN Attachment Feature (#6500 on the 5360; #3315 on the 5362) provides the System/36 with connectivity to the IBM Token-Ring Network via an IBM Personal Computer AT. The directly attached IBM Personal Computer AT serves as a LAN communications controller for the System/36. The IBM Personal Computer AT operates in a dedicated mode, executing software provided by the IBM System/36 LAN Communications Licensed Program (5727-LC1) and downloaded to it.

The 5364 does not require the System/36 LAN Attachment Feature. Attachment to the IBM Token-Ring Network is provided by the IBM 5364 directly attached IBM Personal Computer AT. Support for the attachment is provided by the IBM System/36 PC 5364 LAN Communications Licensed Program (5727-LC6).

The 5360, 5362, and 5364 may attach to two IBM Token-Ring Networks. Each network attachment requires an IBM Token-Ring Network PC Adapter II (feature #5063) in the directly attached IBM Personal Computer AT.

2.8.1.1. IBM PC Features for System/36 LAN Communications

The System/36 LAN Attachment Adapter (feature #3098) must be installed in the IBM Personal Computer AT to which the 5360 or 5362 is directly attached. The cable provided with the System/36 LAN Attachment Feature connects to this card. The card is designed for customer setup. Feature #3098 is automatically shipped with the System/36 LAN Attachment Features (#6500 and #3315). A manual entitled System/36 LAN Attachment Adapter Guide to Operations, and a diagnostic diskette for testing feature #3098 in the IBM Personal Computer AT, are also automatically shipped with the System/36 LAN Attachment Feature. The System/36 LAN Attachment Adapter (#3098) may be ordered separately only if a spare card is desired.

IBM Token-Ring Network PC Adapter II (feature #5063) must be installed in the IBM Personal Computer AT to which the 5360 or 5362 is directly attached. Feature #5063 must also be installed in the IBM Personal Computer AT directly attached to the 5364. Feature #5063 must be ordered separately as an IBM Personal Computer feature since it is not shipped with the System/36 LAN Attachment Feature. If the 5360, 5362, or 5364 is to be attached to two IBM Token-Ring Networks, two of these features will need to be installed in the directly attached IBM Personal Computer AT.

2.8.2. Single Line Communications Adapter(SLCA)

The Single Line Communications Adapter (Feature #2550) provides for attachment of a single communication line to the 5360 when the LAN Attachment Feature is installed. Feature #2550 permits half-duplex operation at speeds from 600 to 9,600 bps using BSC or SDLC protocols, and from 75 to 9,600 bps using asynchronous communications. Both switched and non-switched operations are supported. Three physical interfaces are supported:

- EIA RS-232-C/CCITT V.24 via feature #4552
- Digital data service via feature #4555
- X.21 via feature #4554 (non switched operations only)

Feature #2550 is only available on a System/36 5360 with the LAN Attachment Feature (#6500) installed. To have both SLCA and LAN attachment capability co-resident in the 5360, feature #2550 must be installed as the SLCA feature, not feature #2500.

2.8.2.1. Hardware Requirements

The System/36 LAN Attachment Features (#6500 and #3315) apply to all models of the 5360 and 5362 System Units, respectively. The System/36 LAN Attachment Adapter (feature #3098) applies to all models of the IBM 5170 System Unit. The Single Line Communications Adapter (#2550) applies only to the 5360 with the LAN Attachment Feature (#6500) installed.

2.8.2.2. Software Requirements

The latest release of the IBM System/36 System Support Program, available when the feature is shipped, will provide support for the LAN Attachment Feature. The new IBM System/36 LAN Communications Licensed Program will provide the code that is downloaded and executed in the IBM Personal Computer AT.

2.8.2.3. Prerequisites

Prerequisites for the LAN Attachment Features (#6500 and #3315) are:

1. For the 5360:

    Models AXX and BXX require a Stage 2 level System Unit.

2. For the 5360 and 5362:

    A minimum configuration for the attached IBM Personal Computer AT is a 5170 System, Model 068 with the following special features and I/O:

● 256 Kb Memory Module Kit (#0202)

● IBM Token-Ring Network PC Adapter II (#5063) (If the System/36 is to be attached to two Token-Ring Networks, two adapters will be required.)

● System/36 LAN Attachment Adapter (#3098) (shipped with the System/36 LAN Attachment Feature)

● Monochrome Display and Printer Adapter (#4900)

● 5151 Model 001 Monochrome Display.

Prerequisites for the Single Line Communications Adapter (#2550):

● Feature 6500 must also be installed.

2.8.2.4. <u>Limitations</u>

1. For the LAN Attachment Feature (#6500 and #3315):

    #6500 cannot be installed with SLCA (#2500) on 5360.
    (#6500 can be installed with ELCA (#4550) on 5360.)

    #3315 cannot be installed with SLCA (#2910) on the
    5362.

    Field installation of feature #3315 on a 5362 with SLCA
    (#2910) requires removal of the SLCA. Upgrade to ELCA
    #4550 or MLCA #4500 will be necessary to provide remote
    communications and the LAN attachment on the same 5362.

2. For the directly attached IBM Personal Computer AT:

    Must be dedicated to System/36 LAN attachment communi-
    cations. Cannot execute any other applications concur-
    rently.

3. For the Single Line Communications Adapter (#2550):

    Cannot be installed with the MLCA (#4500), the ELCA
    (#4500), or the SLCA (#2500). Cannot be installed if
    both the 6157 tape attachment (#7950) and the LAN
    attachment (#6500) are installed. Does not support
    Autocall, X.25 Packet Switched Network attachment, X.21
    switched, or line speeds above 9,600 bps.

2.9. <u>IBM 3720 Communication Controller, IBM 3721 Expansion Unit</u>

The IBM 3720 Communication Controller and IBM 3721 Expansion Unit
are a new entry offering in the IBM 3725 communication controller
family. They provide a modular, small size communication
controller characterized by a lower price, lower capacity, and
many functional enhancements. A link-attached model has been
specifically designed for remote operation.

The 3720 and 3721 provide four host attachments via two channel
adapters and two 2-processor switches, up to 60 lines, a maximum
of two IBM Token-Ring adapters, up to 2Mb of main storage,
interfaces for a remote switched console, and a local direct
attached console. They provide enhancements such as improved
maintenance via the Remote Support Facility (RSF), unattended
operation capability, and improved high speed line support.

Characteristics of the 3720 include:

- The 3720 Communication Controller is an entry member of the
  IBM 3725 family. It can operate under control of current
  versions of the same communication program products as the
  IBM 3725: NCP (Version 4), EP (Release 3 and 4), PEP.

- The 3720 Models 2 and 12 have been designed specifically for operating in a remote environment. The remote switched console and new unattended operation procedures provide customers the ability to control 3720 operations from a remote customer location.

- Attachment of up to 28 lines to the 3720 Models 1 and 2. Addition of the IBM 3721 Expansion Unit to the 3720 Model 1 or 2 expands this capability to 60 lines, either duplex or half duplex. Actual capacity of the system in operation may be less than the maximum physical line attachment capability.

- Attachment of up to 2 IBM Token-Ring Networks and up to 16 lines to the 3720 Models 11 and 12. Addition of the IBM 3721 Expansion Unit to the 3720 Model 11 or 12 expands this capability to 48 lines, either duplex or half duplex. The IBM 3721 Expansion Unit does not provide attachment to an IBM Token-Ring Network. Actual capacity of the system in operation may be less than the maximum physical line attachment capability.

  The 3720 Models 1 and 2 are field-upgradable to models 11 and 12 respectively.

- One or two channel adapters in the 3720 Models 1 and 11 to connect to byte multiplexer, block multiplexer, or selector channels of host processors.

  Up to two Processor Switches (TPSs) allow one or two channel adapters to be attached to two processor channels with non-simultaneous communication.

- For integration of the 3720 in the network and for problem determination, a user-provided control terminal is used as the operator console. This terminal may be directly attached (local) or attached via a modem and a switched telephone line (remote). The attachment is only required while the above-mentioned operations are performed.

- A 10Mb hard disk provides additional storage space. This storage is used for the support of files used by MOSS.

- The 3720/3721 improves the support of high-speed lines. Four 56 Kbps or 64 Kbps, or five 48 Kbps full-duplex lines can be attached to a scanner, instead of two with the previous IBM 3725 scanners. This enhancement decreases the cost of high-speed line attachments.

- Line weights instead of LIC weights. For the 3725, the weights are defined per LIC. For the 3720, a weight is assigned to each individual line. Thus the total weight is derived very naturally as the sum of the weights of the connected lines, and the scanner capacity is used much more

efficiently when there are mixes of different line types on the same scanner.

● Line weight granularity. For each protocol, the line weights are proportional to the speed.

● Simplified machine structure: The machine structure is simplified by use of a reduced number of required features: five types of line interfaces, one type of Token-Ring interfaces, one storage feature, one type of channel adapter and one type of two-processor switch. The communication scanners and internal clock controls are included in the base units and the line interfaces may be added or relocated by the customer. This allows easy additions and changes to the machine configuration.

● All units except the 3720 Models 1 and 11 (channel attached) are customer set-up. Configuration upgrades by addition, removal, rearrangement of LICs and TICs can be done by the customer. Such a facility allows easier changes of line configurations and provides additional problem determination facilities.

● Maintenance and Operator Sub-System (MOSS) problem determination facilities are improved: Like the 3725, the 3720 Communication Controller provides a functionally separate processor, which facilitates maintenance and problem determination by providing:

  - box invent recording

  - alert mechanisms

  - display of machine status

  - diagnostics for the Central Control Unit (CCU), channel adapters, scanners, and line interfaces

  - utilities to collect microcode dumps and 3720/3721 configuration data and send them to the host for printing

  - menus displayed on the screen of the console to provide guidance to the operator

MOSS facilities are enhanced with the following functions:

  - Automatic scanner re-IML in case of failure: This new facility further improves the availability of the communication scanner

When a scanner fails, the MOSS will take a scanner dump and re-IML this scanner without operator intervention. At the completion of these actions, the MOSS will notify the host of the outcome of the operations. If they were successful, the lines of

this scanner may be reactivated from the host. If they were not successful, manual intervention will be required at the local or remote 3720 operator console for extended trouble shooting.

> - Automatic analysis of Box Event Records (BERs): MOSS analyzes automatically the box event records and provides a reference code which will be used by the customer and the IBM service organization for determining the probable cause of failure, and the action to be taken.

● All internal clocks set by software: The MOSS operator console is now used to set the speed of the clock, for direct attached synchronous terminals. Previously, hardware straps had to be put in place by IBM service personnel. Speeds are set by line and not by LIC. The speed for other types of attachments, including direct attachment of asynchronous terminals, is specified via the SSP program product, as with the 3725.

● Low-cost network control program ACF/NCP V4 Subset for entry MVS, VSE, and VM users.

● Support of IBM Communication Network Management (CNM) direction: The 3720 supports IBM's CNM direction by sending error-related information to the NetView or NPDA (Network Problem Determination Application) program product running in a host processor.

Alerts generated for 3720 are displayed on the network control terminal by NetView (MVS, VM) or NCCF/NPDA (VSE). If NPDA or the NetView Hardware Monitor component are not available, the alerts will be displayed on the VTAM console for the VTAM release described under the software requirements section. Alert support for the IBM Token-Ring Network is provided only through use of the Hardware Monitor component of NetView.

This enhanced CNM support further improves the problem determination facilities in an SNA network by allowing an easier identification of the failing unit.

● Support of IBM 586X modem Link Problem Determination Aid (LPDA 2) enhancements.

● Support of IBM and non-IBM DTEs with X.25 interface: This support is provided by the X.25 SNA Interconnection PRPQ. It is then possible to convey X.25 traffic using the SNA backbone network and the SNA transport facilities.

The IBM CNM capability is enhanced for X.25 resources by using the X.25 SNA Network Supervisory Function (NSF) PRPQ in the SNA host processor.

2.9.1. Machine Organization

Base Machine: The 3720 Models 1, 2, 11, or 12 are the base machines. Without special features they contain:

- Central control unit

- Main storage of 1Mb

- Diskette drive

- Maintenance and operator sub-system (MOSS)

- One communication scanner, including internal clock controls

  The internal clock supports the following bit rates:

    - Category 1 Rates

    - 50, 110, 134.5, 200, 300, 600, and 1200 bps for start/stop

  or synchronous operation

    - 75, 100, 2400, 4800, 9600 and 19200 bps for start/stop operation only.

  The transmission may be duplex or half-duplex to modem-attached or directly-attached terminals.

    - Category 2 Rates

    - 2,400, 4,800, 9,600, 19,200, 38,400, 55,885 and 245,760 bps for directly-attached synchronous terminals

Category 1 speeds are set by NCP or EP. Category 2 speeds are set from the operator console.

The 3720 Models 1 and 11 also provide:

- One basic Channel Adapter (CA), plus one optional CA (#1561)

  They attach to a byte multiplexer, block multiplexer, or selector channel of an IBM 4341, 4361, 4381, 303X, 308X, or 3090 processor. Except with the 303X, they also attach to the IBM 3044 Fiber Optic Channel Extender Link, allowing installation of 3720 Models 1 or 11 at up to 2 km (6,666 ft) from the host (only with NCP)

- Up to two optional two processor switches (TPSs) (#8320)

  The TPS allows a channel adapter to be attached to two processor channels with non-simultaneous communication.

In addition, the 3720 Model 1 or 2 may contain:

● One optional storage increment of 1 Mb (#7100)

● Up to seven Line Interface Couplers (LICs) Type 1 (#4911),
  Type 2 (#4921), Type 3 (#4931), Type 4A (#4941), or Type 4B
  (#4942)

● Up to two Token-Ring Interface Couplers (TICs) Type 1
  (#4991)

The 3720 models 1 and 2 are field-upgradable to Models 11 and 12
respectively.

2.9.2. Special Features

Depending on the model type, the base 3720 may be upgraded by the
addition of one or more of the following features.

● Storage Increment 1 Mb (#7100): An additional main storage
  increment of 1 Mb to allow up to 2 Mb of memory.

● Second Channel Adapter (#1561): A second logical and
  physical interface between a 3720 Model 1 or 11 and an IBM
  4341, 4361, 4381, 303X, 308X, or 3090 processor. It
  attaches to a byte multiplexer, block multiplexer, or
  selector channel. Except with the 303X, it also attaches to
  IBM 3044 Fiber Optic Channel Extender Link (only with NCP).
  It may be equipped with a two processor switch (#8320).

● Two Processor Switch (#8320): A second channel interface to
  attach the first or the second channel adapter to a Multi-
  processor System (MP) or to two channels of the same or
  different processors, with non-simultaneous communication.

● Line Interface Coupler (LIC) Type 1 (#4911): Four EIA
  RS-232-C/CCITT V.24 interfaces for communication lines
  operating at transmission speeds up to 19.2 Kbps. The lines
  may be used either for duplex or half-duplex data transmis-
  sion. Each interface may also be used as a port for EIA
  RS-366/V.25, X.20 bis, or X.21 bis. It provides direct
  (modemless) attachment at up to 19,200 bps.

● Line Interface Coupler (LIC) Type 2 (#4921): An attachment
  for one communication line at speeds up to 256 Kbps. LIC
  Type 2 supports either duplex or half-duplex data transmis-
  sion. It has a digital interface for attachment to a
  non-switched "wideband" Type 8751, 8801, or 8803 Service.

● Line Interface Coupler (LIC) Type 3 (#4931): An attachment
  for one non-switched high-speed communication line via the
  CCITT V.35 interface at speeds up to 256 Kbps. The line may
  be used for duplex or half-duplex data transmission. It
  provides direct (modemless) attachment at up to 245.76 Kbps.

- Line Interface Coupler (LIC) Type 4A (#4941): Four CCITT X.21 interfaces as defined in IBM SRL GA27-3287 for communication lines operating at speeds up to 9,600 bps. Both switched and non-switched operation are supported. The physical interface follows the CCITT V.11 Recommendation. It provides direct (modemless) attachment at 2,400, 4,800 or 9,600 bps.

- Line Interface Coupler (LIC) Type 4B (#4942): One CCITT X.21 interface as defined in IBM SRL GA27-3287 for a communication line operating at speeds up to 256 Kbps. Both switched and non-switched operation are supported. The physical interface follows the CCITT V.11 Recommendation. It provides direct (modemless) attachment at up to 245.76 Kbps.

- Token-Ring Interface Coupler (TIC) Type 1 (#4991): One attachment to an IBM Token-Ring Network.

2.9.3. Expansion

One 3721 Expansion Unit may be connected to a 3720. The 3721 is installed on top of the 3720 and allows attachment of up to 32 additional lines.

Two models are available: The 3721 Model 1 has one scanner controlling up to 8 LICs, the 3721 Model 2 has two scanners controlling 4 LICs each.

LICs can be added in the field to each model of the 3721 Expansion Unit, but one model cannot be converted to another.

2.9.4. Schedule

General availability of 3720 Models 1 or 2, and of the 3721, is planned for October 1986. General availability of 3720 Models 11 and 12 is planned for July 1987. MESs will be available 90 days after general availability of the corresponding model.

2.9.5. Hardware Requirements

The 3720/3721 operates in an office environment not exceeding 38 degrees C (100 degrees F). Any terminal which is equivalent to IBM 3101 Model 23 may be used as a console, such as an IBM 3161 ASCII Display Station Model 11 or 12 running in 3101 mode, an IBM PC (5150 or 5160) running the IBM 3101 Emulation Program (6024-042), an IBM 3163 ASCII Display Station Model 11 or 12 running in 3101 mode, and an IBM 3164 ASCII Display Station Model 11 or 12 running in 3101 mode.

A single remote operator console may be used to manage multiple 3720s by attaching it to each 3720 via a modem and a switched communication line. Customers running EP only (no NCP/PEP) should provide a local console in order to receive error alerts normally available at the VTAM operator console.

A 1,200 bps, duplex modem compatible with the CCITT Recommendations V.22 (Alternative B) such as the IBM 5841, or V.22 bis operating in asynchronous mode with auto-answer, is required to connect the remote console via the switched telephone network.

A 5841 operating in synchronous mode over public switched telephone network for use by the Remote Support Facility is required to attach to the RSF port. Should a customer elect not to accept RSF support, then a local console is required.

2.9.6. Software Requirements

The following licensed programs and their announced releases support 3720 Models 1 and 2:

- Products operating in both 3720 Models 1 and 2:

  Available October 1986 or before:

  -ACF/NCP Version 4 Release 1 (MVS, VSE). PTFs for both MVS and VSE will be required. PTF UR14024 is the designated PTF for MVS.

  -ACF/NCP Version 4 Release 2 (MVS/VM)

  -ACF/NCP Version 4 Subset (VSE)

  -NTO R3 (MVS, VSE)

  -NTO R4 (MVS, VM)

  -MPSI R4.2 (MVS, VSE)

  -NRF R2 (MVS)

  -NRF R3 (MVS)

  -Non-SNA Interconnection R4 (VSE, MVS)

  Available after October 1986:

  -ACF/NCP Version 4 Subset (MVS 10/86)

  -ACF/NCP Version 4 Subset (VM 1/87)

  -NPSI R4.3 (MVS supporting ACF/NCP Version 4 Release 2: 12/86; supporting ACF/NCP V4 Subset: 4/87)

-NPSI R4.3 (VM supporting ACF/NCP Version 4 Release 2: 3/87; supporting ACF/NCP V4 Subset: 6/87)

-X.25 SNA Interconnection Release 2 PRPQ 7L1000 (4/87)

- Products operating in 3720 Model 1 only:

Available October 1986 or before:

-Emulation Program Release 3 (MVS, VSE)

-Emulation Program Release 4 (MVS, VM)

- Support Products:

Available October 1986 or before:

-ACF/SSP Version 3 Release 2 (MVS, VM, VSE)

- Communication Management Products:

- NetView Release 1 (MVS, MVS/XA, VM).

- NCCF Version 2 Release 2 (VSE)

-NPDA Version 3 Release 2 for VSE with 3720 PTF. (The 3720 PTF will be available by October 1986.)

-NPDA Version 3 (except NPDA V3R2 for VSE with 3720 PTF.

The current level of NPDA Version 3 (without 3720 PTF for VSE) provides non-product-specific alert support for 3720/3721 alerts. This level of support includes an NPDA generated alert description for each 3720 alert and the ability to display event detail data. The probable cause, recommended actions, and the qualifier data are described only in the 3270 Problem Determination Guide.

- Access Methods:

- ACF/TCAM V2R4

TCAM V2R4, with the MSNF feature, supports the 3720 for terminal-to-application (LU-LU) sessions in an NCP environment. However, all SNA resources (LUs) attached to the 3720 must be controlled (activated) by a VTAM host processor. TCAM V2R4 does not support load, dump, or SNA resource ownership of the 3720. The TCAM V2R4 channel contact facility must be used to establish the necessary communication path to the 3720 when channel-attached to a TCAM host processor.

TCAM V2R4 does support the 3720 when operating in emulation mode using Release 3 and 4 of the Emulation Program (EP) for the 3720.

-BTAM/SP, BTAM/ES, RTAM

-ACF/VTAM releases that are compatible with the above
ACF/NCP releases (see Compatibility section below)

Alerts generated for the 3720 are displayed on the network
control terminal by NetView (MVS, VM) or NCCF/NPDA (VSE). Note:
Alert support for the IBM Token-Ring Network is through the
Hardware Monitor component of NetView. NCCF/NPDA does not
support alerts from the IBM Token-Ring Network.

If NPDA or the Hardware Monitor component of NetView are not
available, the alerts for the 3720 Models 1 and 2 will be
displayed on the VTAM console for the following VTAM releases.

VSE	VTAM V2R1 and V3R1
MVS/370	VTAM V2R2, V3R1 and V3R1.1
MVS/XA	VTAM V3R1 and V3R1.1
VM	VTAM V3R1.1

The NCP products and 3720 configurations supported by the ACF/NCP
V4 subset are described in the ACF/NCP V4 subset announcement.

● 3720 Models 11 and 12: ACF/NCP support for MVS and VM for
3720 models 11 and 12 will be provided by the general
availability of 3720 models 11 and 12 by a then current
level of ACF/NCP V4 and the ACF/NCP V4 Subset.

