Apple Computer
Apple Cluster Controller and Appleline

Sales Reference Guide

Acknowledgements:

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Selling and Reference Guide for:

Synchronous Communications Products

Introduction

Purpose of the Sales and Reference Guide on Synchronous Communications Products:

The purpose of this selling guide is to quickly familiarize an Apple Authorized Dealer or Salesperson with the Appleline and Apple Cluster Controller products. This guide will also explain the concepts of terminal emulation and protocol conversion. Furthermore it will serve as a useful reference source and provide background material for seminars and demonstrations.

A glossary of data communications terminology is provided at the back of this guide. If data communications terms are unfamiliar to you, you may want to look at the glossary before you read the rest of this guide.

The Organization of this Guide:

Chapter 1   covers synchronous and asynchronous communications worlds.

Chapter 2   is an introduction to data communications and an overview of customers needs.

Chapter 3   tells how Apple products meet customers needs.

Chapter 4   covers sales scenarios qualifying the prospect.

Chapter 5   covers the demonstration of Apple synchronous communications products.

Chapter 6   lists compatible and competitive software products.

Chapter 7   lists competitive hardware products.

Chapter 8   is a Glossary, a Guide to IBM Numbers, a Reading List and Figures 5-10.

Chapter 1

COMMUNICATIONS MARKET OVERVIEW

The 3 Worlds of Communications

One could say that there are three independent, yet interrelated worlds of data communications. The American Telephone and Telegraph world is by far the biggest with yearly revenues of over $165 billion dollars. This world comprises the highways and by-ways of voice and data communications. Wherever there is a communications wire between two points, chances are that AT&T owns it.

The next biggest world is IBM. With yearly revenues of over $40 billion dollars, and about a 65% share of the mainframe computer market, it is nearly as big as everyone else in the computer business put together.

IBM's communications are primarily EBCDIC character based and synchronously transmitted, with either a bisync or SDLC protocol.

When standards regarding communications are set, generally they are patterned after either AT&T or IBM.

The third communications world is everyone else in the business of moving information electronically. This world is primarily ASCII character based and asynchronously transmitted. This world has its origins in equipment that has evolved since the 1800's - well before the first electronic computer.

The Micro-to-Mainframe Marketplace

The exciting and demanding new micro-to-mainframe marketplace for communications products is just now starting to explode. In the early days of computers, the market was primarily technology driven. But the micro-to-mainframe market is primarily customer driven. Early users of personal computers in major corporations have helped generate a pent-up demand for methods to access existing data stored in their companies' mainframe computers. As the number of installed personal computers in large businesses doubles and quadruples, so too will the products that connect them to the corporate mainframe computers. International Resource Development has projected the size of this market and it is graphed in Figure 2.

The Objective of this Guide:

The objective of this selling guide is to explain the IBM communications world and to tell how Apples' synchronous communications products enable Apple personal computers to fit into that world. First we will give an introduction to the 3270 communications environment, then we will tell who the customers are that will be buying these products and for what reasons, and then we will explain how Apple products meet these needs.

The 3 Worlds of Communications

IBM

Everyone
Else

A T & T
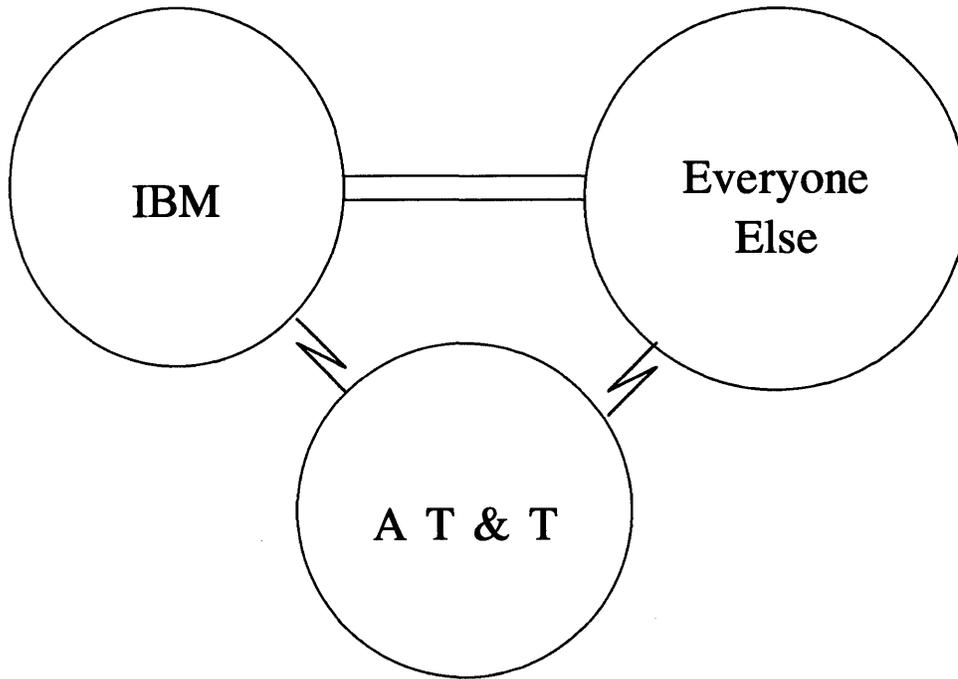
AT& T - Analog Voice Circuits/ Digital   / X.25