2.9.7. <u>Compatibility</u>

In an SNA network, 3720 can coexist with the IBM 3725 and the IBM
3705. The 3720 does not introduce any new compatibility restric-
tion. The compatibility is only dependent on ACF/VTAM and
ACF/NCP releases used in the network.

Compatibility is summarized in the chart below:

	3720-1	3720-2	3720-1 & 3721-1 or 3721-2	3720-2 & 3721-1 or 3721-2	VTAM
ACF/NCP V4R1 +PTFs (VMS,VSE)	Yes	Yes	Yes	Yes	V2R1 V2R2 MVS V3R1 V3R1.1 MVS
ACF/NCP V4R2 (MVS,VM)	Yes	Yes	Yes	Yes	V2R1 V2R2 MVS V3R1

V3R1.1

ACF/NCP SUBSET (VSE,VM,MVS)	Yes	Yes	No	No	VSE:V2R1 V3R1 VM:V3R1 V3R1.1 MVS:V2R1 V2R2 V3R1 V3R1.1
SSP V3 R2	Required	Required	Required	Required	
EP R3	Yes	No	Yes	No	
EP R4	Yes	No	Yes	No	
Netview*	Yes	Yes	Yes	Yes	V3R1.1
NCCF/NPDA* (VSE)	Yes	Yes	Yes	Yes	V2R1 V3R1

*ACF/NCP and VTAM required

2.9.8. Pricing

	Model/ Feature	Monthly Rental Charge	Purchase Price
3720 Communication Controller			
Local Base (line)	001	$2,605	$36,500
Remote Base (lines)	002	1,855	26,000
Local Base (line) + TR	011	3,035	42,500
Remote Base (line) + TR	012	2,285	33,000
Second Channel Adapter	1561	482	6,750
LIC Type 1	4911	179	2,500
LIC Type 2	4921	179	2,500
LIC Type 3	4931	179	2,500
LIC Type 4A	4941	179	2,500
LIC Type 4B	4942	179	2,500
Token-Ring Int Cplr Type 1	4991	161	3,000
Storage Increment 1Mb	7100	429	6,000
Two Processor Switch	8320	286	4,000

2.10. IBM RT Personal Computer Token-Ring Network Adapter

The IBM RT PC Token-Ring Network Adapter (#3797) provides physical attachment of IBM 6150 and 6151 System Units to an IBM Token-Ring Network. The network uses the IBM Cabling System, including Type 3 specified telephone media for physical connec-

tion and a token-ring access protocol for network traffic control. The purchase price is $1,095.

The adapter contains a microprocessor operating under control of adapter-resident microcode. The adapter connects the RT PC to an IBM Token-Ring Network, which operates at up to a speed of 4 Mbps using protocols conforming with IEEE 802.5 and ECMA 89 standards.

Significant reliability, availability, and serviceability functions are built into the adapter and microcode. Diagnostics invoked during adapter initialization verify the adapter opera- tion and check out the cabling to the access unit. The adapter detects permanent errors such as loss of receive signal, and generates a notification signal to initiate automatic network recovery. Recoverable errors such as bit errors in the transmit- ted message are detected by the adapter for subsequent reporting to a ring diagnostic program.

IBM RT PC diagnostic diskettes contain an advanced diagnostic program for service personnel use in isolating faults to the adapter, the adapter attachment cable, or the cable between the work area and the wiring closet.

2.10.1. Hardware Requirements

An operational Token-Ring Network consists of cabling, access units, and attaching devices. Each attaching device requires a network adapter.

To attach a 6150/6151 to the network, the adapter must be installed in either a 6150 Model 020, 025, or A25 or a 6151 Model 010.

The recommended minimum network should consist of at least one RT Personal Computer with an adapter (#3797) and a ring diagnostic program installed to facilitate Token-Ring Network problem determination. A ring diagnostic program is provided with the IBM Token-Ring Network PC Adapter/PC Adapter II or IBM Token-Ring Network Manager for use in an IBM PC.

An attachment cable must be purchased separately and is required for connecting the adapter to the network cabling system. The IBM Token-Ring Network RT PC Adapter cable is a 2.4-meter (8 foot) attachment cable used to connect the adapter to data grade media. The Type 3 Media Filter includes a 2.4-meter (8 foot) cable and is used to connect the adapter to Type 3 telephone media.

2.10.2. Software Requirements

This adapter is intended to be used in an RT Personal Computer hardware environment with the AIX Operating System Version 1.1.

In addition, the user must develop or acquire appropriate VRM/AIX software that specifically supports this adapter.

2.11. IBM 3174 Subsystem Control Unit for IBM 3270s

The new IBM 3174 Subsystem Control Unit large cluster Models 1L, 1R, 2R, and 3R attach up to thirty-two 3270 Information Display System terminals. The small cluster Models 51R, 52R, and 53R attach up to sixteen terminals.

These new control units provide attachment of 3270 system displays, printers, and workstations to IBM host processors via a local channel, remote link, IBM Token-Ring local area network gateway, and IBM Token-Ring local area network. An optional feature permits attachment of ASCII terminals and attachment to ASCII hosts via telecommunications links.

The 3174 models are functionally equivalent to the IBM 3274 Control Unit Models 41A, 41C, 41D, and 61C. They offer improved price/performance, usability, and increased functional capabilities.

Planned first customer shipments are:

Model 01L	July 1986
Models 01R, 02R, 51R, 52R	August 1986
Models 03R, 53R	May 1987

Token-Ring Gateway Purchase Price: $5,000

2.11.1. Host Attachments

The new 3174 Subsystem Control Unit Models 1L, 1R, 2R, and 3R are large cluster control units for attaching up to thirty-two 3270 Information Display System terminals. They attach to the following hosts:

● Model 1L - System/370-architecture channel interface for SNA and non-SNA attachment.

● Model 1R - EIA RS-232-C/CCITT V.24 and CCITT V.35 interfaces for SNA/SDLC, BSC, or X.25 remote link attachment.

● Model 2R - CCITT X.21 interface for SNA/SDLC or X.25 remote link attachment.

● Model 3R - IBM Cabling System interface for IBM Token-Ring Network attachment.

The new models 51R, 52R, and 53R are small cluster control units for attaching up to sixteen 3270 Information Display System terminals. They attach to the following hosts:

- Model 51R - EIA RS-232-C/CCITT V.24 and CCITT V.35 interfaces for SNA/SDLC, BSC, or X.25 remote link attachment.

- Model 52R - CCITT X.21 interface for SNA/SDLC or X.25 remote link attachment.

- Model 53R - IBM Cabling System interface for IBM Token-Ring Network Attachment.

These new control units are functionally equivalent with presently available 3274 Models 41A, 41C, 41D, and 61C control units operating with Configuration Support D microcode at release level 65. (See the Compatibility section for exceptions.)

They are designed and built with state-of-the-art CMOS technology and with very large scale integration circuitry. This new technology design produces advantages of smaller size, faster circuitry, less power, and additional control storage capacity, and allows for growth.

Each control unit is shipped with a host-attachment interface adapter, 1Mb of control storage, and a 1.2Mb 5.25-inch diskette drive.

The performance of the 3174 Model 1L is significantly better than the performance of 3274 Models 41A and 41D, in most cases, particularly with control unit terminals and workstations using control unit terminal mode.

The customization of 3174 Subsystem Control Units has been significantly enhanced through the following elements:

- Use of words and phrases on the customization panels, as opposed to only numbers and symbols

- Error messages presented on screen

- Optional selection of printer authorization matrix definition panel, with self-explanatory prompts

- Reduced number of questions for equivalent function

- Reduced diskette swapping

- Expanded use of defaults

- Reduced machine execution time

Increased control storage capacity, coupled with new optimized control microcode, results in more usable functions in a base control unit, without the need for additional control storage, features, of RPQs to make these functions available. Storage features are available to further increase the control storage capacity when needed to support optional 3174 Subsystem Control Unit functions.

Several 3274 RPQs have been integrated into the base for the new control units. Listed below are the RPQ numbers are indicated in the parentheses.

- 3274 Diskette Processing Aid (8K1071 and 8K1072) Note: Copy function can be done with the base 3174 but Full Copy and Modify and Copy capabilities require the optional 1.2 Mb Diskette Drive (#1046).

- 3274 Unsupported Control Code Translate (8K0980)

- Keyboard Code 8K0932 (i.e., 3178-C4) (8K1163)

- Keyboard Code 8K1038 with and without numeric lock (8K1164 and 8K1165)

- Programmed Symbols Load for Altered Screen - Configuration Support C and D (8K1073 and 8K1168)

- RS-232-C at 19.2 Kbps (8K1308 and 8K1309)

- Distributed Function Terminals Display Performance Enhance (8K1311)

- Coax Timeout Extend (Type A) (8K1042 and 8K1151)

- 3299 Terminal Multiplexer Adapter (8K1155, 8K1156, 8K1180, 8K1181, 8K1182, 8K1183, and 8K1194)

RPQ 8K1377, 3174 Subsystem Control Unit Multiple Logic, is released for the 3174 and will be available in the second half of 1987. Refer to the RPQ Description and Price Transmittal for further details of the support provided.

A second 5.25-inch diskette drive with 1.2Mb capacity is available as an optional feature. It is required for downloading operational microcode to the Asynchronous Emulation Adapter (#3020) and to distributed function terminals like the IBM 3179 Model G. While most offline diskette procedures do not require the optional diskette drive to operate, there are some that do (see offline procedures section). Although it may not be required, having the optional second diskette drive reduces diskette swapping when customizing a 3174 and when running offline diskette utility procedures.

The new control units offer increased flexibility for terminal attachment. They can be configured to connect terminals directly, via 3299 Terminal Multiplexers, via optional Terminal Multiplexer Adapters (#3103) (Models 1L, 1R, 2R, and 3Ronly), or by a combination of these attachment options. A base large cluster control unit (Model 1L, 1R, 2R, or 3R) has an integrated four-port terminal adapter which permits up to four terminals to be directly attached, or by using one of the following, up to a maximum of 32 terminals can be attached:

- One to four 3299 terminal multiplexers

- One to four terminal multiplexer adapter optional features (#3103)

- Any combination, up to four, of the 3299 terminal multiplexers and terminal multiplexer adapter optional features

The small cluster control units (Models 51R, 52R, and 53R) have similar attachment flexibility, but with a maximum attachment capability of 16 terminals. A base control unit has an integrated nine-port terminal adapter which permits up to nine terminals to be directly attached, or by using one of the following, up to a maximum of 16 terminals can be attached:

- Two 3299 terminal multiplexers

- One 3299 terminal multiplexer and connecting up to eight terminals directly

The use of model designations to define selected configurations of the new 3174 control unit has reduced the number of special features that are needed. All special features and all valid model conversions are customer setup.

The 3174 Models 3R and 53R provide host attachment via the IBM Token-Ring Network. These models communicate with the host via an IBM 3720 or 3725 Communications Controller with the NCP/Token-Ring interconnection facility of ACF/NCP Version 4 Release 2, or via a 3174 Model 1L with the IBM Token-Ring Network 3270 Gateway optional feature (#3025).

An optional feature, IBM Token-Ring Network 3270 Gateway (#3025), is available for a 3174 Subsystem Control Unit Model 1L using SNA protocol. This feature provides the capability for up to 140 Token-Ring attached devices, as PU 2.0 nodes, to communicate with an IBM host. Currently, any combination of the following Token-Ring attached devices are supported by this feature:

- 3174 Model 3R or 53R

- IBM Personal Computer using IBM Personal Computer 3270 Emulation Program Version 3

- IBM Personal Computer using APPC/PC (as a PU 2.0 node)

- System/36 with the LAN Attachment Feature and using 3270 emulation or APPC (as a PU 2.0 node)

The devices and workstations directly attached to the 3174 and those attached via the Token-Ring can coexist and operate concurrently with this feature installed. The number of devices using this IBM Token-Ring gateway capability is dependent on available 3174 control storage and performance constraints.

The Asynchronous Emulation Adapter optional feature (#3020) provides the capability for 3270 display terminals operating in control unit terminal mode to emulate an ASCII character mode display terminal (IBM 3101 and DEC VT-100) and communicate from the adapter direct, leased, or switched connection via RS-232-C with ASCII applications and public data networks, while providing a connection when required to IBM applications. Attached 3270 printers can also emulate an ASCII printer and provide local host print support. IBM and non-IBM ASCII displays and ASCII printers supported by the adapter can communicate with the IBM 3270 applications through 3270 emulation support, via full duplex asynchronous communication lines to the 3174. Personal Computers emulating any of the supported ASCII displays can likewise communicate with the IBM 3270 applications. Connection modes to the 3174 adapter are direct, leased, or switched connection via RS-232-C. Additionally, the ASCII displays, printers, and Personal Computers described above can communicate with ASCII applications in the pass-through mode via this adapter without disconnecting from the 3174.

Each adapter provides eight ASCII ports. The 3174 Models 1L, 1R, 2R, and 3R can each have up to three adapters, for a range of 1 to 24 ports. Models 51R and 52R can have one adapter, providing a range of 1 to 8 port capacity. These device attachments are in addition to the maximum available on SNA controllers (32). The number of device addresses supported by non-SNA controllers remains limited to 32.

The 3174 remote attach models provide improved communications capabilities. The base control unit will provide the following support as is applicable to the 3174 model selected:

● EIA RS-232-C CCITT V.24/28 operation up to a maximum speed of 9.6 Kbps for BSC and 19.2 Kbps for SNA/SDLC.

● CCITT V.35 and X.21 operation up to a maximum speed of 64 Kbps for SNA/SDLC.

● X.25 operation up to 19.2 Kbps, using base control storage.

When using the 3174 with IBM Cabling System data-grade media, cabling to terminals is via direct attachment to the IBM Cabling System media. A balun cable assembly is not required at the 3174 end of the cable.

The 3174 Model 1L provides single-tag interlocked and two-tag high-speed-transfer channel operational modes, with data rates up to 1.25Mb per second.

A central site customizing facility (available second half, 1987) will be provided through a diskette utility procedure. It provides for the creation and maintenance of a central site library containing the customization parameters for all the network 3174 Subsystem Control Units serviced from the central

site. Utilizing the customization parameters stored in the
central site library, the utility procedure also provides for the
generation of customized diskettes for network 3174 Subsystem
Control Units.

Response Time Monitor is a base function in the new control
units. It provides for enhanced network management by permitting
the accurate measurement and recording of transaction times
between an inbound host attention and a user-defined transaction
end.

Offline procedures are provided to aid in the configuring and
managing of 3174 microcode and to provide offline diagnostic
functions. They are invoked from a "master menu" panel that is
displayed on a control unit terminal attached to port 0. The
3174 offline procedures include:

● Customize the Control Diskette - Provides the ability to
  configure control unit microcode, define printer authoriza-
  tion matrix, merge RPQs, and modify keyboards.

● Merge Downstream Load - Provides the ability to merge the
  microcode required by two or more downstream-load terminals
  on to one diskette. The microcode is provided by the
  following no-charge auxiliary microcode diskette features:
  #9015 for the Asynchronous Emulation Adapter; #9016 for the
  3179 "G" Color Graphics Display Station; #9017 for the 3193
  Display Station; #9021 for the 3290 Information Panel. Use
  of this procedure requires the 1.2 Mb diskette Drive
  optional feature (#1046).

● Copy Files - Through its seven variations, provides a means
  of duplicating diskettes, copying specific data areas, and
  copying with configuration modifications from one control
  diskette to another. The functions of the 3274 Diskette
  Processing Aid RPQ 8K1071 are included in this procedure.
  The Full Copy and Modify and Copy options require the 1.2 Mb
  Diskette Drive optional feature (#1046). This feature is
  not required for the other copy files options, but their
  usage is enhanced with it, since the need for diskette
  swapping is reduced.

● Diagnostics - Provides a full range of offline diagnostics.
  Diagnostics are selected form a menu panel when this utility
  is invoked.

● Microcode Upgrade - Provides a process to update a newly
  released control diskette with the configuration data from
  the down level control diskette, thus greatly reducing the
  time required to execute this task.

● Encrypt/Decrypt - Provides facilities to load a master key
  value into the encrypt/decrypt adapter, display the verify
  pattern that is resident on the encrypt/decrypt diskette,
  verify the current master key value, and test the encrypt/-

decrypt feature. It is applicable only to Models 1R, 2R, and 3R that have the encrypt/decrypt feature (#3680).

● Identify Customizing Keyboard - Expands the types and configurations of keyboards from which the 3174 customization process can be executed. It is applicable primarily in World Trade Corporation countries, due to the variability of the keyboard layouts found there.

● Central Site Customization - Enhances the management, distribution, and control of microcode for 3174 control units in a network. It provides the ability to create offline a central site library of network control unit data; create, modify, or delete library members; and generate customized control diskettes for mailing to network 3174s. The 1.2 Mb Diskette Drive feature (#1046) is required to use this procedure. Although not required, the 1 Mb Storage Expansion feature (#1012) is recommended to facilitate generating diskettes for network control units by reducing the time and manual intervention required to read individual, duplicate control diskettes. (The 1 Mb Storage Expansion feature is not available on Models 51R, 52R, or 53R.) This procedure does not support microcode management, distribution, or control for a 3174 Model 1L with the IBM Token-Ring Network 3270 Gateway optional feature (#3025).

A Serial OEM Interface (SOEMI) is a base non-SNA function for a 3174 Model 1L Subsystem Control Unit that extends attachment capabilities to a variety of industry devices of independent manufacturers for engineering, scientific, and manufacturing environments. A non-SNA protocol, based on structured fields, provides the user programming flexibility.

Attachment of instrumentation, measurement and control, and other equipment can be provided via OEM adapters that provide appropriate conversion and control functions to industry standard bus interfaces such as IEEE 488, IEEE 696, IEEE 796, etc. Applications such as controlling and measurement, robotics, process control, voice synthesis/recognition, medical applications, and many others can then be implemented.

Intelligent Printer Data Stream (IPDS) is supported for the IBM 4224 Printer. The 4224 Printer uses a 3270 Extended Data Stream structured field approach to manage and control printer processes. IPDS is designed to allow the presentation of text, raster images, vector graphics, bar codes, and previously stored overlays at any point on a page. IPDS commands within the data stream also enable the host processor to control media handling, error recovery, and the downloading and management of symbol sets (fonts) and printer stored objects, such as overlays and page segments. The printer can later use these stored objects to construct a printed page. IPDS significantly reduce the load on the host processor.

2.11.2. Specified Operating Environment

The 3174 communicates with the following IBM systems and processors using SNA and non-SNA protocols:

System/ Processor	Channel (Model 1L)		Remote Link (Models 1R & 51R)		(Models 2R & 52R)	Token-Ring N e t w o r k (Models 3R & 53R)
	SNA	Non-SNA	SNA	Non-SNA	SNA	SNA
System/36***	-	-	X	-	X	-
System/38	-	-	X	-	X	-
308X	X	X	X	X	X	X
3090	X	X	X	X	X	X
4361	X	X	X	X	X	X
4381	X	X	X	X	X	X
8100 (DPPX only)	-	-	X	-	X	-

***Support to be available in fourth quarter, 1986.

2.11.3. Attachments

Channel Attachment: The 3174 Model 1L attaches to a byte multiplexer, block multiplexer, or selector channel of the processors listed in the chart.   It can attach via the IBM 3044 Fiber Optic Channel Extender Link.

Remote Link Attachment: 3174 Models 1R, 2R, 51R, and 52R can attach to a 308X, 3090, or 4361/4381 via an IBM 3720 or 3725 Communication Controller.   Attachment to System/36, System/38, and 8100 (DPPX only) is via communications features in those products.   Attachment to the 4361 may also be via its communications adapter.   A modem or other data circuit-terminating equipment is required, unless the circuit-terminating equipment is required, unless the host processor or system provides a method of direct-connection attachment, without the need for data circuit-terminating equipment.   Models 1R and 51R can also attach via the IBM 3710 Network Controller.

IBM Token-Ring Network Attachment: The 3174 Models 3R and 53R transmit and receive at 4 Mps using media access protocols conforming with IEEE 802.5 and ECMA 89 standards, and logical-link protocols conforming with IEEE 802.2 standard, over a baseband token-ring.   They can attach to a 308X, 3090, or 4361/4381 via an IBM 3720 or 3725 Communication Controller with the ACF/NCP Token-Ring Interconnection (NTRI) facility of ACF/NCP Version 4, Release 2, or via a 3174 Model 1L with the IBM Token-Ring Network 3270 Gateway optional feature (#3025).

Communications Facilities: The 3174 Models 1R, 2R, 51R, and 52R operate in data half-duplex point-to-point or multipoint modes on

duplex or half-duplex non-switched facilities, and in half-duplex point-to-point mode on switched facilities. Switched, X.21, and X.25 network operations are supported only through SNA/SDLC.

2.11.4. Hardware Requirements

- The Model 1L requires a control unit position on a system channel.

- When a Model 1L is attached to a 308X channel via an IBM 3044 Fiber Optic Channel Extender Link, the 3044 Model DO1 must have RPQ 8P1162.

- When a Model 1L is attached to a 4361 byte multiplexer channel, the 4361 must be at EC level 364436, or higher.

- When a Model 1L is attached to a 3090 channel, the 3090 must be at System EC level 218590 with patches CXL 10044 and CXY10045 applied.

- A control unit terminal or 3270-PC operating in control unit terminal mode attached to port 0 is required to customize subsystem microcode or to run offline diagnostics from a display.

- A control unit terminal or 3270-PC operating in control unit terminal mode attached to any port is required to perform subsystem RAS tests.

- A control unit terminal or 3270-PC operating in control unit terminal mode attached to any port is required to establish X.21 switched network and X.25 sessions. After session establishment, all terminals, control unit terminals, and distributed function terminals can use the established session.

2.11.5. Software Requirements

The host programming support for the IBM 3174 is compatible to that for the IBM 3274 for host attachment except as noted below.

Current versions of IBM access methods, operating systems, application subsystems, and 3270 applications that support the 3274 and conform to the appropriate attachment and data stream architectures (e.g., SNA, BSC, 3270DS, 370 channel, SDLC, X.25) will work unchanged with the 3174.

- SOEMI Support

    The SOEMI facility of the Model 1L is supported by the IBM Serial OEM Interface (SOEMI) Access Method Licensed Program in the following environments:

-Virtual Machine/System Product (VM/SP) (with or without HPO) and VM/SP Entry via PP 5664-201

-VSE/SP and VSE/AF via PP 5666-330

SOEMI cannot be configured in subsystems using Virtual Machine/Extended Architecture (VM/XA)

● Intelligent Printer Data Stream (IPDS) support

The IBM 3174 Models 1R, 2R, 51R, and 52R attached to a 3720 or 3725 using BSC protocols and IPDS require the following level of NCP with the PTF indicated installed:

-IBM 3725 with ACF/NCP Version 3: PTF #UR12446

-IBM 3720 or 3725 with ACF/NCP Version 4: PTF #UR12444

● Communication Network Management products will support IBM 3174 error detection and configuration reporting. However, the 3174 requires the following programs at the specified levels for central site problem determination:

For all models except 1L with optional IBM Token-Ring Network 3270 Gateway feature (#3025), the following programs are required:

NPDA Version 3 Release 2 with:

-APAR PP43332 (PTF UP90223) for MVS/370

-APAR PP43337 (PTF UP90224) for Multiple Virtual Storage/Extended Architecture (MVS/XA)

-APAR VM22413 (PTF UV90110) for VM

-No PTFs are required for VSE.

Or

NetView

For Model 1L with the optional IBM Token-Ring Network 3270 Gateway feature (#3025), NetView is required.

● Response Time Monitor is a base IBM 3174 function. It is supported by:

NLDM Release 2 for VM/SP (with or without HPO)

NLDM Release 3 for MVS/370, MVS/XA, and VSE

NetView

● IBM Personal Computer 3270 Emulation and File Transfer Support

The 3174 Subsystem Control Unit supports IBM Personal Computers configured to operate with:

The IBM Personal Computer 3278/79 Emulation Control Program Version 2 (P/N 8665780)

The IBM Personal Computer 3270 Emulation Program, Entry Level (P/N 59X9904)

The IBM Personal Computer 3270 Emulation Program Version 3.0 (P/N 59X9969) (planned availability date: January 1987)

The RT Personal Computer 3278/79 Emulation Program (5669-052)

IBM Virtual Machine/Personal Computer Release 2 (6467040)

VM Bond Release 2 (6467022)

Personal Services/PC 1.04 (6403826) (or higher)

● IBM Host PC File Transfer Support

The 3174 Subsystem Control Unit supports the following host file transfer programs which allow the above Personal Computer configurations to perform file transfers.

- PC Bond (5664-298)

- IBM Virtual Machine/Personal Computer Release 2 (5664-319)

- MVS/TSO (5665-311)

- VM/SP (with or without HPO) (5664-281)

- DISOSS (5665-290 for MVS) (5666-270 for VSE)

- PROFS Version 2 (5664-309) (Personal Computer Connection Extended)

2.11.6. Compatibility

These new control units are functionally equivalent with presently available 3274 Models 41A, 41C, 41D, and 61C operating with Configuration Support D microcode at release level #65 with the following exceptions:

● A Dataphone Digital Data Service Adapter is not offered.

● IBM 3278 Model 1 displays (960-character buffer) and use of

the 960-character buffer format by printers are not support-
ed.

- The IBM 3278/3279 Personal Computer Attachment features
  (#5315, 5316/#5325, 5326) are not supported.

- Intelligent Printer Data Stream (IPDS) support is scheduled
  for later availability.

- A Loop Adapter is not offered. (3274 Model 61C compatibil-
  ity)

- An Encrypt/Decrypc Adapter is not offered for Models 51R or
  52R. (3274 Model 61C compatibility)

The 3174 adheres to the device attachment architectures specified
in the following documents:

- IBM 3174, 3274, 3276 Control Unit to Device Function
  Information

- IBM 3174/3274 Control Unit to Distributed Function Device
  Product Attachment Information.

The 3174 Subsystem Control Unit sequence of commands and their
timing will be different than the 3274 sequence and timing.
Also, additional checking is provided in the 3174 to ensure
device delays do not cause a "host lock out" for other attached
devices. In general, the 3174 performance is improved. The 3174
supports the IBM Personal Computer 3270 emulation software
products listed in the software requirements section. Attachments
and software not specifically identified should be tested by the
customer to verify correct operation.

2.12. IBM 3725 Communication Controller Enhancements

The IBM 3725 Communication Controller is enhanced to offer
additional capabilities. These new capabilities are main storage
capacity in 256Kb increments up to 3 megabytes, support of IBM
586X modem enhanced functions, support of more 14.4 Kbps and
high-speed lines per scanner, and the ability to access main-
tenance and operator subsystem (MOSS) remotely from a console on
a switched (dial) line.

These enhancements and the announced 3725 attachment to the IBM
token-ring network extend 3725 capabilities to meet growth needs.

3. Token-Ring Software

3.1. Token-Ring Software Summary

IBM has announced a number of software products for the Token-Ring. These are summarized in Figure 3-1 and described below.

3.2. IBM PC Local Area Network Program Version 1.1

The IBM PC Local Area Network Program Version 1.1 (6280083), formally called the IBM PC Network Program, was originally designed to operate with DOS 3.1 and NETBIOS on the IBM PC (broadband) Network. To operate the program on the Token-Ring, purchase of the NETBIOS emulator is required as well as the required DOS 3.2. The program actually consists of one giant executable file which can be brought up one of four ways: the user executes a NET START command and then specifies a redirector, receiver, messenger, or server. The first three (redirector, receiver and messenger) are for workstations, and the last one (server) is a true, non-dedicated file/print server implementation which runs as a background task in a workstation.

Using the redirector is the most basic way to get onto the local network. It intercepts the workstation's printer and disk I/O to send to a server; users can also send messages to other machines. The receiver messenger and server perform the same as the redirector with the addition of: the receiver receives and logs messages to any device or file; the messenger allows a user to transfer files; and the server allows hard disks and printers to be shared.

The installation procedure is menu driven. Once installed, the PC Network Program can be operated by typing commands at the DOS prompt or by menus. Figure 3-2 summarizes the LAN program evolution.

3.3. IBM Token-Ring Network NETBIOS Program

The IBM Token-Ring Network NETBIOS (Network Basic Input/Output System) Program (6467037) is a licensed program for the IBM Personal Computer that provides a NETBIOS programming interface for the IBM Token-Ring Network and allows application programs to be written for operation on both the IBM Token-Ring Network and the IBM PC Network.

NETBIOS provides the network control system for the IBM PC Network. NETBIOS was initially made available as part of the IBM PC Network Adapter, which allows IBM Personal Computers to be linked into a broadband local area network. Communication application programs, such as the IBM PC Network Program, use the network by interfacing to the adapter NETBIOS.

August, 1984

PC Network Program

October, 1985	*April, 1986*	*May, 1986*
NETBIOS Emulation	PC LAN Program	PC/Host File Transfer and Terminal Emulator Program
Async Comm Server	3270 Emulation Program	
APPC/PC	Enhanced PC Support/36	Magic Menu Network
Interconnect Program	System/35 LAN Comm Program	
	Personal Services/PC Rel 2	
	PC Support/36	
	Token-Ring Network Manager	
	Telephone Manager Compatibility	
	PC DOS 3.2	

June, 1986

TOS/E Servers,
CMS Servers, PC
Requesters

Figure 3-1:   IBM Token Ring Software Evolution

August, 1984

Called IBM PC Network Program
  Version 1.0
Requires New PC DOS 3.1
IBM PC Network

April, 1986

Called IBM PC Local Area Network Program
  Version 1.1
Requires New PC DOS 3.2
IBM PC Network
IBM PC Token-Ring
Topview Compatible
Price Increased

Figure 3-2:　IBM PC LAN Program Evolution

The IBM Token-Ring Network is a baseband local area network. Access protocol for the network conforms to the 802.5 standard for Token-Ring networks and is implemented by the IBM Token-Ring Network PC Adapter.

The IBM Token-Ring Network NETBIOS Program is an IBM Personal Computer program that allows programs written using the NETBIOS interface to operate on the IBM Token-Ring Network. Application program requests for NETBIOS functions are translated into token-ring protocol requests, which are passed to the IBM Token-Ring Network PC Adapter for execution. An IBM Personal Computer application can use both the NETBIOS program and the Advanced Program-to-Program Communication for the IBM Personal Computer (APPC/PC) program for concurrent access to the Token-Ring network. Only one Token-Ring PC adapter is required.

3.3.1. Hardware Requirements

The IBM Token-Ring Network Personal Computer Adapter (including the adapter handler program supplied with the adapter diskette) is a prerequisite for the NETBIOS program. The adapter is supported for the following system units:

- IBM Personal Computer

- IBM Portable Personal Computer

- IBM Personal Computer XT

- IBM Personal Computer AT

Memory Requirements for the IBM Personal Computer are 46Kb for the NETBIOS program and 7Kb for the adapter handler program.

3.3.2. Software Requirements

The latest level of IBM Personal Computer DOS current at program availability is required.

The following programs use the NETBIOS programming interface and have been successfully tested on the IBM Token-Ring Network:

- IBM PC Network SNA 3270 Emulation Program

- IBM Asynchronous Communications Server Program

- IBM Token-Ring Network/PC Network Interconnect Program

- IBM PC Network Program

Programs that operate in the IBM PC Network environment using the server functions of the IBM PC Network Program, including the

programs listed in IBM Programming Announcement 2185-132, dated April 2, 1985, should operate in the IBM Token-Ring Network environment using the server functions of the IBM PC Network Program. Programs that have been successfully tested include:

- APL Version 1

- BASIC Compiler Version 1

- BASIC Interpreter Version 3.1

- Binary Synchronous 3270 Emulation Version 1

- COBOL Compiler Version 1

- DisplayWrite 1

- DisplayWrite 3 Version 1

- DisplayWrite Legal Support Version 1

- DisplayWrite Medical Support Version 1

- FileCommand Version 1

- FORTRAN Compiler Version 2

- Graphical Kernel System Version 1

- Graphics Development ToolKit Version 1

- Graphics File System Version 1

- IBM Business Management Series Application Editions with Local Area Network Access Edition

- IBM Filing Assistant Version 1

- IBM Graphing Assistant Version 1

- IBM Local Area Network PrintManager

- IBM Personal Telephone Manager Program

- IBM Personal Telephone Manager Program for the IBM Personal Computer Voice Communication Option

- IBM Planning Assistant Version 1

- IBM Writing Assistant Version 1

- IBM 3101 Emulation Version 1

- Macro Assembler Version 2

- Multiplan Version 1.1

- Office Correspondence Retrieval System Version 1

- PASCAL Compiler Version 2

- Personal Editor Version 1

- Plotting System Version 1

- Professional Editor Version 1

- Professional FORTRAN Compiler Version 1

- SCRIPT/PC Version 1

- Solutions Series

  - IBM Accounting Solutions Version 1

  - IBM Executive Solutions Version 1

  - IBM Home Solutions Verson 1

- Sort Version 1

- Word Proof Version 1

The IBM PC Network Program using an IBM Personal Computer with the IBM 3812 Pageprinter as a print server has been tested successfully on the IBM Token-Ring Network.

The IBM Series/1-PC Connect (5791-CN1) program is planned to be available in the IBM Token-Ring Network environment by second quarter 1986.

ROLM's Juniper II Personal Communication Software will coexist with a network application program, such as the IBM PC Network Program, in an IBM Personal Computer attached to the network. (See IBM Product Announcement 185-127, dated October 15, 1985.)

Pricing: IBM Token-Ring Network NETBIOS Program (6467037): $35.00.

3.4. IBM Asynchronous Communications Server Program

The IBM Asynchronous Communications Server Program (1642003) executes on an IBM Personal Computer, IBM Personal Computer XT, or IBM Personal Computer AT as a background program and can run concurrently with other programs.

The IBM Asynchronous Communications Server Program provides IBM Personal Computers attached to the IBM Token-Ring Network or IBM PC Network access to asynchronous communication applications via

circuit-switched connections through a CBX II, a PBX, or the public switched network. See Figure 3-3. Using the IBM Asynchronous Communications Server Program, modems are not required in each individual's IBM Personal Computer to access dial-up applications. These dial-up applications may include ASCII host systems, information providers, or IBM Personal Computers. The information providers include services such as IBM Information Network, Dow Jones News/Retrieval Services, and Compuserve.

Each IBM Asynchronous Communications Server Program supports one or two communication lines attached to a CBX II, a PBX, or to the public switched network, and allocates these lines as needed to establish asynchronous circuit-switched connections between ASCII devices and IBM Token-Ring Network- or IBM PC Network- attached IBM Personal Computers. Multiple communications servers can reside on the same network (in different IBM Personal Computers) to expand the total number of communication ports available. The IBM Personal Computer on which the IBM Asynchronous Communications Server Program executes need not be dedicated to this specific function. The IBM Personal Computers, acting as communications servers, may also be shared with other programs.

When an IBM Personal Computer user wishes to establish a switched connection, he or she executes an asynchronous communication program that establishes a connection with the IBM Asynchronous Communications Server Program. The asynchronous communication program must use the IBM Asynchronous Communications Server Program protocol via the NETBIOS interface. Using this protocol, the asynchronous communication program sends commands to the IBM Asynchronous Communications Server Program to establish a switched connection. The call request may be queued if all communication server lines are being used. When a line becomes available, the connection will be established.

The IBM Asynchronous Communications Server Program may allow a customer to justify higher speed modems than may be justified on a per-user basis. Therefore, the IBM Asynchronous Communications Server Program may provide a cost-effective solution for IBM Personal Computer users who require infrequent connection to ASCII applications.

IBM Asynchronous Communications Server Program functions include:

● Attachment to IBM Token-Ring Network or IBM PC Network.

● Attachment to CBX II via ROLM's DataCom Module (DCM), Integrated Personal Computer Interface (IPCI), Integrated Personal Computer Interface AT (IPCI/AT), Data Terminal Interface (DTI), IBM 5841 Modem, IBM Personal Computer 1,200 bps Modem, or Attention "AT" command-set compatible modem.

● Attachment to a PBX or public switched network via IBM 5841 Modem, IBM Personal Computer 1,200 bps Modem, or "AT" command-set compatible modem.
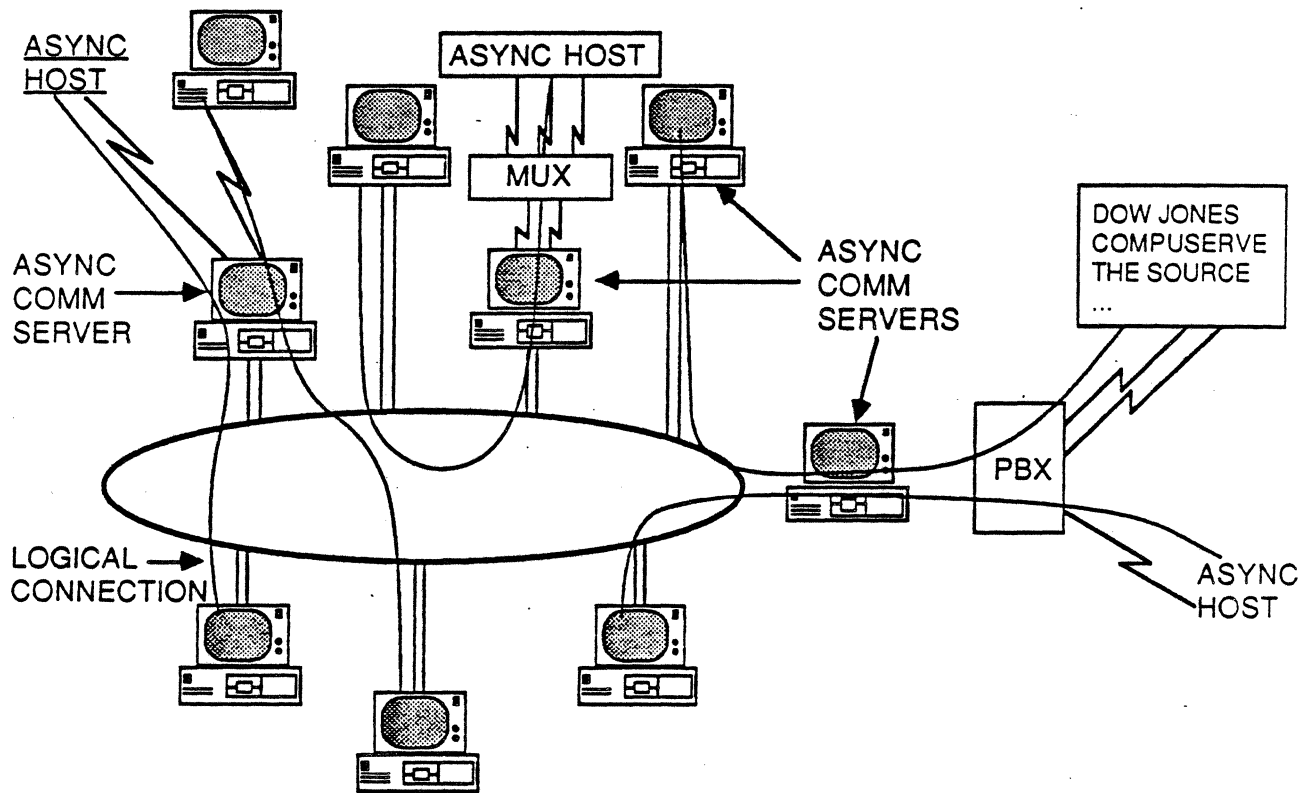
Figure 3-3:   Asynchronous Communications Server

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- Management of one or two asynchronous ports.

- Establishment of outgoing calls on request:
  - Through logical names or telephone numbers.
  - Connection requests queued if busy.
  - Pulse/tone dialing supported.

- Acceptance of incoming calls:
  - Calling ASCII device prompted for called party identification.
  - Establish session with IBM Personal Computer attached to IBM Token-Ring Network or IBM PC Network.

- Transportation of data transparently between ASCII device and IBM Token-Ring Network, or IBM PC Network-attached IBM Personal Computer.

- Termination of connection on request.

3.4.1. Attachments

The IBM Asynchronous Communications Server Program provides digital attachment support to the CBX II via ROLM's DataCom Module (DCM), Integrated Personal Computer Interface (IPCI), Integrated Personal Computer Interface AT (IPCI/AT), or Data Terminal Interface (DTI). Each IBM Asynchronous Communications Server can support up to two DCMs, IPCI cards, or DTI modules.

The IBM Asynchronous Communications Server Program interacts with the CBX II through the DCM, IPCI, IPCI/AT, or DTI using the CBX II Data Communications feature software, which provides the interactive call setup interface and data management functions.

The IBM Asynchronous Communications Server Program, with the digital data switching capabilities of the CBX II, provides the following potential advantages over an analog connection:

- Digital end-to-end transmission to locally attached ASCII devices (IBM Personal Computer or ASCII host system).

- Access to the CBX II modem pool to connect to remote ASCII devices.

- Access to the CBX II X.25 Data Network Interface to utilize both public and private X.25 networks to connect to remote ASCII devices (CBX II 8004).

- Automatic queuing on CBX II controlled communication resources (for example, X.25 port), with user notification of queue position.

- Automatic line parameter adjustment (for example, speed and parity) to locally attached ASCII devices.

● · CBX II resource utilization and error information reports.

The IBM Asynchronous Communications Server Program also supports modem attachment to a CBX II via an analog connection. The CBX II digital connection advantages stated above do not apply to modem attachment.

The IBM Asynchronous Communications Server Program may also be modem-attached to any PBX system or the public switched network. In this case, the server uses an IBM 5841 Modem, IBM Personal Computer 1,200 bps Modem, or "AT" command-set compatible modem to establish the communication path.

3.4.2. Coexistence

The IBM Asynchronous Communications Server Program can coexist on the same IBM Token-Ring Network or IBM PC Network with other network application programs, such as the IBM PC Network Program, IBM PC Network SNA 3270 Emulation Program, and IBM Token-Ring Network/IBM PC Network Interconnect Program.

An IBM Personal Computer can be used to execute other programs while the IBM Asynchronous Communications Server program is running. There are many factors to consider in concurrent program execution such as sufficient RAM memory, effect on program performance, and availability of appropriate adapters and slots.

In addition, programs requiring the IBM Personal Computer user to reset or cycle the power on the IBM Personal Computer cannot coexist with the IBM Asynchronous Communications Server Program because this would terminate any active communications. The IBM Asynchronous Communications Server Program requires exclusive use of the asynchronous communication adapters. However, the IBM Token-Ring Network Adapter or IBM PC Network Adapter may be shared with other programs.

The IBM Asynchronous Communications Server Program will not operate with the IBM PC Network Program, in the same IBM Personal Computer, when the IBM PC Network Program is configured for receiver, messenger, or server functions. It will operate when the IBM PC Network Program is configured for redirector functions.

A list of IBM Personal Computer DOS application programs that can operate with the IBM Asynchronous Communications Server Program in the same IBM Personal Computer will be provided at program availability.

3.4.3. Hardware Requirements

The IBM Asynchronous Communications Server Program will operate on the IBM Personal Computer, the IBM Personal Computer XT, and

the IBM Personal Computer AT. In addition, the IBM Personal
Computer must have an IBM PC Network Adapter when executing on
the IBM PC Network or an IBM Token-Ring Network PC Adapter when
executing on the IBM Token-Ring Network.

Each IBM Asynchronous Communications Server Program will support
one or two asynchronous communication links. If two links are
required on a communications server, the hardware configuration
of the two ports must be identical.

The communications server requires a DCM, IPCI, IPCI/AT, or DTI
for each digital attachment to the CBX II. These products are
sold and serviced by the ROLM Corporation.

Alternatively, the communication server may also be configured
using an IBM 5841 Modem or IBM Personal Computer 1,200 bps Modem
operating in "AT" command-set and asynchronous mode. In addition,
"AT" command-set compatible 300, 1,200, or 2,400 bps (asynchro-
nous mode) modems may be used. These modems may be internal or
external.