IBM - EBCDIC / Synchronous   / SNA / SDLC

Everyone Else - ASCII /Asynchronous

Figure 1

Growth of the Micro to Mainframe Marketplace

$Millions

```
3000 ┤                                                    ▓
     │                                                    ▓
     │                                                    ▓
     │                                                    ▓
     │                                            ▓       ▓
2000 ┤                                            ▓       ▓
     │                                    ▓       ▓       ▓
     │                            ▓       ▓       ▓       ▓
     │                            ▓       ▓       ▓       ▓
1000 ┤                    ▓       ▓       ▓       ▓       ▓
     │            ▓       ▓       ▓       ▓       ▓       ▓
     │    ▓       ▓       ▓       ▓       ▓       ▓       ▓
   0 ┤____▓_____▓_____▓_____▓_____▓_____▓_____
         1983    1984    1985    1986    1987    1988
```
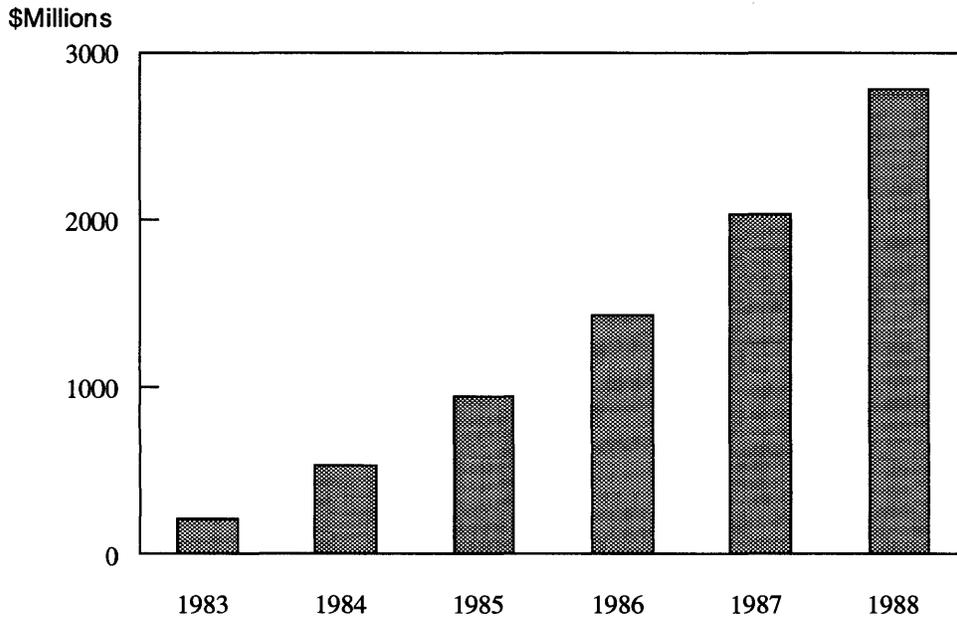
Total Installed Base: $7.97 billion
at a 43% average growth rate