Modem Attachment: For the IBM Personal Computer or the IBM
Personal Computer XT, one of the following is required:

● Asynchronous Communications Adapter, RS-232-C cable, IBM
  5841 or "AT" command-set compatible 300, 1,200, or 2,400 bps
  modem, and an analog telephone line.

● IBM Personal Computer 1,200 bps Modem or "AT" command-set
  compatible 1,200 bps internal modem, and an analog telephone
  line.

For the IBM Personal Computer AT, one of the following is
required:

● Serial/parallel adapter, serial 10-inch connector or serial
  10-foot cable, IBM 5841 or "AT" command-set compatible 300,
  1,200, or 2,400 bps modem, and an analog telephone line.

● IBM Personal Computer 1,200 bps Modem or "AT command-set
  compatible 1,200 bps internal modem, and an analog telephone
  line.

3.4.4. Digital Attachment to CBX II

For the IBM Personal Computer or IBM Personal Computer XT, one of
the following is required:

● Asynchronous Communication Adapter, RS-232-C cable, DCM, and
  ROLMlink to the CBX II ROLMphone Data Interface.

● IPCI (revision E or later level) and connector/wiring to the
  CBX II Data Line Interface.

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● Asynchronous Communication Adapter, RS-232-C cable, DTI, and connector/wiring to the CBX II Data Line Interface.

For the IBM Personal Computer AT, one of the following is required:

● Serial/parallel adapter, serial 10-inch connector or 10-foot cable, DCM, ROLMlink to the CBX II ROLMphone Data Interface.

● IPCI/AT and connector/wiring to the CBX II Data Line Interface.

● Serial/parallel adapter, serial 10-inch connector or serial 10-foot cable, DTI, and connector/wiring to the CBX II Data Line Interface.

One of the following displays is required for the display of messages during IBM Asynchronous Communications Server Program installation, reconfiguration, initiation or problem determination procedures:

● An IBM Personal Computer Monochrome Display and an IBM Monochrome Display and Printer Adapter.

● An IBM Personal Computer Color Display and an IBM Color Graphics Display Adapter.

The IBM Asynchronous Communications Server Program requires a minimum of 160Kb of memory in order to be initialized. After the program has been initialized, it requires a minimum of 120Kb of memory for operation. These memory requirements are in addition to the memory required by the IBM Personal Computer programs referenced below.

3.4.5. Software Requirements

The IBM Asynchronous Communications Server Program uses the NETBIOS interface and requires the IBM Personal Computer Disk Operating System 3.1 (DOS 3.1). The IBM Token-Ring Network NETBIOS Program is required for the IBM Token-Ring Network Personal Computer Adapter.

The CBX II must be an 8004 or 9004 system at the current software level, and have the CBX II Data Communication software feature installed for use with the DCM, IPCI, IPCI/AT, or DTI.

The end user's IBM Personal Computer that is attached to the IBM Token-Ring Network or IBM PC Network requires an asynchronous communication program which uses the IBM Asynchronous Communications Server Program protocol via the NETBIOS interface.

3.4.6. Pricing

The IBM Asynchronous Communications Seerver Program (Part Number 1642003, feature number 2003) is $495.

3.5. Advanced Program-to-Program Communication

Advanced Program-to-Program Communication for the IBM Personal Computer (APPC/PC) (6467038) is a licensed program that supports the SNA application programming interface (logical unit [LU] type 6.2, physical unit [PU] type 2.1) and allows program-to-program communication over an IBM Token-Ring Network and synchronous data link control (SDLC) communication links. Figure 3-4 illustrates possible PC-to-host communication via APPC.

The functions provided by an implementation of SNA LU type 6.2 are generally referred to as Advanced Program-to-Program Communication (APPC), which is designed to provide enhanced SNA support for distributed processing. It provides a single, converged solution to the communications requirements of a growing set of IBM products. As a common protocol for communication, APPC can provide improved connectivity among distributed transaction programs.

APPC/PC supports the IBM Token-Ring Network PC Adapter and SDLC adapters. It provides a common program-to-program protocol that allows multiple conversations between applications running in an IBM Personal Computer and a System/370 (CICS/OS/VS Version 1, Release 7), System/36, System/38, Series/1 (Realtime Programming System Version 7.1), or another IBM Personal Computer. APPC/PC does not provide direct connectivity between sessions on the IBM Token-Ring Network link and sessions on the SDLC link, but it does provide the application programming interface to allow a user-written program to communicate between sessions on the two links. It conforms to SNA LU type 6.2. The support is based on SNA LU type 6.2 sessions as defined in SNA Format and Protocol Reference Manual: Architecture Logic for LU Type 6.2 (SC30-3269). APPC/PC supports PU2.1 architecture and provides a peer-to-peer relationship between the IBM Personal Computer and other PU2.1 nodes, such as the System/36, System/38, and Series/1. APPC/PC attaches to a System/370 as a PU 2.0 node. Figure 3-5 provides a model of APPC operation.

APPC/PC can be used by IBM Personal Computers to help satisfy the requirements to attach to other SNA products using the SNA APPC architecture (LU 6.2). It provides communication services for applications in much the same way that IBM Personal Computer DOS provides disk input/output and file management services. The subsystem will allow a program developer to concentrate on the application function rather than on the implementation of the communication protocols.

The program has been designed to have an open application program interface; that is, it provides an interface which may be used by

SERIES/1
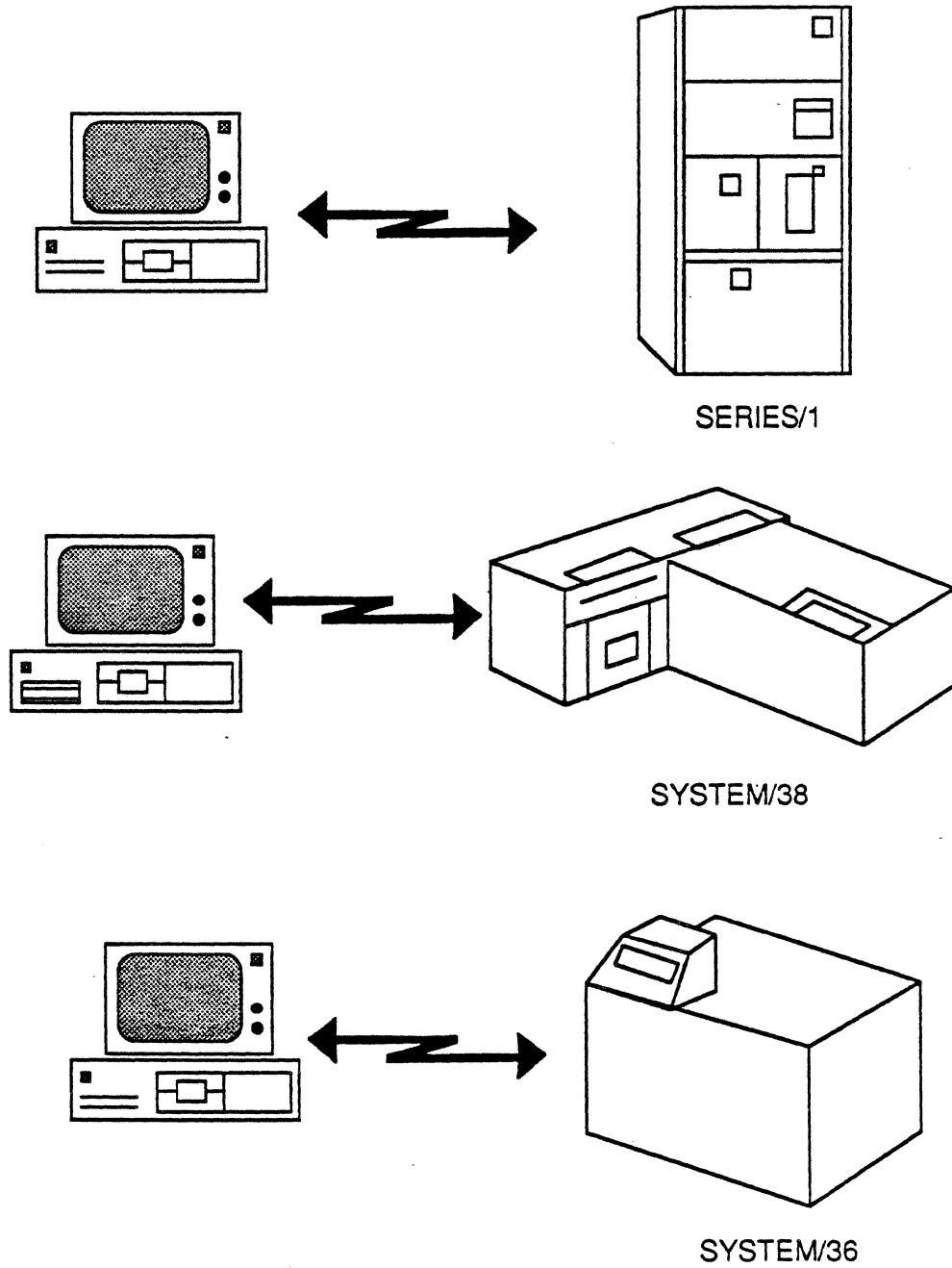
SYSTEM/38

SYSTEM/36

Figure 3-4: APPC From PC To Host
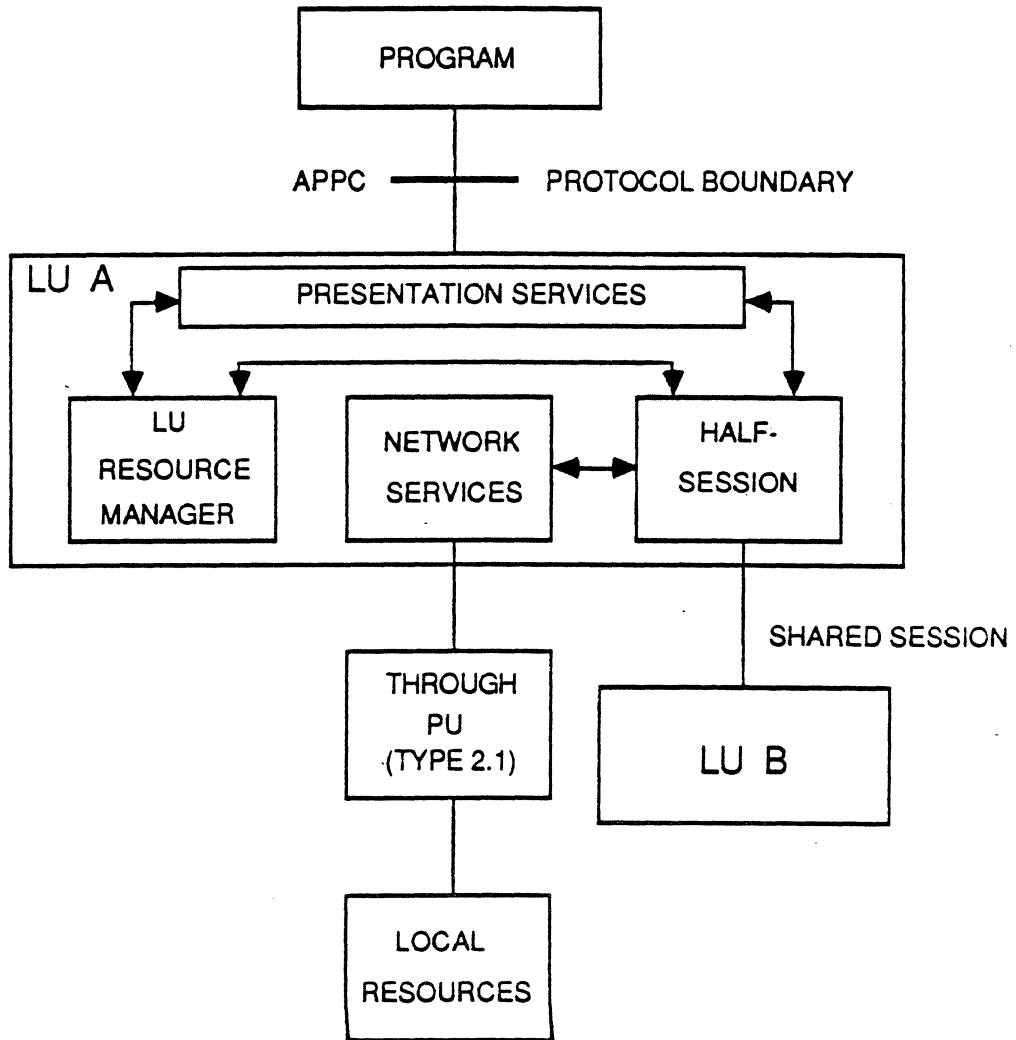
Figure 3-5: APPC Model

other products. APPC/PC will appear as a set of communication
services provided by the operating system.

It supports a program interface through a set of verbs that
allows application transaction programs to communicate at a
conversational level with no session awareness. Application
programs can engage in two types of conversation:

- Mapped conversation: intended for use in communications
  between user-written programs

- Basic conversation: Intended to provide a lower level
  interface, such as that required by logical unit service
  programs.

APPC/PC security support is provided to the IBM Personal Computer
application program at both the session and conversation levels.

Network management data can be created by APPC/PC or by the user
application program. The data can be sent to the network problem
determination application.

The APPC/PC configurator supports creation of a configuration
file or updating of an existing configuration file. The configu-
rator checks the validity of the information entered.

An IBM Personal Computer application can use both this program
and the IBM Token-Ring Network NETBIOS Program for concurrent
access to the token-ring network. Only one token-ring Personal
Computer adapter is required.

Connectivity supported by the program includes:

- IBM Personal Computer to IBM Personal Computer, using an IBM
  Token-Ring Network communications link

- IBM Personal Computer to IBM Personal Computer, using an
  SDLC communications link

- IBM Personal Computer to System/370, System/36, System/38,
  or Series/1, using an SDLC communications link

3.5.1. Hardware Requirements

The IBM Token-Ring Network Personal Computer Adapter and adapter
handler program (#9100) or the SDLC Adapter (#1025, #2090) is a
prerequisite for APPC/PC. One of the following system units is
required:

- IBM Personal Computer

- IBM Portable Personal Computer

- IBM Personal Computer XT

● IBM Personal Computer AT

Minimum memory requirements are:

● SDLC only, 185 Kb

● Token-Ring only, 195Kb

● SDLC and Token-Ring, 208Kb

An additional 7Kb is required for the IBM Token-Ring Network Personal Computer adapter handler program.

3.5.2. Software Requirements

The latest level of IBM Personal Computer DOS current at program availability is required.

3.5.3. Pricing

The APPC/PC (part number 6467038, feature number 7038) is $150.

3.6. IBM Token-Ring Network/IBM PC Network Interconnect Program

The IBM Token-Ring Network/IBM PC Network Interconnect Program (6467036) is a licensed program for the IBM Personal Computer. The program permits the exchange of information between IBM Personal Computers attached to the IBM Token-Ring Network and IBM Personal Computers attached to the IBM PC Network. Figure 3-6 illustrates a possible configuration.

A dedicated IBM Personal Computer running only the interconnect program is physically attached to both networks using appropriate adapters. This allows devices on one network to communicate with devices on the other network. Network application programs to be linked by the interconnect program must use network basic input/output system (NETBIOS) communication protocols. Many programs that operate on either network using the NETBIOS programming interface will operate across both networks. An IBM PC Network Program user can access programs or data on a server from one network to another using the IBM Token-Ring Network/IBM PC Network Interconnect Program.

The configuration phase of the program is used to identify the devices on each network that will be known to the other network. The operational phase receives messages from one network and forwards the messages to the other network. The operational phase includes an operator function that allows the user to check device status and monitor program activities.

FILE SERVER

PRINT SERVER

TOKEN-RING

INTERCONNECT PROGRAM

FILE/PRINT
SERVER

LOCAL FILE/PRINT
SHARING

INTERNET FILE/PRINT
SHARING

PC NETWORK
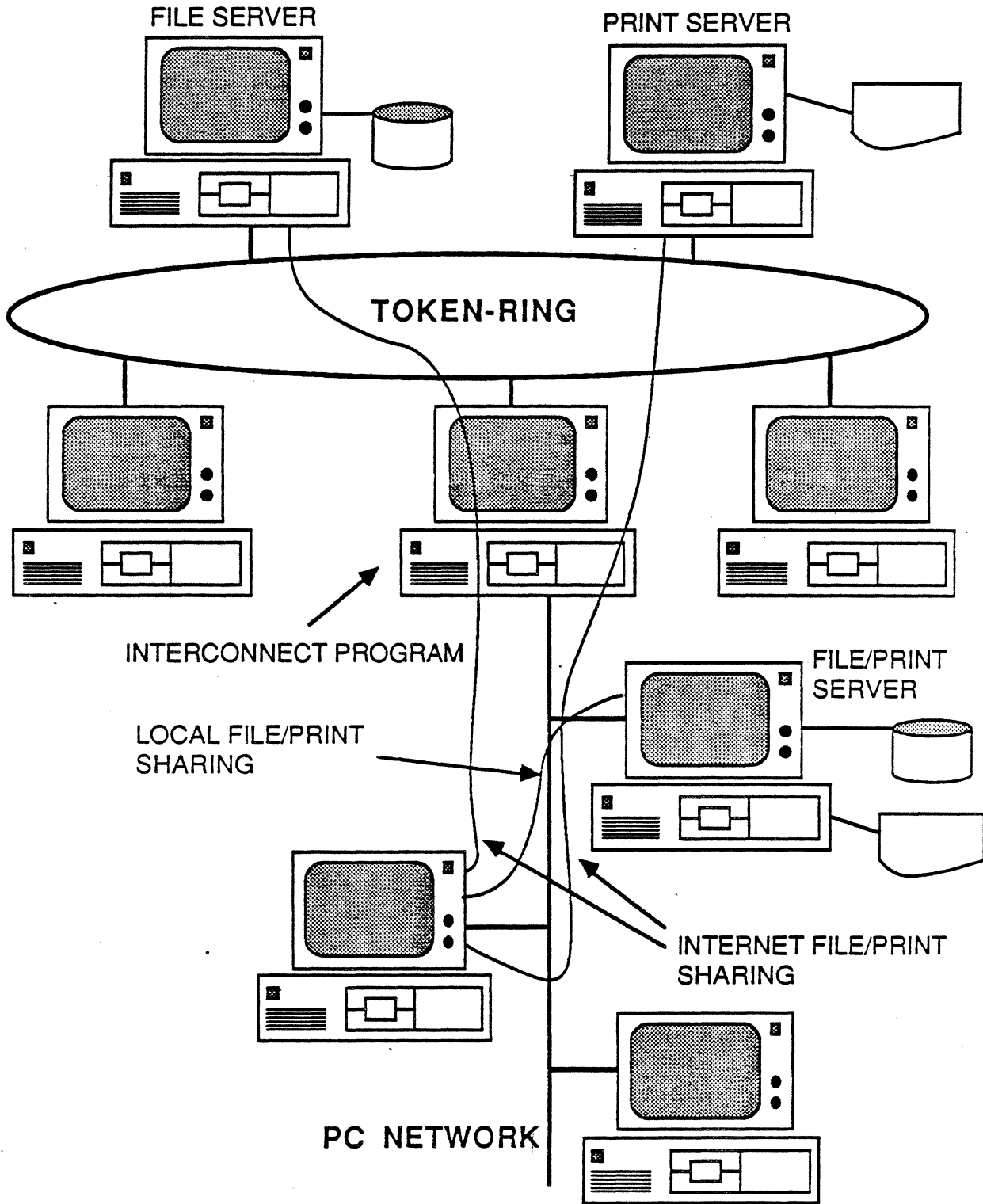
Figure 3-6:   Interconnect Program

3.6.1. Hardware Requirements

The program requires the following dedicated hardware:

- IBM Personal Computer XT or IBM Personal Computer AT

- 256Kb memory (minimum)

- 360Kb diskette drive

- Monochrome or color display

- IBM Token-Ring Network PC Adapter (including the adapter handler program supplied with the adapter diskette)

- IBM PC Network Adapter

3.6.2. Software Requirements

The latest level of IBM Personal Computer DOS current at program availability and the IBM Token-Ring Network NETBIOS Program are required. Network application programs to be linked by the interconnect program must use NETBIOS communication protocols. Figure 3-7 shows NETBIOS implementation on IBM LANs.

The interconnect program uses the NETBIOS programming interface for transmitting and receiving messages to and from the networks. Many network application programs that use the NETBIOS interface and operate on either network will operate across the two networks. Programs that have been successfully tested include:

- IBM PC Network SNA 3270 Emulation Program

- IBM Asynchronous Communications Server Program

- IBM PC Network Program (although the message function is not supported)

3.6.3. Operational Considerations

Up to 16 names for each network can be defined to the interconnect program. Thus, the maximum number of attaching devices on one network that can be identified to the other network is 16.

Some applications require the use of multiple names. For example, the file server function of the IBM PC Network Program requires the use of three names; thus, a maximum of five file servers on one network can be identified to the other network. An application program using the file server redirector function is identified with one name; thus, a maximum of 16 programs using the redirector function can be identified to the other network.

PC NETWORK **PC TOKEN-RING**

NETBIOS APPLICATION

NETBIOS INTERFACE

PC NETWORK ADAPTER

SESSION LAYER
TRANSPORT LAYER
NETWORK LAYER
CSMA/CD LINK LAYER
PHYSICAL TRANSPORT

NETBIOS PROGRAM
SESSION LAYER
TRANSPORT LAYER
NETWORK LAYER

IEEE 802.2	DIRECT
ADAPTER HANDLER	

TOKEN-RING ADAPTER

DLC 802.2	
	MAC 802.5
PHYSICAL TRANSPORT	

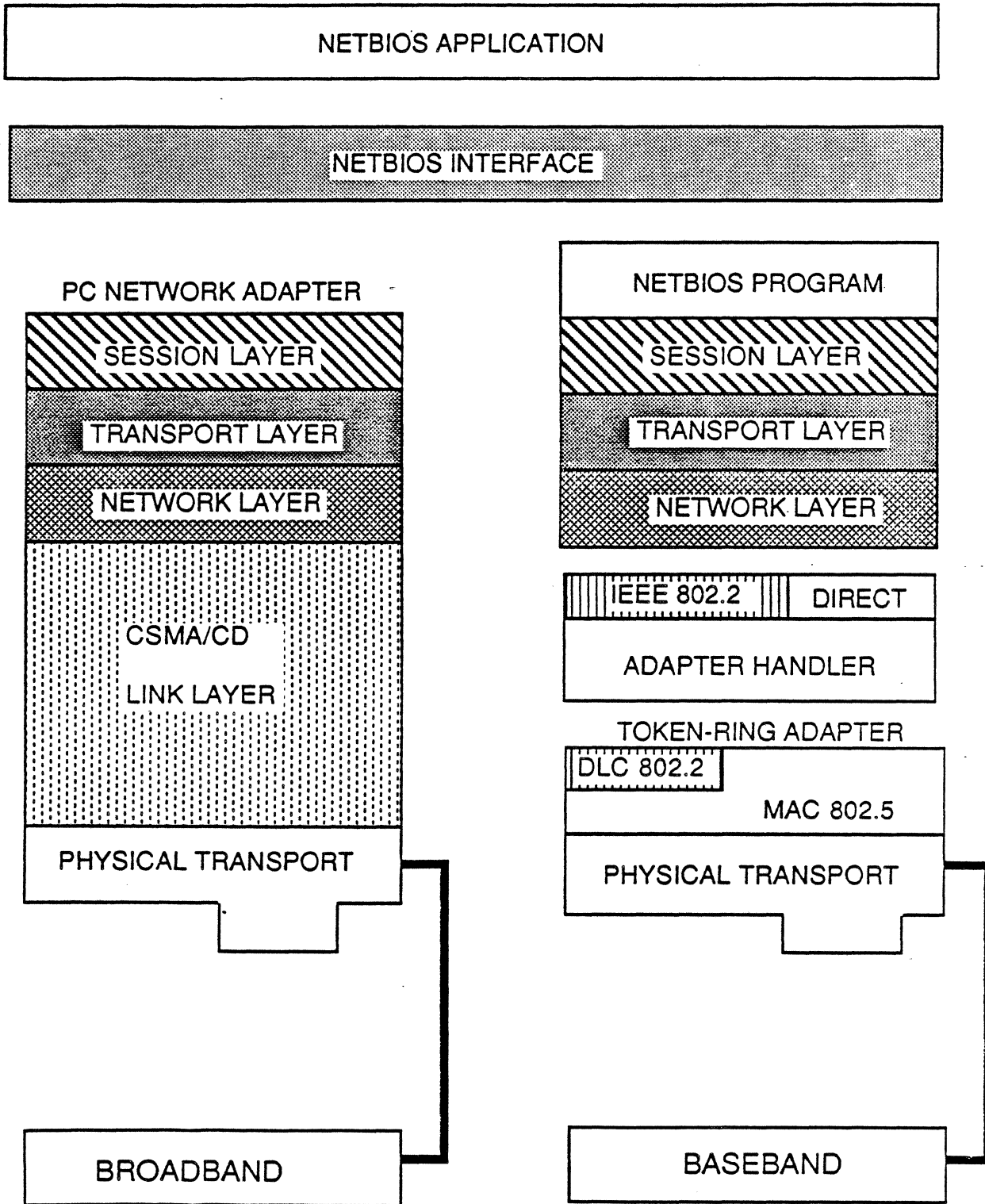| BROADBAND |
|---|

BASEBAND

Figure 3-7:   NETBIOS Implementation

Use of NETBIOS by the program allows operations at the message source to be completed before related operations at the message destination are complete. As a result, error conditions may not be properly identified, and the operational characteristics of some application programs will be altered when running across two networks.

Other configuration and operational considerations for the program are identified in the User's Guide.

3.6.4. Pricing

The IBM Token-Ring Network/IBM PC Network Interconnect Program (6467036) costs $495.

3.7. IBM PC 3270 Emulation Program Version 3.0

The IBM PC 3270 Emulation Program Version 3.0 (59X9969) is a new member of the IBM family of 3270 emulation programs providing additional connectivity options to IBM System/370 hosts.

IBM 3270 emulation in IBM Token-Ring Network environments is enhanced to include IBM 3270 emulation using the Token-Ring Network connected directly to the IBM 3725. The direct attachment allows an IBM Personal Computer to be configured as a standalone workstation, a network gateway station, or a network station.

The PC 3270 Emulation Program Version 3.0 extends the IBM 3274 attachment provided by Version 2.0 to include IBM 3274 attachment to a System 370 host using BSC (Binary Synchronous Communication). BSC support is available in a standalone configuration only. It is not available on a network gateway station. The attachment to the IBM 3274 Control Unit requires the IBM 3278/79 Emulation Adapter on the IBM Personal Computer.

The PC 3270 Emulation Program Version 3.0 continues the enhancement of the IBM family of 3270 emulation programs. Version 3.0 is part of the family that includes:

- IBM PC 3270 Emulation Program, Entry Level (refer to Programming Announcement 286-131, dated April 2, 1986)

- IBM PC 3270 Emulation Program Version 2.0 (refer to Programming Announcement 286-132, dated April 2, 1986)

- IBM 3270 PC Control Program Version 3.0 for the IBM 3270 Personal Computer (refer to Programming Announcement 286-133, dated April 2, 1986)

The family of 3270 emulation programs provides multiple function levels to the user, beginning with simple entry into the IBM 3270 host interactive environment. From the entry level product, a

migration path to enhanced function System/370 host interactive facilities is provided by Version 2.0 and Version 3.0.

3.7.1. IBM Token-Ring Attachment

The PC 3270 Emulation Program Version 3.0 provides many possible configurations when used in a 3270 emulation environment with IBM local area networks. Version 3.0 can be used in both the IBM Token-Ring Network and IBM PC Network local area network environments to provide 3270 emulation for IBM Personal Computers. On the Token-Ring Network, the configuration capabilities are extended over the support offered in Version 2.0. Included is the addition of the attachment of IBM Personal Computers using Version 3.0 to a Token-Ring Network connected to the IBM 3725. This capability allows the configuration of an IBM Personal Computer with Version 3.0 to emulate the IBM 3274 Control Unit, an IBM 3278 or 3279 Display, and an IBM 3287 Printer. Using this configuration option, each IBM Personal Computer appears to the IBM 3725 and the System/370 as a control unit with a display and printer. This configuration provides direct connection via the Token-Ring Network with the IBM 3725, with no intervening gateway station.

The second additional configuration option involves the IBM Personal Computer configured as a gateway on the Token-Ring Network. With this option, the gateway attaches to the Token-Ring Network attached to the IBM 3725. The gateway emulates the IBM 3274; emulation of a display and printer is optional. Attached to the gateway, other IBM Personal Computers are configured as display and printer only. This allows greater flexibility in the IBM 3725 and System/370, with each network station using the gateway IBM Personal Computer to gain access to the IBM 3725. In gateway and network station configurations, additional overhead is added by the gateway station when compared to non-gateway configurations. Up to 32 sessions may be supported through a gateway station. A session is either a display or a printer, configured and activated on the gateway or network station.

The PC 3270 Emulation Program Version 3.0 gateway station may also be configured to support network stations attached to the PC Network. The gateway station from the PC Network may be attached to the Token-Ring Network for access to the IBM 3725. A gateway station must be used for PC Network-attached IBM Personal Computers. In this configuration, the gateway station requires both the Token-Ring Network and PC Network adapters.

In some gateway configurations, the gateway IBM Personal Computer may need to be dedicated and not used for other IBM Personal Computer applications.

3.7.2. Additional Connectivity

PC 3270 Emulation Version 3.0 extends the Distributed Function Terminal (DFT) Mode attachment provided by Version 2.0 to include BSC support for an IBM 3274 Control Unit attached to a System/370 using BSC. BSC is available in a standalone configuration (not on a network gateway station). Because of stringent timing requirements in the BSC and non-SNA channel environments, when a file transfer is initiated, no other activity should be taking place. These activities can be either in the alternate task partition or a TopView window. The restriction does not apply to periods when file transfer is not active. DFT attachment requires the 3278/79 Emulation Adapter on the IBM Personal Computer.

PC-DOS Support

The PC 3270 Emulation Program Version 3.0 supports the IBM PC Disk Operating System (PC-DOS) 3.1 and 3.2. PC-DOS 3.2 is required for operation with the Token-Ring Network.

Planned availability date is January, 1987.

3.7.3. Hardware Requirements

An IBM Personal Computer running the PC 3270 Emulation Program Version 3.0 has the following requirements:

● The IBM Personal Computer models supported:

   - IBM Personal Computer (5150) Models 166, 176

   - IBM Personal Computer XT (5160) Models 068, 078, 086, 087, 088, 089, 267, 268, 277, 278, and 589 (PC mode only)

   - IBM Personal Computer AT (5170) Models 068, 099, 239, 319, and 339 (Models 599, 739, 919, and 939 in PC mode only)

   - IBM Portable Personal Computer (5155).

● Members of the IBM Personal Computer family (only models previously referenced) supported in various configurations:

	PC	PC/XT[1]	AT[1]	Portable PC
Standalone (non-Network)	Y	Y	Y	Y
Standalone (attached to LAN)[2]	Y	Y	Y	N
Network Station[2]	Y	Y	Y	Y

Gateway2	Y	Y3	Y3	N
Gateway and Network Station2	Y	Y3	Y3	N

1   PC/XT and AT may support all configurations of IBM PC LAN Program Version 1.10 (including server) with all LAN-attached configurations of PC 3270 Emulation Program Version 3.0.

2   All-LAN attached IBM Personal Computers are compatible with PC LAN Program Version 1.10 redirector and messenger configurations.

3   In a PC LAN Program server configuration for SDLC attachment, the gateway can serve a maximum of 28 display and/or printer sessions (the PC LAN Program 1.10 uses a minimum of four network sessions). For DFT attachment (the 3278/79 Emulation Adapter is used), the maximum number of display and/or printer sessions is five.

●   The IBM Personal Computer must have at least one 360 Kb dual-sided 5-1/4-inch diskette drive.

The memory levels indicated do not include PC-DOS or National Language Keyboard support. For planning purposes, PC-DOS 3.1, or 3.2 will generally require memory in the range of 45 to 60 Kb. Some DOS functions may require additional memory, for example, mouse device support or performance options.

Standalone Configurations: Either non-LAN IBM Personal Computers or IBM Personal Computers on networks not using a gateway:

- SDLC Standalone: 161 Kb

- 3274 DFT Attached Standalone: 166 Kb

- Token-Ring Attached Standalone: 161 Kb

Network Station Configurations: IBM Personal Computers attached to PC Network and Token-Ring Network using PC 3270 Emulation Version 3.0 through a network gateway configuration:

- Network Station: 156 Kb

Gateway Configurations: IBM Personal Computer functioning as a gateway for network stations (if the IBM Personal Computer used as a gateway also is a network station, add 28 Kb):

- Gateway to SDLC: 195 Kb
  (For the Token-Ring, NETBIOS and Adapter Handler Programs [53 Kb] are required.)

- Gateway to 3274 DFT: 200 Kb
  (For the Token-Ring, NETBIOS and Adapter Handler Programs [53 Kb] are required.)

- PC Network Gateway to Token-Ring/3725:   195 Kb
  (IBM Token-Ring Adapter Handler Program [7 Kb] is required.)

- Token-Ring Gateway to Token-Ring/3725:   195 Kb
  (For the Token-Ring, NETBIOS and Adapter Handler Programs
  [53 Kb] are required.)

Note: The ability to look at the DOS Directory while in the 3270
emulation session is provided when file transfer is selected or
when alternate task is not selected. The memory requirement for
this function is 6 Kb.

In addition to the base requirements, the following PC 3270
Emulation Program Version 3.0 memory is needed, as appropriate,
for the application:

- File Transfer Support (PROFS/Personal Computer Support): 18 Kb

- 3287 Printer Emulation Support: 11 Kb

- Alternate Task Support: 11 Kb

- General API Support (Personal Services/PC):   8 Kb

- 3270 Keyboard Remap Function: 2 Kb

If alternate tasks are used, the remainder of memory must be at
least 20 Kb for PC-DOS 3.1 and 23 Kb for PC-DOS 3.2.   The
following adapter cards are required:

● Standalone Station:

   - One SDLC Adapter (P/N 1501205 or P/N 1502090)

   - One 3278/79 Emulation Adapter (P/N 1602507 or P/N 8665789)

   or

   - One Token-Ring Network PC Adapter (P/N 6339100)

● Network Station:

   - One PC Network Adapter (P/N 6450213)

   or

   - One Token-Ring Network PC Adapter (P/N 6339100)

● Gateway or Gateway with Network Station:

   - One SDLC Adapter (P/N 1601205 or P/N 1502090)
     With the PC 3270 Emulation Program Version 3.0, the SDLC
     Adaper (P/N 1501205) will operate at line speds up to 9600
     bps. This is required for the Personal Computer AT.   The

SDLC Adapter (P/N 1502090) will operate at line speeds up to 4800 bps. At line speeds below 2400 bps, a maximum of eight sessions may be supported. TopView Version 1.10 may not be run when communicating at line speeds below 2400 bps. At speeds of 2400 bps and above, TopView Version 1.10 may impact file transfer performance. A modem is required.

or

- One 3278/79 Emulation Adapter (P/N 160257 or P/N 8665789) Two Token-Ring PC Adapters are not required (one adapter allows communication to both network stations and the host).

or

- One Token-Ring Network PC Adapter (PC 6339100)

and

- One PC Network Adapter (P/N 6450213)

or

- One Token-Ring Network PC Adapter (P/N 6339100).

The displays supported are:

● IBM Color Display with Color/Graphics Display Adapter

● IBM Monochrome Display with Monochrome Display and Printer Adapter

● IBM Enhanced Color Display with Enhanced Graphics Adapter (in modes 0-5 and 7 only)

The printers supported with the appropriate adapter are:

● IBM 3812 Pageprinter

● IBM 3852-2 Color Jetprinter

● IBM 4201 Proprinter

● IBM 5152 Graphics Printer

● IBM 5201 Quietwriter Model 1

● IBM 5201 Quietwriter Model 2

● IBM 5216 Wheelprinter

● IBM 5223 Wheelprinter E Model 1.

The PC 3270 Emulation Program Version 3.0 uses IBM Personal Computer interrupt levels 3 and 4 for the SDLC Adapter, level 2 for the 3278/79 Emulation Adapter, and either level 2 or 3 for the PC Network Adapter or Token-Ring Network PC Adapter. If any other hardware uses these interrupts, interrupt conflicts are possible, and results will be unpredictable. On configurations that require the SDLC Adapter, only one PC Network Adapter or Token-Ring Network PC Adapter can be present. The adapter must be configured to use interrupt level 2 (the default level of both network adapters as shipped by IBM). On configurations that require 3278/79 Emulation Adapter, only one PC Network Adapter or Token-Ring Network PC Adapter can be present. The adapter must be configured to use interrupt level 3.

For a network station configuration, if two PC Network Adapters or two Token-Ring Network PC Adapters are present, or if one of each is present, the PC 3270 Emulation Program Version 3.0 will always use the first functioning card (card in slot 0 is tried, then card in slot 1).

The PC 3270 Emulation Program Version 3.0 causes a standalone IBM Personal Computer or an IBM Personal Computer functioning as a gateway on the PC Network or Token-Ring Network to emulate a subset of the IBM 3274 Model 51C Control Unit function. Although Version 3.0 supports commonly used 3274 features and capabilities, the following are not supported:

●   APL/Text Character Set

●   Configuration C features:

    - Structured field and attribute processing (SFAP) (EBCDIC only)
    - Programmed symbols (PS) on attached terminals
    - Extended color on attachment terminals
    - Extended highlighting on attached terminals
    - Decompression of PS load data
    - Attachment of local or remote R-Loop
    - Explicit partitions - X.21 communication protocol

●   Display screens other than 1920 characters

●   Entry assist

●   3270 Extended Data Stream (except for file transfer)

●   Graphics escape

●   Katakana

●   All IBM 3278 keyboard types except the IBM 3278 Typewriter keyboard

●   Certain IBM 3278 keys:

- Alternate cursor
- Click
- Cursor blink
- Extended function keys: color, highlighting, programmed symbols
- Ident

● Magnetic stripe reader

● Mono/dual case switch

● NMVT (Network Management Vector Transport) alerts

● Certain IBM 3287 Printer capabilities:

- Mono/dual case switch/light
- Test switch/light
- Reset switch
- Setup switch
- Index switch
- Control Unit signal light

● 3274 response time monitor for this terminal

● Security keylock

● Selector light pen.

In addition to the previously mentioned restrictions, when using DFT communications attachment, the following features and capabilities of the IBM 3274 Control Units are not supported:

● Attachment to port 0 of the 3274

● Data base operations

● 3270 Diagnostic Reset Dump

● Dump facility

● 3274 local copy

● Concurrent display and printer operation in non-SNA configurations

● Patch facility.

The following features and capabilities of the IBM 3278 and IBM 3279 Display Stations and the IBM 3287 Printer are not supported:

● Audible alarm

● Extended highlighting

● Programmed symbols

- Response time monitor

- SNA character string data structured fields

- Underscore

- X print error indication

3.7.4. Software Requirements

For the IBM Personal Computer running the PC 3270 Emulation Program Version 3.0:

- PC-DOS 3.1 or higher is required

- TopView Version 1.10 is optional

- PC LAN Program Version 1.10 is optional

- With the Token-Ring Network, PC-DOS 3.2 is required

- With the Token-Ring Network, the Token-Ring Network NETBIOS Program (P/N 6467037) is required. Also required is the IBM Adapter Handler Program (shipped with the Token-Ring Network PC Adapter).

Note: The PC 3270 Emulation Program Version 3.0 does not modify the DOS level requirements and function level requirements of applications that may be running in the alternate partition. Use of these compatible applications with the PC 3270 Emulation Program Version 3.0 may result in a specific level of PC-DOS being required for the application.

The user of the PC 3270 Emulation Program Version 3.0 must install appropriate versions of host programming support for the 3270 device(s) being emulated.

IBM host computers communicating with the PC 3270 Emulation Program Version 3.0 require the following:

- For Remote Gateway or SDLC connection to VM/SP, ACF/VTAM is required. MVS/XA requires ACF/VTAM Version 2 or higher. The following PTFs are required:

  - For ACF/VTAM Version 2, Release 2: PTF UZ73733

  - For ACF/VTAM Version 2, Release 1: PTFs UZ90213 and UZ73742

  - For ACF/VTAM Version 1, Release 3: PTF UZ76406

When IBM Personal Computer running Version 3.0 is attached to an

IBM 3274 Control Unit in Distributed Function Terminal (DFT) mode, Release 65, or above, of the 3274 microcode is required.

The programs required to be installed on the IBM 43XX or 30XX host computer for file transfer are:

- For MVS/TSO: IBM 3270 PC File Transfer Program Release 1, Model 0 (5665-311)

- For VM/SP: IBM 3270 PC File Transfer Program Release 1, Model 0 (5664-281)

- For CICS/VS (MVS and VSE): IBM CICS/VS 3270 PC File Transfer Program Release 1, Model 0 (5798-DHQ).

The programs required for communications with Personal Services/PC are:

- For DISOSS, the current level of DISOSS/370 (5665-290)

- For the IBM Personal Computer, Personal Services/PC Program Release 1.2 (6476054) or the upgrade to Release 1.2 (6476053).

  IBM PROFS Version 2 (5664-309) is required to be installed on the IBM 43XX or 30XX host computer for communications with PROFS/Personal Computer Support Feature.

When the PC 3270 Emulation Program Version 3.0 emulates a subset of the IBM 3274 Model 51C functions, it does not support the Network Management Vector Transport (NMVT) Communications and Systems Management (C&SM) Architecture. However, Version 3.0 does support the Record Formatted Maintenance Statistics (RECFMS) command.

A list of PC-DOS application programs compatible with the PC 3270 Emulation Program Version 3.0 will be provided at Version 3.0 availability.

3.7.5. Pricing

Description	Part Number	Feature Code	Single Unit One-time Charge
IBM PC 3270 Emulation Program Version 3.0	59X9969	9969	$475.00
Upgrade from IBM 3270 Emulation Program, Entry Level (P/N 59X9904)	59X9980	9970	240.00
Upgrade from IBM PC Network SNA 3270 Emulation Program			

(P/N 6322526)   59X9981   9971   75.00

Upgrade from IBM PC 3270 Emulation
Program Version 2.0 (P/N 59X9951)   59X9995   9972   75.00

3.8. PC Support/36 Enhancements, Workstation Feature

3.8.1. Enhancements

PC Support/36 is enhanced to support the IBM Local Area Network
(LAN) environment. All PC Support/36 functions available via
twinaxial cable attachment to the IBM System/36 PC will be
available to the IBM Personal Computer (PC) utilizing the LAN
attachment. This support provides additional flexibility in
attachment of the IBM PCs to the IBM System/36 PC.

IBM is also announcing the optional PC Support/36 Workstation
Feature for PC Support/36 to give the IBM PC user interactive
workstation function and printer emulation for the IBM System/36
PC. This feature is downloaded from the IBM System/36 PC to the
IBM PC.

The original (non-distribution option) one-time charge is $600
(#6181); the distribution option one-time charge is $450 (#6181).
Planned availability date is second quarter 1987. The product
number is 5727-WS6.

PC Support/36 provides information exchange and resource sharing
between the IBM PC and the IBM System/36 PC. PC Support/36 can
be used with an IBM PC, IBM Personal Computer XT, IBM Portable
Personal Computer, or IBM Personal Computer AT attached to the
IBM System/36 PC. The Enhanced Personal Computer Keyboard
announced with the new IBM PC XT and IBM Personal Computer AT
models is supported. Refer to Product Announcements 186-051 and
186-052 dated April 2, 1986.

All PC Support/36 functions available via twinaxial cable
attachment to the IBM System/36 PC or via the directly-attached
IBM PC of the 5364 System Unit will be available to the IBM PC
utilizing the LAN attachment. These include virtual disk virtual
print and transfer facility.