Micro to Mainframe Communications Products

Hardware and Software sales for the next 5 years

Source: International Resource Development, Inc

Figure 2
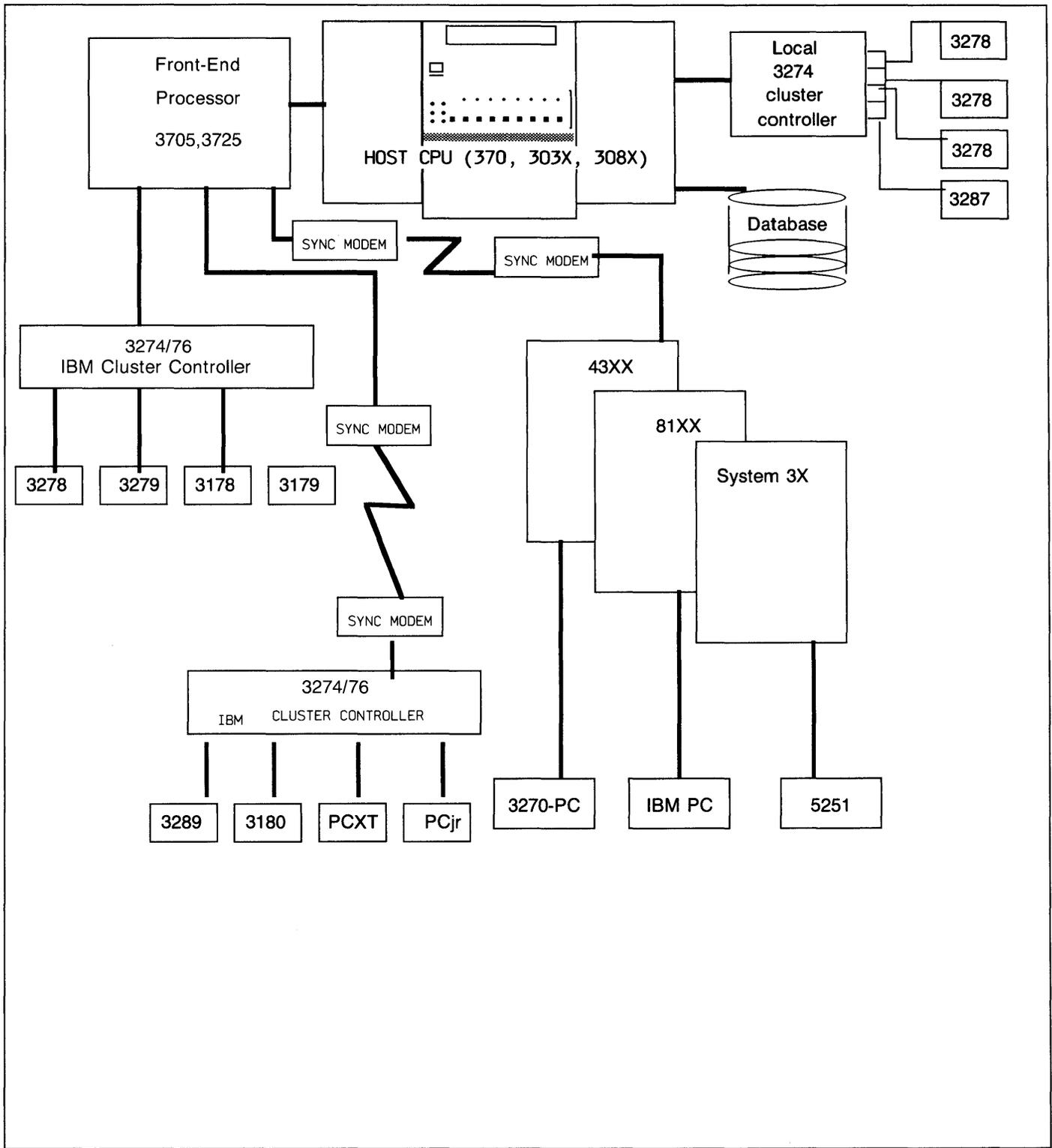
The IBM Big Picture

Figure 3

Chapter 2

INTRODUCTION TO DATA COMMUNICATIONS

A Brief Introduction To The IBM 3270 World

In order to express the significant benefits offered by Appleline and Apple Cluster Controller to the potential corporate customer, it is necessary to understand the nature of that customer's environment. This brief introduction to that environment is intended to provide that understanding. For those who desire additional depth, a glossary of IBM software and hardware terminology and a guide to IBM product numbering is provided in Chapter 8.

The great majority of large corporations today use large-scale IBM or IBM plug-compatible mainframes as the central computer in their data processing systems. Typically, hundreds or even thousands of CRT terminals and printers are in use on these systems. If all of these had to be handled directly by the mainframe little capacity would remain for actual computing. IBM had therefore chosen to distribute this terminal-handling burden to intelligent control devices (called, simply enough, controllers). Thus, a mainframe rarely communicates directly with a user's terminal or printers, but instead does so through a number of controllers arranged in some form of communications network.

The most widely used communications network type utilizes an interrelated group of controllers, terminals, printers, and miscellaneous devices called, collectively, the 3270 or 327X family. When an IBM mainframe system is installed or expanded, members of this family are arranged building-block style into a 3270 Communications Network. Many such configurations are possible, and a fairly representative one is diagrammed on Figure 3. You may wish to refer to this diagram as the individual components are briefly described below.