Local twinaxial cable-attached, remote-attached, and LAN-attached
IBM PCs can coexist on the same IBM System/36 PC. Concurrent
operation of the IBM PC Local Area Network Program and PC
Support/36 on the IBM PC is not supported.

3.8.2. PC Support/36 Workstation Feature (#6181)

This optional feature (#6181) gives interactive workstation
function and printer emulation to the IBM PC when attached to the
System/36 via the LAN. The functions of this feature are similar

but not identical to those of the Enhanced 5250 Emulation Program.

The PC Support/36 Workstation Feature allows the IBM PC user to emulate the System/36 PC set of displays and printers except the IBM 5292 Model 2.

The PC Support/36 Workstation Feature allows the user to establish up to four workstation sessions with a single IBM System/36 PC via LAN. An IBM PC printer may use one of these workstation sessions to emulate a 5219 or 5256 workstation printer when attached to an IBM PC.

Virtual print, virtual disk, and the transfer facility do not use a workstation session. These functions may run concurrently with the four workstation sessions.

A "hot key" sequence is used to switch among IBM System/36 workstation sessions and the IBM PC session.

IBM PCs attached to an IBM System/36 PC via LAN do not have to be individually configured with the SSP configuration program. The sessions are allocated independently of local or remote addressing considerations.

The PC Support/36 Workstation Feature is required for 3278 emulation via IBM PC when the IBM PC is attached via LAN.

The PC Support/36 Workstation Feature also allows the user to define keyboard functions. Predefined keyboard configurations are provided for the IBM PC and IBM Personal Computer AT keyboards. Optionally, the user can define the keyboard to satisfy unique requirements.

Concurrent access to the IBM fixed disk is provided while PC Support/36 Workstation Feature is active.

Text functions are provided to optimize the performance of text operations when using DisplayWrite/36 via the LAN. These functions include word wrap, continuous text entry, tab entry and control, split screen format, and prompting.

Table-Driven Printer Support provides 5256 or 5219 emulation for a variety of IBM PC printers and OEM printers, both parallel and serial. The user must provide a printer description table to the PC Support/36 Workstation Feature program unless the printer model is found in the following table.

● 5256 Emulation

- IBM 5152 Matrix Printer (Model 001)

- IBM 5152 Graphics Printer (Model 002)

- IBM 5182 Color Printer

- IBM 5216 Wheelprinter (Model 001)

- IBM 5201 Quietwriter Printer (Model 001)

- IBM 4201 Proprinter

- NEC 3550 Spinwriter

- 5219 Emulation

  - IBM 5182 Color Printer

  - IBM 5216 Wheelprinter (Model 001)

  - IBM 5201 Quietwriter Printer (Model 001)

  - NEC 3550 Spinwriter

One sample printer description table supporting 5256 emulation on a wide range of printers is provided. Users now have the flexibility to select from a large number of printers available for attachment to the IBM Personal Computer and can choose the one that meets their needs.

Serial Printer Attachment Support provides 5256 or 5219 emulation for a variety of IBM Personal Computer printers and OEM printers that are RS-232 compatible. PC Support/36 Workstation Feature also provides support for the Color Graphics Adapter (CGA), Enhanced Graphics Adapter (EGA), and Professional Graphics Controller (PGC).

3.8.3. Hardware Requirements

PC Support/36 requires any model of the 5364 System Unit with the IBM Token-Ring Network PC Adapter II installed in the directly attached IBM Personal Computer AT. Requirements for the IBM PC attached via the LAN are:

- An IBM PC, IBM PC XT, IBM Personal Portable Computer, or IBM Personal Computer AT

- 5-1/4" double-sided diskette drive (320K) and adapter or 5-1/4" diskette drive (1.2M) and adapter in the IBM Personal Computer AT

- 640K bytes of memory recommended

- One of the following:

  - IBM Token-Ring Network PC Adapter

  - IBM Token-Ring Network PC Adapter II

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- One of the following:

  - IBM Monochrome Display and IBM Monochrome Display and Printer Adapter

  - IBM Color Display and IBM Color/Graphics Adapter

  - IBM 5151 Monochrome Display, IBM 5153 Color Display or IBM 5154 Enhanced Color Display, and the Enhanced Graphics Adapter

  - IBM 5175 Professional Graphics Display and Professional Graphics Controller

  - An equivalent monochrome display, 80 columns by 25 rows, and the IBM Color/Graphics Monitor Adapter (similar to the IBM Portable Personal Computer).

3.8.4. Software Requirements

- System/36 PC:

  PC Support/36 has been designed to operate with the latest release of IBM System/36 PC System Support Program (5727-SS6) at general availability of LAN support. The Interactive Data Definition Utility (IDDU) is required.

IBM System/36 PC LAN Communications Licensed Program (5727-LC6) is required.

The System/36 PC requires a minimum region of 48K.

- IBM Personal Computer

  PC Support/36 LAN Support and the PC Support/36 Workstation Feature are designed to operate with the IBM PC under the control of the IBM PC Disk Operating System (DOS) Release 3 Modification Level 2 or later compatible releases.

3.8.5. Limitations

- PC Support/36 Workstation Feature:

    - Magnetic stripe reader, selector pen, and multinational character sets for the System/36 set of displays are not supported.

    - As a result of physical differences between displays, some information displayed on the System/36 set of displays may appear differently than on the IBM PC display.

3.9. IBM Personal Telephone Manager Program

The IBM Personal Telephone Manager Program (#1642004) now available for the Token-Ring is the software program that runs in the foreground or background and provides support for the IBM Personal Computer Voice Communications Option. These products combine to connect the telephone to an IBM Personal Computer for creating and maintaining telephone directories and reminders, and facilitating one-key dialing, audible call progress, and redial lists. They also provide the ability to detect a host or IBM Personal Computer screen for speed dialing. These functions have the potential to increase productivity in office voice communications.

The IBM Personal Telephone Manager Program provides software support for the IBM Personal Computer Voice Communications Option, allowing the IBM Personal Computer to perform certain standard and advanced telephone functions. The program also contains user-friendly screens of advanced telephone functions that will prompt the user to perform telephone directory and reminder functions in conjunction with the IBM Personal Computer Voice Communications Option. Online tutorials are available to provide guidance to the user.

The IBM Personal Telephone Manager Program for the IBM Personal Computer Voice Communication Option is compatible with the IBM Personal Computer Local Area Network Program Version 1.1.

Note: This product cannot co-reside with the server configuration of the IBM Personal Computer Local Area Network Program.

3.10. IBM System/36 PC 5364 LAN Communications Program

IBM has announced the System/36 PC 5364 Local Area Network Communications Licensed Program (5727-LC6), allowing the 5364 System Unit to connect to the IBM Token-Ring Network.

The IBM System/36 PC 5364 LAN Communications Licensed Program consists of two components. The first component executes on the IBM 5364 System Unit. The second component is downloaded to and executes on the directly attached IBM Personal Computer AT.

Original (non-distribution option) one-time charge is $695, the distribution option one-time charge is $521. The planned availability date is second quarter 1987.

The IBM System/36 PC 5364 LAN Communications Licensed Program provides support for up to two LAN attachments to the System/36 PC. The LAN attachments appear as communication lines. The licensed program also provides support that is downloaded to the directly attached IBM Personal Computer AT (which gives controller function to the LAN attachment) and includes common logical link control and media access control functions. The LAN

communication lines are supported by System Support Program (SSP) functions and features that support SNA/SDLC communications (except Finance and Peer ICF Subsystems and remote workstation support).

For LAN-attached IBM Personal Computers used as workstations, support for an IBM Personal Computer, IBM Personal Computer XT, IBM Portable Personal Computer, and IBM Personal Computer AT is provided by PC Support/36. System/36 workstation emulation is provided in the PC Support/36 Workstation Feature. The 3278 Emulation via IBM Personal Computer feature of the IBM System/36 PC SSP provides 3278 Model 2 or 3279 Model 2A or S2A emulation.

3.10.1. Hardware Requirements

The IBM System/36 PC 5364 LAN Communications Licensed Program will run in any model of the 5364 System Unit. A minimum configuration for the directly attached IBM Personal Computer AT is a 5170 System, Model 068 with the following special features and I/O:

- 256 Kb Memory Module Kit (#0202)

- IBM Token-Ring Network PC Adapter II (#5063) (If the System/36 is to be attached to two Token-Ring networks, two adapters will be required.)

- Monochrome Display and Printer Adapter (#4900)

- 5151 Model 001 Monochrome Display.

3.10.2. Software Requirements

The program requires the latest release of the IBM System/36 PC SSP (5727-SS6) and the Communications Feature (#6047) at general availability of LAN support.

PC Support/36 Workstation Feature is a prerequisite for 3278 emulation via IBM Personal Computer when used in the LAN environment.

IBM System/36 PC 5364 LAN communications Licensed Program is not supported by Finance and Peer ICF Subsystems nor remote workstation functions of the SSP.

3.11. IBM System/36 5360/5362 LAN Communications Program

IBM announced the System/36 5360/5362 Local Area Network Communications Licensed Program (5727-LC1), allowing the 5360 and 5362 System Units to connect to the IBM Token-Ring Network.

The IBM System/36 5360/5362 LAN Communications Licensed Program consists of two components. The first component executes on the IBM 5360 or 5362 System Unit. The second component is downloaded to and executes on the directly attached IBM Personal Computer AT.

The basic one-time charge is $925; the distributed systems license option one-time charge is $814. The planned availability date of the program is second quarter 1987.

The IBM System/36 5360/5362 LAN Communications Licensed Program provides support for up to two LAN Attachment Features (#6500 for 5360, #3315 for 5362). The LAN attachments appear as communication lines. The licensed program also provides support that is downloaded to the directly attached IBM Personal Computer AT (which gives controller function to the LAN attachment), and includes common logical link control and media access control functions. The LAN communication lines are supported by System Support Program (SSP) functions and features that support SNA/SDLC communications (except Finance and Peer ICF Subsystems and remote workstation support).

For LAN-attached IBM Personal Computers used as workstations, support for an IBM Personal Computer, IBM Personal Computer XT, IBM Portable Personal Computer, and IBM Personal Computer AT is provided by PC Support/36. System/36 workstation emulation is provided in the PC Support/36 Workstation Feature. The 3278 Emulation via IBM Personal Computer feature of the System/36 SSP provides 3278 Model 2 or 3279 Model 3A or S2A emulation.

3.11.1. Hardware Requirements

The IBM System/36 LAN Communications Licensed Program will run in any model of the System/36 5360 with LAN Attachment Feature #6500, or 5362 with LAN Attachment Feature #3315.

3.11.2. Software Requirements

The latest release of the System/36 SSP (5727-SS1) and the Communications Feature (#6001) at general availability of LAN support.

PC Support/36 Workstation Feature is a prerequisite for 3278 Emulation via IBM Personal Computer when used in the LAN environment.

IBM System/36 5360/5362 LAN Communications Licensed Program is not supported by Finance and Peer ICF Subsystems nor remote workstation functions of the SSP.

3.11.3. Pricing

Description	Type/ Model	Billing Option	License Feature	Charge
IBM	5727-LC1	Basic MLC	4404	$ 75
System/36		Basic OTC	4403	925
5360/5362		DSLO OTC	9520	814
LAN				
Communications				

MLC = Monthly License Charge   OTC = One-time Charge

3.12. <u>Personal Services/PC Version 1 Release 2</u>

Personal Services/PC Version 1, Release 2 (6476054)is an office-oriented mail and library management system that uses the IBM Personal Computer. It provides a comprehensive and easy-to-use set of office systems functions for all users in the office environment. Operating as an application that supports Document Interchange Architecture (DIA) on the Personal Computer, Personal Services/PC offers a wide range of automated mail and library functions. This release extends the services of the previous release by offering access to the DISOSS/370 library, attachment to the Series/1 Office Connect for mail and library services, and usability enhancements.

Personal Services/PC Version 1 Release 2 continues the automated mail features, electronic file cabinet management functions, nickname/distribution list functions, trace facility, help facility, and tutorial of the previous release and adds the following new and enhanced functions:

Library Management and Other Functions

When attached to DISOSS/370, the user may store, delete, search for, or retrieve a document or a reference to an external document from the host library.

The user may modify the document access codes or add keywords to those that had been specified when the document was stored.

Documents stored on the IBM Personal Computer or in the host library may be printed on printers attached to DISOSS/370.

File Cabinet Functions

Entries are made automatically each time the user stores an item in or retrieves an item from the DISOSS/370 library.

Attachment to Series/1 Office Connect

Access to DIA distribution services and library services are provided in addition to Document Content Architecture letter-quality print services on the IBM Series/1. SNADS connectivity is also provided.

3.12.1. Specified Operating Environment

Personal Services/PC Version 1 Release 2 supports the following IBM Personal Computer models when equipped as described below:

● IBM Portable Personal Computer 5155 Models 68 and 76.

● IBM Personal Computer 5150 Models 104, 166, and 176.

● IBM Personal Computer XT 5160 Models 68, 78, 86, and 87.

● IBM Personal Computer AT 5170 Models 68, 99, and 239.

In addition, the following IBM Personal Computer models will be supported in the first half of 1987 by the then-current release of Personal Services/PC:

● IBM Personal Computer XT 5160 Models 267, 277, 088, 268, 278, and 089.

● IBM Personal Computer AT 5170 Models 319 and 339.

The Personal Computer must be equipped with the following:

● IBM Personal Computer DOS Version 2.1, 3.1, 3.2.

● One fixed disk drive or access to a fixed disk drive.

● At least one 5-1/4-inch double-sided diskette drive.

● 256Kb to 640Kb of total IBM Personal Computer random access memory. Personal Services/PC Version 1 Release 2 always required 224Kb of memory; none of this memory is available for use by other programs in the Personal Computer DOS Subcommand Environment.

● An IBM 80 character-per-second Graphics Printer (IBM 5152 Model 2) or an IBM 4201 Proprinter. Support for the IBM 4201 Proprinter is limited to the level of function provided for the IBM Graphics Printer data stream.

● An IBM Color Display with an IBM Color/Graphics Monitor Adapter or an IBM Monochrome Display with an IBM Monochrome Display and Printer Adapter.

● One of the following communications environments:

    - Asynchronous dial-up connection to a properly configured DISOSS/370 host, a properly configured IBM Series/1 Office Connect host, or another IBM Personal Computer supporting Personal Services/PC.

In this environment, at the user's option, Personal Services/PC operates under TopView, the IBM multiprogramming multiple-window manager.

Asynchronous connection to a DISOSS/370 host requires one of the following:

● 3710 Network Controller with microcode diskette at March 1986 engineering change level or later (in enveloping mode)

● 3708 Network Conversion Unit with pluggable cartridge at service part number 63X4401 and April 30, 1986 availability date (in enveloping mode)

● Installation of the Network Terminal Option in the Network Control Program. For asynchronous communication, the IBM Asynchronous Adapter or the Serial/ParallelAdapter (IBM Personal Computer AT) and a supported modem may be used. Modems supported are:

  - IBM Personal Computer 1200 bps modem (no adapter required).

  - IBM 5841 Modem.

  -Hayes Smartmodem 300.

  -Hayes Smartmodem 1200.

IBM Personal Services/PC also supports asynchronous communication using the ROLM CBX II. This option requires the following:

-A ROLM Juniper II Personal Computer communications complement or an IBM Asynchronous Adapter and a connection to a properly configured CBX II data line via either a ROLM Data Terminal Interface attachment or a ROLMphone Data Communications Module.

-A ROLM 8000 series or ROLM 9000 series processor. The CBX II operating system must be at a minimum level of Release 8004 for the 8000 processor or Release 9004 for the 9000 processor and must have the Data Communications Software feature installed.

-A ROLM CBX II data line defined as an ORIGINATE/ANSWER terminal with REQUEST FOR SERVICE = MANUAL and AUTOBAUD = NO.

Connection to a properly configured DISOSS/370 host via an IBM 4700 Personal Computer, IBM Personal Computer, IBM Personal Computer XT, or IBM Personal Computer AT attached to a 4700 Controller with RM4700CTLR pass-through.

Connection to a properly configured DISOSS/370 host via the IBM PC 3270 Emulation Program, Entry Level, the IBM PC 3270 Emulation Program Version 2.0, or the IBM PC 3270 Emulation Program 3.0, when available. When using the IBM PC 3270 Emulation Program Version 3.0, connection to the host may be via the IBM 3725 Attachment to IBM Token-Ring Network.

Connection to a properly configured IBM Series/1 Office Connect host.

Personal Services/PC Version 1 Release 2 continues support for the following environment on an IBM 3270 Personal Computer 5271 (Models 4 and 6) or an IBM 3270 Personal Computer AT 5273 (Models 20, 41, 42, 61, and 62):

- IBM 3270 Personal Computer Control Program Version 3.

- IBM Personal Computer DOS Version 2.1, 3.1, or 3.2 (DOS 2.1 is not supported on the IBM 3270 Personal Computer AT).

- One fixed disk drive or access to a fixed disk drive.

- One 5-1/4-inch double-sided diskette drive.

- 640Kb of total IBM Personal Computer random access memory. Personal Services/PC 1.2 always requires 224Kb of memory; none of this memory is available for use by other programs in the IBM Personal Computer DOS Subcommand Environment.

- An IBM 80 character-per-second Graphics Printer (IBM 5152 Model 2) or an IBM 4201 Proprinter. Support for the IBM 4201 Proprinter is limited to the level of function provided for the IBM Graphics Printer data stream.

- An IBM 5272 Color Display or an IBM Monochrome Display.

Personal Services/PC will operate in conjunction with DISOSS/370 Version 3 Release 2 and with DISOSS/370 Verson 3 Release 3. Any program temporary fixes required will be listed at general availability.

3.12.2. Compatibility

This program is compatible with the licensed programs identified in the preceding specified operating environment section.

In addition, when configured at the basic Redirector level, Personal Services/PC Version 1 Release 2 is compatible with the IBM Personal Computer Local Area Network Program 1.10 when run under IBM Personal Computer DOS 3.2 on the IBM Token Ring or on the IBM Personal Computer Network.

3.13. PC Support/36 LAN Enhancements and Workstation Feature

3.13.1. Enhancements

PC Support/36 (5727-WS1) is enhanced to support the IBM System/36 Local Area Network (LAN) environment. All PC Support/36 functions available via twinaxial cable attachment to the IBM System/36 will be available to the IBM Personal Computer (PC) utilizing the LAN attachment. This support provides additional flexibility in attachment of the IBM PCs to the IBM System/36.

IBM is also announcing the optional PC Support/36 Workstation Feature for PC Support/36 to give the IBM PC user interactive workstation function and printer emulation for the IBM System/36. This feature is downloaded from the IBM System/36 to the IBM PC.

The basic one-time charge is $1500 (#6248); the distributed systems license option one-time charge is $1320 (#6248). The planned availability date is second quarter 1987.

PC Support/36 provides information exchange and resource sharing between the IBM Personal Computer and the IBM System/36. PC Support/36 can be used with an IBM PC, IBM Personal Computer XT, IBM Portable Personal Computer, or IBM Personal Computer AT attached to the IBM System/36. The Enhanced Personal Computer Keyboard announced with the new IBM PC XT and IBM Personal Computer AT models is supported.

All PC Support/36 functions available via twinaxial cable attachment to the IBM System/36 will be available to the IBM PC utilizing the LAN attachment, including virtual disk, virtual print and transfer facility.

Local twinaxial cable attached, remote attached, and LAN attached IBM PCs can coexist on the same IBM System/36.

Concurrent operation of the IBM PC Local Area Network Program and PC Support/36 on the IBM PC is not supported.

3.13.2. PC Support/36 Workstation Feature

This optional feature gives workstation function and printer emulation to the IBM PC when attached to the System/36 via the LAN. The functions of this feature are similar but not identical to those of the Enhanced 5250 Emulation Program.

The PC Support/36 Workstation Feature allows the IBM PC to emulate the System/36 set of displays and printers except the IBM 5292 Model 2.

The PC Support/36 Workstation Feature allows the user to establish up to four workstation sessions with a single IBM System/36 via a LAN. An IBM PC printer may use one of these workstation

sessions to emulate a 5219 or 5256 workstation printer when attached to an IBM PC.

Virtual print, virtual disk, and the transfer facility do not use a workstation session. These functions may run concurrently with the four workstation sessions. A "hot key" sequence is used to switch among IBM System/36 workstation sessions and the IBM PC sessions.

IBM PCs attached to an IBM System/36 via a LAN do not have to be individually configured with the SSP configuration program. The sessions are allocated independently of local or remote addressing considerations. The PC Support/36 Workstation Feature is required for 3278 emulation via the IBM PC when the IBM PC is attached via LAN.

The PC Support/36 Workstation Feature allows the user to define the keyboard functions. Predefined keyboard configurations are provided for the IBM PC and IBM Personal Computer AT keyboards. Optionally, the user can define the keyboard to satisfy unique requirements.

Concurrent access to the IBM PC fixed disk is provided while the PC Support/36 Workstation Feature is active.

Text functions are provided to optimize the performance of text operations when using DisplayWrite/36 via the LAN. These functions include word wrap, continuous text entry, tab entry and control, split screen format, and prompting.

Table-Driven Printer Support provides 5256 or 5219 emulation for a variety of IBM PC printers and OEM printers, both parallel and serial. The user must provide a printer description table to the PC Support/36 Workstation Feature unless the printer model is found in the following table.

- 5256 Emulation

    - IBM 5152 Matrix Printer (Model 001)

    - IBM 5152 Graphics Printer (Model 002)

    - IBM 5182 Color Printer

    - IBM 5216 Wheelprinter (Model 001)

    - IBM 5201 Quietwriter Printer (Model 001)

    - IBM 4201 Proprinter

    - NEC 3550 Spinwriter

- 5219 Emulation

    - IBM 5182 Color Printer

- IBM 5216 Wheelprinter (Model 001)

- IBM 5201 Quietwriter Printer (Model 001)

- NEC 3550 Spinwriter

One sample printer description table supporting 5256 emulation on a wide range of printers is provided. The user has the flexibility to select from a large number of printers available for attachment to the IBM PC and can choose one that meets the user's needs.

Serial Printer Attachment Support provides 5256 or 5219 emulation for a variety of IBM PC printers and OEM printers that are RS-232 compatible.

PC Support/36 Workstation Feature provides support for the Color Graphics Adapter (CGA), Enhanced Graphics Adapter (EGA), and Professional Graphics Control (PGC).

3.13.3. Hardware Requirements

The operating environment specifies any model of the 5360 with the LAN Attachment Feature (#6500), or 5362 with the LAN Attachment Feature (#3315). Requirements for the IBM PC attached via the LAN are:

- An IBM PC, IBM PC XT, IBM Portable Personal Computer, or IBM Personal Computer AT

- 5-1/4" double-sided diskette drive (320K) and adapter or 5-1/4" diskette drive (1.2M) and adapter in the IBM Personal Computer AT

- 640K bytes of memory recommended

- One of the following:

  - IBM Token-Ring Network PC Adapter
  - IBM Token-Ring Network PC Adapter II

- One of the following:

  - IBM Monochrome Display and IBM Monochrome Display and Printer Adapter

  - IBM Color Display and IBM Color/Graphics Adapter

  - IBM 5151 Monochrome Display, IBM 5153 Color Display or IBM 5154 Enhanced Color Display, and the Enhanced Graphics Adapter

- IBM 5175 Professional Graphics Display and Professional Graphics Controller

- An equivalent monochrome display, 80 columns by 25 rows, and the IBM Color/Graphics Monitor Adapter (similar to the IBM Portable Personal Computer).

3.13.4. Software Requirements

● System/36:

PC Support/36 has been designed to operate with the latest release of the IBM System/36 System Support Program (5727-SS1) at general availability of LAN support. The Interactive Data Definition Utility (IDDU) is required.

IBM System/36 LAN Communications Licensed Program (5727-LC1) is required.

The System/36 requires a minimum region of 48K

● IBM Personal Computer:

PC Support/36 LAN support and the PC Support/36 Workstation Feature are designed to operate with the IBM PC under the control of the IBM PC Disk Operating System (DOS) Release 3 Modification Level 2, or later, compatible releases.

Magnetic stripe reader, selector pen, and multinational character sets for the System/36 set of displays are not supported by the PC Support/36 Workstation Feature. As a result of physical differences between displays, some information displayed on the System/36 set of displays may appear differently than on the IBM PC display.

3.14. IBM Token-Ring Network Manager

The IBM Token-Ring Network Manager (6476046), a licensed program for the IBM Personal Computer, assists the user in problem determination and error recovery for the IBM Token-Ring Network. The IBM Token-Ring Network Manager program monitors the IBM Token-Ring Network for failures and provides information and control functions to assist the user with network problem determination and recovery. The failures recorded by the program include errors associated with the network cabling system, access units, and attaching station network adapters. The program supports up to 260 attaching stations on a single ring of an IBM Token-Ring Network.

Recorded errors include soft and hard errors. A soft error is recorded when the error threshold for transient recoverable error is exceeded. It can indicate the impending loss of a network

resource. A hard error is recorded when a permanent error causes the loss of a network resource.

Network errors are recorded by the program in an event log on a disk (or diskette). Other network events, such as stations joining and withdrawing from the network, are optionally recorded in the log. The recorded information can assist the user with network problem determination. Events logged during a specified time period and/or associated with a specified adapter (station) can be displayed and/or printed.

Certain network errors indicate a loss or impending loss of a network resource and will cause an alert message to be recorded in the alert file in addition to the event log. An alert condition is immediately signaled to the operator by an audible alarm and a highlighted indicator on the operator display. Messages from the alert file can be displayed by the network operator. Probable cause and source causing the alert can be displayed. Such information can assist in isolating a failure to a specific component of the network.

Operator control functions are provided. A station adapter can be logically removed from the network to assist with problem isolation. Connectivity problems can be investigated by displaying all online stations or requesting a path test between two stations. Intensive recording mode (which causes all soft-error incidents to be recorded) and continuous network traffic generation are operator-controlled functions that are useful in isolating transient failures.

Operator interaction with the program is accomplished through a series of panels (menus). The operator selects program functions from the panels presented at the operator's display. Function keys are used to simplify operator interaction. The HELP function key causes the the program to display explanatory information on program functions. Operator interaction is also simplified through the use of symbolic names for network stations (adapters). Station names are assigned by the operator and stored in a names file. The program will recognize and display both the symbolic name and the hardware address for stations with an assigned name.

An operator security function can assist the customer in preventing unauthorized use of the program. When the function is enabled, the operator must provide a password to use the network management functions of the program.

The IBM Token-Ring Network Problem Determination Guide (SX27-3710), which is planned to be available in June 1986, contains step-by-step problem determination procedures for the network, and is used with the IBM Token-Ring Network Manager program to isolate and resolve network failures. The network manager itself is scheduled for availability in July 1986.

3.14.1. Hardware Requirements

The IBM Token-Ring Manager requires:

- A dedicated IBM Personal Computer, IBM Personal Computer XT, IBM Personal Computer AT, or IBM Portable Personal Computer

- 512Kb Memory

- Two dual-sided or high-capacity diskette drives or one fixed-disk (10Mb or 20Mb) drive and one dual-sided or high-capacity diskette drive

- IBM Token-Ring Network PC Adapter

- IBM Monochrome Display or IBM Color Display

- IBM Graphics Printer or IBM Proprinter (optional)

3.14.2. Software Requirements

IBM Personal Computer DOS Version 3.2 is required.

The program does not receive or transmit user data, and thus does not impact user data security. Information for creating an audit trail of stations joining and withdrawing from the network is included in the event log. The program allows the program operator to logically remove another station from the network.

User management is responsible for controlling the installation and use of the program. The operator security function can assist user management in preventing unauthorized use of the program.

3.15. PC/HOST File Transfer and Terminal Emulator Program

The PC/HOST File Transfer and Terminal Emulator Program (6476052) is a licensed program that supports IBM Personal Computers communicating with an IBM SNA host through an IBM 3708 Network Conversion Unit or an IBM 3710 Network Controller. It gives the IBM Personal Computer user full-screen 3270 terminal emulation and file transfer capability when operating in protocol conversion mode with the 3708 or the 3710's 8-Port Asynchronous Communication Adapter. Connection between the IBM Personal Computer and the 3708 or 3710 is via the IBM Personal Computer's asynchronous communication adapter.

An IBM Personal Computer running the PC/HOST File Transfer and Terminal Emulator Program can also emulate an IBM 3101 terminal and attach to the 3708 or 3710 in protocol enveloping mode. This connection provides access to asynchronous applications at the IBM SNA host that formerly interfaced to the Network Terminal Option (NTO) licensed program in the 37X5. The IBM Personal

Computer can also operate through the 3708/3710 to an ASCII/asyn-
chronous host attached to another port on the 3708 or to another
port on the same 3710 8-Port Asynchronous Communication Adapter.

3.15.1. Program Functions

PC/HOST File Transfer and Terminal Emulator Program supports file
transfers to and from IBM host programs running in an IBM MVS,
VM, or VSE SNA host. These IBM host file transfer programs are
called the 3270 PC File Transfer Programs, often referred to as
the IND$FILE programs. These IBM host programs also support file
transfers to and from IBM Personal Computers using the IBM
3278/79 Emulation Control Program, the IBM PC Network SNA 3270
Emulation Program, or the 3270-PC Control Program when attached
to an IBM 3274 Display Control Unit, the IBM Token-Ring Network,
or the IBM PC Network.

A variety of file transfer options can be performed. Transfers of
both binary and text files are supported by the PC/HOST File
Transfer and Terminal Emulator Program. The file transfer data
does not appear on the IBM Personal Computer user's screen while
the file transfer operation is in progress. IBM Personal
Computer DOS files can be sent to an IBM host or to the IBM
Personal Computer printer. IBM Personal Computer DOS screens can
be sent to an IBM Personal Computer DOS file, an IBM Personal
Computer printer, or an IBM host. IBM host files can be directed
to an IBM Personal Computer DOS file or to the IBM Personal
Computer printer. IBM host session screens can be sent to an IBM
Personal Computer DOS file, the IBM Personal Computer printer, or
to an IBM host file. Multiple files can be transferred with a
single file-transfer request. The IBM Personal Computer user
simply generates an IBM Personal Computer DOS file that contains
commands to transfer multiple IBM Personal Computer or host files
and then invokes the batch file transfer function with the
PC/HOST File Transfer and Terminal Emulator Program. Batch file
transfer provides a significant productivity enhancements for
users who repeatedly send the same files to and from the IBM
host.

Two logical units per port, commonly referred to as multiple
logical units, are supported. Two logical units per port is a
feature of the 3708/3710 operating in protocol conversion mode.
It allows an IBM Personal Computer or a display with an attached
printer to share an IBM 3708/3710 port while appearing to the
host as two logical units. A user can communicate with the host
processor from the keyboard/display and have output sent to the
printer over the same connection. This feature of the IBM
3708/3710 permits a remote user to realize a significant cost
savings by having both display and printer capabilities on a
single communication line. The two logical unit support provided
by the PC/HOST File Transfer and Terminal Emulator Program allows
the 3708/3710 to interleave data to the display and printer
without requiring manual intervention by the IBM Personal
Computer user.

The PC/HOST File Transfer and Terminal Emulator Program also provides IBM 3101 terminal emulation to IBM host asynchronous application programs when operating through the 3708/3710 in protocol enveloping mode. The Network Terminal Option (NTO) licensed program in 37X5 Communication Controller is not required when operating in this mode. Line-by-line file transfers are supported in this mode. The PC/HOST File Transfer and Terminal Emulator Program also allows an IBM Personal Computer user to communicate through the 3708/3710 to an ASCII/Asynchronous host processor as a 3101 terminal.

In addition to providing a communication link through the 3708/3710, the PC/HOST File Transfer and Terminal Emulator Program's 3101 emulation permits an IBM Personal Computer user to connect to online information services, such as the IBM Information Network through the personal computer's asynchronous adapter/modem.

The PC/HOST File Transfer and Terminal Emulator Program can be configured as a resident or non-resident. The non-resident option is selected if personal computer storage is a limiting factor. The resident option should be selected if the user wishes to load the PC/HOST File Transfer and Terminal Emulator Program only once with every power-on or system reset. The PC/HOST File Transfer and Terminal Emulator Program can reside on a diskette or a fixed disk.

Another option is concurrent mode, which permits file transfers to occur in the background while an IBM Personal Computer DOS session runs in the foreground. The PC/HOST File Transfer and Terminal Emulator Program can also be run in non-concurrent mode, in which case the IBM Personal Computer will be dedicated during file transfer.

3.15.2. Usability Features

Hot-key switching provides a fast path to switch the IBM Personal Computer user to and from the IBM Personal Computer DOS session, the file transfer session, the host interactive session, or the host message screen. For example, a user in 3270 interactive session with CICS who decides to transfer a file from the host to the IBM Personal Computer can use a simple "hot key" switch to the file transfer menu screen. The CICS interactive session is maintained. Once the host file to be transferred is defined and the file transfer initiated, the user can "hot key" to the IBM Personal Computer DOS session and run another IBM Personal Computer program while the file transfer is in progress. After the file transfer is completed, the user can return to the host interactive CICS session via another hot key operation.

The PC/HOST File Transfer and Terminal Emulator Program permits remapping the IBM Personal Computer keyboard. This feature allows the IBM Personal Computer user to tailor the keyboard to a

personal preference. Keyboard remapping allows the user to setup the keyboard of the remote personal computer to match or be very similar to the user's IBM Personal Computer at work. Another use of keyboard remapping is to allow the IBM Personal Computer user to redefine hot key sequence(s).

At any time during a file transfer, the IBM Personal Computer user may monitor the status and progress of data movement between the IBM Personal Computer and the IBM host. The number of bytes transferred is displayed and continuously updated on the bottom of the IBM Personal Computer screen. During batch file transfers, a screen showing the file names and the status ("complete" or "in progress") is presented to the IBM Personal Computer user. User options include an online help facility and menu screens designed for the occasional user. The user can also predefine and store keystroke sequences activated by a single function key. An example of this feature is storing a sequence of keystrokes to permit invoking modem auto-dial with a single key.

Multiple configuration parameter files are supported. Different configuration parameter files can be dynamically loaded without reloading the PC/HOST File Transfer and Terminal Emulator Program. This feature allows the user to initiate a connection to another host with an entirely different set of communication parameters. For example, a user can communicate to an IBM host, terminate the session, and then reestablish a new communication link to an online information service using different line speeds or stop bits, without reloading the PC/HOST File Transfer and Terminal Emulator Program.

3.15.3. Line Parameters

Line speed parameters of 110 to 9,600 bps between the IBM Personal Computer and the 3708/3710 are supported for file transfers performed in protocol conversion mode. Line-speed considerations, when operating in line-by-line mode to either an IBM host or an ASCII/asynchronous host, are specified in the product user's guide. A full range of communication parameters can be specified to permit maximum flexibility. Examples of parameters include: duplex or half-duplex operation, odd or even parity, one or two stop bits, automatic new line, automatic line feed, carriage return or carriage return with line feed, scrolling, XON/XOFF enabling, and optional end-of-message characters.

3.15.4. Error Checking and Automatic Retransmission

Error checking and automatic retransmission of data are supported. The PC/HOST File Transfer and Terminal Emulator Program handles IBM Personal Computer DOS-detected errors, host-detected errors during file transfer, and communication-line errors that occur during the file transfer operation.

● IBM Personal Computer-detected errors

Some error messages may be detected by IBM Personal Computer DOS when specifying the source or destination for the file transfer. For example, if the destination is an IBM Personal Computer DOS file and the disk is write protected, this condition is reported by the IBM Personal Computer DOS. If an error condition is detected after the file transfer has started, such as the disk is full, the file transfer is terminated and a message appears on the status screen informing the user of the cause.

● IBM host-detected errors

While a file transfer is in progress, it is possible that some error condition may be detected by the host system. The error message information is sent to the IBM Personal Computer by the host support program and the file transfer is cancelled. The audible alarm is sounded and error information is displayed the next time the status report is displayed.

● Communication-line errors

Several types of errors may occur on the communication line while file transfer is in progress. Line noise may cause some loss of data during transmission. The PC/HOST File Transfer and Terminal Emulator Program calculates and transmits a check-sum value for each block of data which is transmitted in either direction. The IBM host 3270 Personal Computer File Transfer Program verifies that the check-sum is correct before processing the data. If a check-sum error is detected, the block of data is automatically retransmitted three times before the host aborts the file transfer.

Another error situation can occur when a line drop causes a total loss of communication between the 3708/3710 and the IBM Personal Computer. If, during file transfer or while waiting for a response from the host system during preparation for file transfer, data set ready is dropped, the PC/HOST File Transfer and Terminal Emulator Program assumes that communications with the 3708/3710 has been lost. The file transfer request is terminated immediately and a message is displayed on the IBM Personal Computer user's screen. A similar result occurs if the host system fails to respond within a specified period of time.

3.16. 3820 Page Printer Local Area Network PrintManager

3820 Page Printer Local Area Network PrintManager licensed program (6317-042) provides device management support for attachment of a 3820 Page Printer to an IBM Token-Ring Network, an IBM PC Network, or a Corvus OMNINET local area network.

The support in this licensed program allows PC users on the supported local area networks to process 5151 ASCII print or text files created by PC application programs for printing on the 3820 Page Printer. The 3820 attaches to a specified IBM PC on the

network which may also be used as a LAN workstation when no PrintManager files are being printed.

In the IBM Token-Ring Network or IBM Personal Computer Network environments, PrintManager uses the print services support provided with the IBM Token-Ring Network Program or the IBM Personal Computer Network Program. LAN PrintManager adds user-specified formatting parameters to a 5152 ASCII print or text file created by an IBM Personal Computer application and invokes IBM Token-Ring Network or IBM Personal Computer Network print services which transmit the file to the server. The IBM Token-Ring Network or Personal Computer Network print services on the server then transmit the file to the LAN PrintManager device driver for printing on the 3820 Page Printer.

A series of hierarchical menus allow the user to specify page format and invoke the system services required for execution. Support parameters provide facilities to:

● Select from 54 IBM-supplied uniformly-spaced and mixed-pitch fonts, including representation of the 5152 fonts.

● Select one of four print orientations (0,90,180,270 degrees.)

● Select paper size.

● Select either simplex or one of two duplex print modes.

● Specify the paper source as either the paper bin, cassette, or one of two predetermined combination from both the bin and cassette.

● Set margins.

● Set initial line spacing.

● Specify the number of copies of the entire print file.

Additional supporting services allow the user to:

● Set an error limit threshold.

● Set tabs.

● Define the fonts to be used with each job.

A single LAN PrintManager license allows the attachment of one 3820 Page Printer to the local area network as specified in the terms and conditions for this licensed program.

3.16.1. Hardware Requirements

● A network workstation may have IBM Token-Ring Network or IBM PC Network, and Corvus OMNINET adapters installed, but both network programs cannot be active at the same time.

● The PC serving the 3820 must have an SDLC communications adapter card and communications cable.

● EIA Interface Cable is required for modem attachment.

● Self-clocking external modem or modem eliminator which supports EIA RS232C interface and protocol supporting point-to-point non-switched common carrier service.

3.16.2. Software Requirements

The IBM LAN PrintManager on an IBM Token-Ring Network or IBM PC Network requires:

● IBM PC DOS 3.1

● IBM Token-Ring Network Program or IBM PC Network Program

The IBM LAN PrintManager on a Corvus OMNINET requires:

● IBM PC DOS 2.0 or DOS 3.0 with the appropriate prerequisite support on Corvus OMNINET

● Corvus OMNINET

3.16.3. Personal Computer Configurations

● Attachment of an IBM 3820 Page Printer to the IBM Token-Ring Network or IBM PC Network requires that the IBM 3820 be attached to one of the following PCs functioning as a network file/print server: An IBM Personal Computer with an expansion unit, IBM Personal Computer XT, or IBM Personal Computer AT. The PC to which the IBM 3820 is attached must have a minimum of 512K bytes of memory.

● Attachment of an IBM 3820 Page Printer to the Corvus OMNINET requires that the IBM 3820 be attached to an IBM Personal Computer or IBM Personal Computer XT. The PC to which the IBM 3820 is attached must have a minimum of 512K bytes of memory.

● Personal Computers on IBM Token-Ring Network or IBM PC Network using the facilities of PrintManager to create and schedule print jobs for the 3820 must have a minimum of 384K bytes of memory.

● Personal Computers on Corvus OMNINET using the facilities of PrintManager to create and schedule print jobs for the 3820 must have a minimum of 256K bytes of memory.

A PrintManager license is required to attach a single IBM 3820 to a local area network. The PrintManager licensed program is distributed on two diskettes: LANServe and LANPrint. The LANServe diskette contains the PrintManager facilities required at the server workstation to print files of the IBM 38XX. The LANPrint diskette is distributed with LANServe and contains the facilities used at the LAN workstation to request a file to be printed on an IBM 38XX and specify printing attributes for the file. LANPrint, when used in conjunction with LANServe, may be copied for use on any workstation using an IBM 38XX attached to the local area network.

3.17. PC Network Remote Control

PC Network Remote Control is a $24.95 software product that "echoes" the screen of any PC on an IBM PC Network onto the screen of one or more of the other PCs on the LAN. The product- - being marketed as a member of IBM's Personally Developed Software (PDS) series -- is billed as a utility for the IBM PC Network, but IBM does note that it will function on any LAN that is NETBIOS-compatible -- viz the IBM Token-Ring LAN. The PC Network Remote Control software can be used in training and support applications, as well as to allow users to share resources or confer on a common document or application program.

3.18. Magic Menu Network

Magic Menu Network (6187303) is a menu system that helps provide control of the terminals on the network system. Menus allow the selection and execution of applications programs without dealing with DOS or consulting a manual. Magic Menu Network is an interface between the user and DOS allowing an application to be performed with a few keystrokes. Sequence screens allow automatic execution of a series of menu entries, while password security is available for all applications. Magic Menu Network provides automatic screen blanking, dynamic variable for customizing general entries, speed entries, and other advanced features. The capability exists for tailored access menus for each specific user of the network system.

Highlights

● Selection and execution of applications programs with easy-to-use menus

● System security using password locks on any or all menu entries

- Sequence screens allowing automatic execution of a series of new entries

- Dynamic variable to customize general entries at entry selection time

- Speed entry function to directly execute menu entries without paging through menu screens

- Setup control of printers, modems, and other peripherals via menu entries

- Menu-driven editor for building and modifying screens

- Operator prompts and instructions controlled by menu entries

- Fast menu display and execution

The program number of Magic Menu is 6187303; the feature code is 9565. It is intended for IBM Personal Computers PC/XTs, ATs, and 3270-PCs and will be availabile after June 20, 1986 for a one-time charge of $500.

3.19. IBM TSO/E Servers, CMS Servers, & IBM PC Requesters

IBM Personal Computer Requesters, IBM CMS Servers, and IBM TSO/Extensions (TSO/E) Servers (IBM Requesters/Servers) licensed programs are part of the IBM System/370 to IBM Personal Computer Enhanced Connectivity Facilities announcement. Included are new and enhanced facilities for interconnecting IBM Personal Computers with IBM System/370 computers in the Multiple Virtual Storage/Extended Architecture (MVS/XA) TSO/E, and Virtual Machine/System Product (VM/SP) environments.

The IBM Requester/Servers licensed programs consolidate much of the function found in many of IBM's currently available System/370 to IBM Personal Computer connectivity licensed programs. The IBM Requesters/Servers licensed programs provide a set of host services to IBM Personal Computer users. The IBM Requesters/Servers functions include the ability to execute a host procedure or command, virtual disk, virtual file, virtual print, file transfer, and host database access. Programs will run on the Token-ring.

The planned availability date is third quarter 1987. The product numbers are 5664-327 -- IBM CMS Servers; 5665-396 -- IBM TSO/E Servers; 6316993 -- IBM Personal Computer Requesters.

3.19.1. Host Database Access

3.19.1.1. DATABASE 2 and SQL/DS

Data access is supported from DATABASE 2 and SQL/DS through dynamic or predefined requests. A full-screen interface is provided that will prompt a user in developing an SQL language query. Query results can be stored in host files, transferred to the IBM Personal Computer, or copied directly into a virtual disk. Host results of these queries are sequential files containing the extracted host data, preserving the host data types, and optionally including file definition information. File definition information can be preserved through requesting the query result to be given in the DXT Integration Exchange Format (IXF). Users can also extract data and perform a file transfer operation in one step, such that all the functions of file transfer are available at the time of the query operation.

Users may list the names of tables and fields that they may access. A user may specify that a particular dynamic request be saved to be executed later as a predefined request.

3.19.1.2. DXT

DXT extraction requests must be created using the DXT Version 2 licensed program through its host interface. The IBM Personal Computer Requesters licensed program provides an interface for a user to list and select one of these requests for batch execution. The user can request the status of the query results. Users may extract the following data using DXT jobs:

● DL/1 databases and Fast Path databases

● VSAM files and SAM files

● DATABASE 2 and SQL/DS databases

Results of the DXT extraction jobs are sequential files stored in the host in DXT Integration Exchange Format (IXF) in machine form. Users can directly use these result files as virtual files or copy them to the IBM Personal Computer or to a virtual disk file without having to define the host file.

3.19.1.3. Virtual Disk

Virtual disk enables the IBM Personal Computer user to use host system disk space as if it were an IBM Personal Computer fixed disk. File access on the IBM Personal Computer is through the DOS user-installed device driver interface. The data is stored at the host in IBM Personal Computer format without translations. This gives the IBM Personal Computer user access to large amounts of additional storage. Once the setup is completed, the actual reading from and writing to the host is transparent to IBM Personal Computer users and their programs. The IBM Personal Computer user refers to the virtual disks as additional drives

(for example C:, D:.). Virtual disks can be shared by multiple concurrent users in read-mode. One writer or multiple readers are allowed. Users should not expect virtual disk response time to be as fast as accessing local storage devices. Virtual disk will work with most Personal Computer DOS commands. For example, files may be copied between the IBM Personal Computer and the host by using the IBM Personal Computer DOS copy command. The following commands will not work with virtual disk: Format, Diskcopy, Disk Compare, Fdisk, and Sys.

3.19.1.4. Virtual File

Through the use of virtual file an IBM Personal Computer user or an application is given an IBM Personal Computer view of a host file. The IBM Personal Computer user or an application accesses the virtual file as if it were a local IBM Personal Computer file. The physical data accessed, however, resides at the host system and is stored in host-file format. The virtual file facility provides the translations and transformations between the different file formats according to user-supplied specifications. The host file is usable by both IBM Personal Computer and host applications.

The primary use of the virtual file is to allow the sharing of host data between mainframe applications and the IBM Personal Computer. IBM Personal Computer users can run applications sharing host data with host applications and other IBM Personal Computer applications in a real-time environment. CMS files are supported in the VM environment, and sequential files (including partitioned data sets) are supported in the VMS environment. IBM Personal Computer programs can be run using up-to-date host system data files. IBM Personal Computer programs and DOS commands can be used with host data files maintained on the host in host format. Once the setup is completed, the actual accessing of host files is transparent to Personal Computer users and their programs.

Most Personal Computer DOS commands will function. An example would be the Personal Computer DOS file copy command. The following DOS commands will not function when given a Virtual File drive as a parameter:

- BACKUP when Virtual File drive is target (use COPY instead)
- CHKDSK
- DISKCOMP (use COMP instead)
- DISKCOPY (use COPY instead)
- FORMAT
- JOIN
- LABEL
- RECOVER
- RESTORE when Virtual File drive is source (use COPY instead)
- SUBST
- SYS

The IBM Personal Computer user accesses virtual files using a virtual device drive such as E:, or F:. Virtual files are shared between the IBM Personal Computer and the host under the control of the host operating system. Users should not expect response time for virtual file to be as fast accessing local storage devices.

3.19.1.5. Virtual Print

Virtual print provides access to host system printers so they appear to be attached to the IBM Personal Computer. Virtual print processes Personal Computer files that contain printer control characters for these IBM Personal Computer printers:

- IBM 5201 Quietwriter Printer
- IBM 5201 Quietwriter Printer Model 2
- IBM 5216 Wheelprinter Model 2
- IBM 4201 Proprinter
- IBM Color Jetprinter (3852 Model 2)
- IBM 5152 Printer Model 1 (Personal Computer Dot Matrix)
- IBM 5152 Graphics Printer, Model 2
- IBM 5182 Personal Computer Color Printer Model 1

Virtual print converts IBM Personal Computer print data streams for supported IBM Personal Computer printers to IBM 1403 or 3800 Model 1 data streams. The user may attach up to four host printers at a time. The virtual print profile may be edited to add, copy, delete, or modify entries according to the user's specific needs. Only character-mode print streams are supported by virtual print; graphics printing cannot be done using virtual print.

3.19.1.6. File Transfer

File Transfer allows data to be copied between an IBM Personal Computer file or a virtual disk file and a host file. File transfer includes support for character, binary, and formatted file transfer, including support for copying to popular IBM Personal Computer data interchange formats.

- Formatted: The data is formatted according to prespecified file definitions for the host and IBM Personal Computer files. Using formatted file transfer, each host field is mapped to each IBM Personal Computer field, and data conversions are performed on each field according to user specifications. In addition to this support, an exit is provided for user-supplied transforms.

- Character: The data is translated between EBCDIC and ASCII. Standard Personal Computer character file end-of-record indicators are recognized and used.

- Binary: The data is copied without any modification.

The following interchange formats are supported:

- Data Interchange Format (DIF)
- LOTUS Corporation SYMPHONY WRK Format
- LOTUS 1-2-3 WKS Format
- dBASEII and dBASEKKK SDF Delimited Format
- Comma Separated Variable (CSV)
- Multiplan Input Format (SYLK)

File transfer provides alias naming of host data so that IBM Personal Computer users do not need to learn the complexities of host file naming conventions. File types directly supported are CMS files in the VM environment and sequential (including members of partitioned data sets), and VSAM (ESDS, KSDS, RRDS) files in the MVS environment.

3.19.1.7. Execute Host Procedure, Command, or Program

This service allows an IBM Personal Computer user to run a VM EXEC, TSO CLIST, CMS command processor (CP), TSO command, or a host program on the host computer. These jobs run in the user's TSO address space or the user's VM virtual machine. This facility gives the user the ability to perform many tasks, such as to execute the VM TELL command to send an immediate message or to run an EXEC that may stage data from a production file to a work file. These functions are executed at the host in real-time. Only functions that require no prompted input or do not produce full-screen output are supported. Line-by-line screen output results are shown at the IBM Personal Computer screen or are stored in a file at the IBM Personal Computer.

3.19.1.8. Interfaces

User Interface: Most functions are accessible through a full-screen user interface included in the licensed program. This interface requires the EZ-VU II Run Time Facility, and is primarily intended for the business professional user. It includes online help and is a full-screen, menu-driven interface.

Command Interface: The command interface is available for users who prefer to use commands, and may also be used by application programmers who may invoke these commands in BAT files and in application programs through a subroutine.

3.19.2. Migration From IBM Licensed Programs

3.19.2.1. From Personal Computer/VM Bond

- Personal Computer/VM (PC/VM) Bond virtual disks are compatible with the IBM CMS Servers virtual disks.

- The Execute Host Command function in the IBM Requesters/Servers licensed programs is designed to function in the same manner as the PC/VM Bond HOST Program Interface.

- There is no equivalent function to the PC/VM Bond HOSTRAW program interface in the IBM Personal Computer Requesters licensed program. Programs using the HOSTRAW program interface in PC/VM Bond must be rewritten to utilize the API in the IBM Personal Computer 3270 Emulation Program Version 3 or IBM 3270-PC Control Program Version 3.

- VM Bond provides IBM 3270 terminal emulation in Control Unit Terminal (CUT) mode. The Enhanced Connectivity Facilities programs require the IBM PC 3270 Emulation Program Version 3, operating in Distributed Function Terminal (DFT) mode.

- VM messages may be sent via the IBM CMS Servers execute host command function. Receipt of a message will generate a single tone in the Personal Computer mode. Messages may be viewed on a terminal emulation screen.

- REXX/Personal Computer is not provided as part of Enhanced Connectivity Facilities.

3.19.2.2. From Personal Decision Series Attachment/370

- Personal Decision Series (PDS) Attachment/370 and Attachment/370+ virtual disks are compatible with the IBM Requesters/Servers virtual disks.

- There is no equivalent or replacement for the support of PDS Attachment/370 or Attachment/370+ messaging. Users migrating from PDS Attachment/370 and Attachment/370+ will be able to use system messaging facilities such as PROFS, XMIT, DISOSS, or VM NOTE by exiting IBM Personal Computer Requesters and using terminal emulation.

- PDS Attachment/370 and Attachment/370+ users will have to re-enter file definitions when migrating to the IBM Requesters licensed program.

- The PDS Attachment screen interface is not provided in the IBM Personal Computers Requesters licensed program.

3.19.2.3. From IBM 3270-PC File Transfer Program on VM and TSO

- The IBM Requesters/Servers licensed programs file transfer functions provide a superset of the data conversion functions in the IBM 3270-PC File Transfer Program. The Personal Computer commands invoking the functions have different syntax.

● The IBM Requesters/Servers File Transfer Facility includes
   binary, character, and formatted file transfer; IBM 3270-PC
   File Transfer includes binary and character. In formatted
   file transfer, data is formatted according to prespecified
   file definitions for the host and Personal Computer files.
   A map is created when each host field is mapped to each
   Personal Computer field and data conversions are performed
   on each field.

Planned general availability is third quarter 1987.

3.19.3. Specified Operating Environment

3.19.3.1. Host Environments

MVS/XA with TSO/E

● IBM TSO/E Servers will run on any IBM processor capable of
   running TSO/E Release 3 with the MVS/XA Feature. The
   software prerequisite licensed programs are:

   - MVS/System Product Version 2 Release 1.2 (MVS/XA), JES2 or
   JES3 (5740-XYS or 5665-291), and either MVS/XA Data Facility
   Product Version 1 Release 1.2 (5665-284) or MVS/XA Data
   Facility Product Version 2 Release 1 (5665-XA2)

   - TSO Extensions (TSO/E) Release 3 with MVS/XA Feature
   (5665-285), and its prerequisite licensed programs

   - Interactive System Productivity Facility (ISPF) Version 2
   Release 2 (5665-319)

● For DXT and/or DATABASE 2, the co-requisite licensed
   programs are:

   - DATABASE 2 Release 2 (5740-XYR)

   - DXT Version 2 (5668-788)

VM/SP

● IBM CMS Servers will run on any IBM processor capable of
   running VM/SP Release 4. The software prerequisite licensed
   programs are:

   - VM/SP Release 4 (5664-167) with or without High Perfor-
   mance Option (HPO) (5664-173)

   - ACF/VTAM Version 3 (5664-280) for SNA/SDLC

   - ISPFh Version 2 Release 2 (5664-282)

● For DXT and/or SQL/DS, the co-requisite licensed programs are:

  - SQL/DS Release 3.5 (5748-XXJ)

  - DXT Version 2 (5668-788)

3.19.3.2. Hardware Requirements

IBM Personal Computer Requesters will operate on the following:

● IBM Personal Computer 5150 Models 166 and 176

● IBM Personal Computer XT 5160 Models 068, 078, 086, 076, 088, 089, 267, 268, 277, and 278.

● IBM Personal Computer AT 5170 Models 068, 099, 239, 319, and 339 computers. At least two diskettes or one diskette and a fixed-disk are required. A fixed-disk is required for using the IBM Personal Computer Requesters screen interface.

● IBM 3270 Personal Computer AT (all models)

● IBM 3270-PC (all models, except 24/26)

For the IBM Personal Computer, IBM Personal Computer/XT, and IBM Personal Computer/AT, one or more of the following adapter cards is required:

● SDLC Communications Adapter for host-connected standalone or gateway

● IBM Personal Computer 3278/79 Emulation Adapter for host-connected standalone or gateway

● IBM Token-Ring Adapter for network station and gateway

● IBM Personal Computer Network Adapter for network station and gateway

For the IBM 3270-PC and IBM 3270 Personal Computer AT, a 5151 Monochrome or 5272 Color Display, and a 5271 keyboard or the Enhanced IBM Personal Computer keyboard are required. At least two diskettes or one diskette and a fixed disk are required. A fixed disk is required for using the IBM Personal Computer Requesters screen interface.

3.19.3.3. Software Requirements

The software prerequisite licensed programs for the IBM Personal Computer are:

● PC DOS 3.1 or 3.2

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● IBM 3270-PC Emulation Program Version 3

The software prerequisite licensed programs for the IBM 3270 Personal Computer are:

● PC DOS 3.1 or 3.2

● IBM 3270-PC Control Program Version 3

For users making use of the IBM Personal Computer Requesters screen interface, the EZ-VU II Runtime Facility (6317025) is required.

3.19.3.4. Memory Requirements For IBM PC Requesters

The recommended configuration size is 640Kb. In the IBM 3270 Personal Computer environment, 640Kb or the 1Mb or 2Mb Expanded Memory Adapter (XMA) is recommended. More specific information about memory requirements will be included in the IBM TSO/E Servers, IBM CMS Servers, and IBM Personal Computer Requesters General Information publication available first quarter 1987.

The following memory may be assumed to be available for applications:

● 244Kb to 317Kb in the IBM Personal Computer

● 128Kb to 192Kb in the IBM 3270 Personal Computer without an XMA card

● Up to 436Kb in the IBM 3270 Personal Computer with an XMA card. The remainder of the 768Kb to 1856Kb is available for other applications in sizes of 384Kb or less per application.

This planning information is based on estimates of memory requirements of IBM Personal Computer DOS, the IBM 3270-PC Control Program Version 3 with Enhanced Connectivity Facilities, the IBM PC 3270 Emulation Program Version 3 with Enhanced Connectivity Facilities, and IBM Personal Computer Requesters.

Available memory is decreased if the application requires other services, such as the EZ-VU Run Time Facility.

Users writing their own requesters (and corresponding servers) should refer to the following IBM Programming Announcements to compute the specific memory requirements for their configurations:

● IBM 3270-PC Control Program Version 3 Support for Enhanced Connectivity Facilities 286-282, dated June 16, 1986.

●   IBM PC 3270 Emulation Program Version 3 Support for Enhanced Connectivity Facilities 286-283, dated June 16, 1986.

A sample list of Personal Computer programs and a description of the characteristics of programs that should run with and be able to utilize the IBM Personal Computer Requesters licensed program will be provided in the IBM TSO/E Servers, IBM CMS Servers, and IBM PC Requesters General Information publication available first quarter 1987.

MVS System Integrity applies. IBM Requesters/Servers licensed program users must first log on to TSO or CMS, and are consequently subject to the restrictions that apply to the use of those subsystems' security facilities.

3.19.4. Pricing

One-time charge:

    IBM PC Requesters -- $450.

Monthly Charge:

    IBM TSO/E Servers -- $1,350

    IBM CMS Servers -- $850

Upgrade Charge:

    Current licensed users of program number 6317047, Attachment/370+, may upgrade to program number 6316993 (IBM Personal Computer Requesters) for the following upgrade charges per license: $188 (one-time charge).

Appendices

Index by Product Name

Index by Product Number

Index by System Type

ATC Publications

MONTHLY NEWSLETTERS FROM ARCHITECTURE TECHNOLOGY CORPORATION	U.S. PRICE	OUTSIDE U.S. PRICE
DataCom Reader: A monthly abstracting service drawn from the previous month's new product announcements listed in several key trade publications, including Computerworld, Data Communications, and Telephony.	_____ $ 175	_____ $ 215
LOCALNetter: The definitive publication on local network news and product information. Also covers standards, financial news, and personnel developments and includes special reports providing in-depth coverage of products and other topics of interest.	_____ $ 300	_____ $ 350
MAPNetter: Focuses on new hardware and software offerings for factory automation, including networks, CAD/CAM and CIM systems, servers, adapter boards, controllers, and vision systems. Also covers company news and MAP and TOP standards developments. Includes in-depth special reports each month.	_____ $ 372	_____ $ 432
OSINetter: Covers product and company activity in the rapidly evolving area of Open Systems Interconnection. Includes U.S. and international news, product announcements, standards activities, finance, and personnel news, as well as in-depth special reports on key OSI-compatible products.	_____ $ 372	_____ $ 432
Token Perspectives: Scrutinizes IBM's token ring strategy and product direction and also reports on the products and activities of other token-passing LAN vendors. Additional emphasis is on technology and market trends.	_____ $ 312	_____ $ 372
PCNetter Newsletter: Monthly coverage of personal computer news and product information for business environments. Includes industry news, communications, micro-to-host, hardware, software, and workstation and servers product information, and financial information. Also includes special reports providing in-depth coverage of products and other topics of interest.	_____ $ 275	_____ $ 325

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OTHER PUBLICATIONS FROM ARCHITECTURE TECHNOLOGY CORPORATION	U.S. PRICE	FOREIGN PRICE
Data Communications Product Directory: Two comprehensive listings of over 2,500 data communications products as abstracted from leading trade publications. Categories include emulators; LANs; modems; multiplexers & switches; PBXs; software; terminals, workstations, & PCs; and test equipment.	_____ $ 124	_____ $ 154
Distributed Process Control & Factory Communications: A 282-page report covering computer-based, digital electronic, and batching and proportioning control types of distributed control systems as well as manufacturing cell control systems and supervisory control and data acquisition systems. Includes case histories.	_____ $ 375	_____ $ 435
Ethernet-Type Local Networks Report: A 330-page book that traces the evolution of Ethernet, discusses Ethernet characteristics and VLSI technology, and surveys key Ethernet LAN products.	_____ $ 186	_____ $ 236
How To Evaluate & Select LANs/Cabling Systems Report: Chronicles the procedure used by American Express to evaluate LANs and cabling systems for the new 50-story Amex Tower world headquarters in Manhattan. Contents cover determining needs and constraints, writing an RFP, assessing products, selecting a system, and managing the implementation.	_____ $ 355	_____ $ 415
IBM vs. AT&T: LAN Strategic Issues: Compares two industry giants on the basis of their wiring, LAN transport, and PBX transport schemes. Includes a set of strategic questions and answers.	_____ $ 395	_____ $ 455
Inside NETBIOS: Provides an in-depth look at the NETBIOS protocols developed for IBM's PC Network by Sytek. Covers programming procedures, commands, error codes, packet formats, the Server Message Block, and the implementation differences between NETBIOS in the PC Network, the Token-Ring, and third-	_____ $ 49.95	_____ $ 59.95
Inside The Token-Ring: Offers an in-depth look at the technology and features of the IBM Token-Ring. Covers hardware, protocols, handlers, commands, and the APPC interface, as well as network services, administration, and performance.	_____ $ 49.95	_____ $ 59.95

Integrated Voice/Data PBX Report: A 242-page report designed to explain and illustrate the basic operation of the integrated voice/data PBX. One whole section is devoted to an in-depth examination of the PBX systems available from 17 vendors.   _____ $ 167   _____ $ 217

LAN Software Directory: A 180-page directory containing descriptions of more than 250 products that operate on a wide variety of computers and networks, including PC LANs. Each entry contains product description, operating environment information, pricing, and vendor address.   _____ $ 137   _____ $ 187

Local Network Vendors' Strategies Report: A 320-page report that zeroes in on the strategies of 20 key LAN vendors in terms of product line, technology and topological structure employed, correspondence to the OSI Reference Model, and marketing emphasis.   _____ $ 219   _____ $ 269

LOCALNetter Designer's Handbook 5th Edition: Features detailed product information and articles on topics of practical importance to buyers, vendors, and designers of local networks and network products. Product coverage divided into baseband, broadband, PC LAN, and PBX systems.   _____ $ 102   _____ $ 132

LOCALNetter Update Service: Provides in-depth information on more than 100 local network offerings from 75+ vendors. Product reports range in size from 6 to 30 pages and are updated quarterly. At least five completely new reports are also added each quarter.   _____ $ 1500   _____ $ 2000

Micro-To-Mainframe Communications: A directory covering 475 micro-to-host communications products from 250 different vendors. Each entry contains a brief product description, any micro or operating system specifications, pricing, and the full vendor address.   _____ $ 107   _____ $ 127

Microcomputer Application Of Electronic File Transfers: A 185-page report covering microcomputer file transfer formats, structures, and methods. Includes information on text files, delimited files, DIF, DDF, X.409 Presentation Syntax, document files (Word-Star, Multimate, WordPerfect), and other application files (VisiCalc, SuperCalc, MultiPlan, Lotus 1-2-3, and dBASE II.   _____ $ 165   _____ $ 195

Network Database Systems Report: A 328-page report focusing on the evaluation of database systems in a network environment. Explains database features and functions, helps readers determine their requirements, and shows them how to use these requirements to select a commercially available system.

_____ $ 215   _____ $ 255

PC LAN Software Report: A 224-page report covering the technology, major trends, considerations, and trade-offs involved in choosing software for PC LANs. Offers a closer look at several key products currently available.

_____ $ 197   _____ $ 237

PC LANs vs. Multi-User Report: A 442-page report covering the benefits and drawbacks associated with the two major departmental computing approaches. Also covers the commercial offerings of 21 vendors.

_____ $ 246   _____ $ 296

Personal Computer Local Networks Report: Defines PC LANs and the PC LAN marketplace, including advanced hardware and software topics and in-depth information on products, configurations, features, pricing, and service. 271 pages with 80 figures and 4 tables.

_____ $ 192   _____ $ 232

Ring-Based Local Networks Report: A 298-page report examining the three types of ring-based networks: the slotted ring, the token-passing ring, and the register-insertion ring. Includes a survey of the key commercial ring-based LANs, with special emphasis on the IBM Token-Ring.

_____ $ 245   _____ $ 295

Programmable Controllers: A thorough investigation and evaluation of a powerful tool that is changing the face of industrial technology. Examines critical areas such as industrial communications, PLCs and PCs working together, and the future of programmable controllers.

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