The heart of any computer system is, of course, the central or host computer. IBM has divided its various models of computers into families (also called series). The main memory size and processing power of different machines within a family may vary widely. Significantly, software written for one machine in a family can run with little or no modification on any other machine in the family. This feature makes upgrading of computer systems within a family much more simple and cost effective. It is this concept that catapulted IBM into its prominent market position in the mid-60's.

In an IBM 3270 Terminal Network, the host is a member of the IBM 370, 303X, 308X, or 43XX family. (Note that the X's represent actual digits in model numbers of family members. For instance, the 43XX family includes, among others, 4331 and 4341 models.)

As mentioned earlier, the host communicates with terminals and printers through a network of controllers. The type and arrangement of the controllers vary according to whether the controllers are handling local or remote terminals and printers. Thus, there exist two classes of terminal controllers - local and remote.

Local controllers attach directly to a mainframe channel (a channel is roughly analogous to a connector into the system bus on a microcomputer). They are, therefore, often referred to as channel attached controllers.

Remote controllers, as the name implies, are located anywhere from a few miles to several thousand miles away from the host computer site. Remote terminal controllers are not managed directly by the host, but are instead supported by an IBM Communications Controller (sometimes called a "front-end processor" or simply a "front-end"). It is typically a model 3705, though a newer version called the 3725 is starting to appear. Like a local terminal controller, a Communications Controller is channel-attached directly into the host. Remote terminal controllers communicate with the 3705 or 3725 via modems and communications lines (such as standard dial-up phone lines or dedicated transmission lines). A single 3705 or 3725 can be configured to support up to 32 remote terminal controllers in this way.

Local controllers in a 3270 network are typically model 3274's. Remote controllers are typically either 3274's or 3276's. You should note that a local 3274 and a remote 3274 are slightly different models and are not interchangeable. Either one, however, can be configured to support up to 32 peripheral devices (i.e., terminals and printers). On the other hand, a 3276 can only support up to eight peripheral devices. The Apple Cluster Controller emulates an IBM 3274/76 to the IBM host, but can have either 3 or 7 ports. A 3276 does have a CRT terminal built into it, while a 3274 does not.

Each terminal controller (also called a cluster controller) acts as a communications hub for the peripheral devices clustered in its vicinity. Each peripheral device is connected to the cluster controller with a coaxial cable (similar to that used in cable television connections, and often called just "coax") which may be up to 5,000 feet long. The attached peripheral devices are most often terminals or printers, but various other input/output devices such as card readers and bar code readers are also supported.

A number of different models of IBM printers are used with 3274 and 3276 cluster controllers. The 3287, 3288, and 3289 are fairly common models.

The 3270 series CRT terminals, called terminal workstations in the IBM world, are available in both monochrome (model 3278) and color (model 3279) versions. Screen size options are available for both models. These options are (columns x rows): mod 1 (80x12 or 40x24), mod 2 (80x24), mod 3 (80x32), mod 4 (80x43), and mod 5 (132x27). The mod 1, mod 4, and mod 5 options are only available for the 3278. The 3278 and 3279 are each also available in either full-graphics or character-only versions. This is indicated with a suffix as follows: B or G suffix = full graphics, A or no suffix = character only.

As an example, the most common terminal workstation, the 3278 mod 2 (or mod 2A), is a monochrome, 80x24, character-only terminal. This is often represented simply as a model 3278-2 or 3278-2A. The color equivalent of this, which is fairly common, is the 3279-2 (or 3279-2A). The less common 3279-2G (or 3279-2B) is a color, 80x24, full-graphics terminal.

The 3278 and 3279 terminal workstations are "dumb" terminals; that is, they have no stand-alone computing capabilities. Replacing them with an "intelligent" terminal which has full stand-alone computing capabilities is very attractive to IBM 3270 Network users.

You will sometimes encounter an older class of 3270 devices which are represented by the 3271 and 3272 cluster controllers and 3277 terminals. These are now not nearly as common as the newer 3274 and 3276 cluster controllers and 3278 and 3279 terminals.

You should note that a 3274 controller can support both newer 3278/3279 terminals and older 3277 terminals. (3276 controllers do not support 3277's) The 3274 accomplishes this through the use of terminal adapters; Type A adapters work with 3278's and 3279's and Type B adapters work with 3277's.

You will often hear the terms BSC and SNA/SDLC applied to a 3270 environment. These are software protocols, one or the other being used for the transmission of data through a given 3270 Network. BSC, which stands for Binary Synchronous Communications (often called bi-synch), is an older protocol, but remains popular. SNA/SDLC, which stands for System Network Architecture/Synchronous Data Link Control often called just SNA or SDLC), is more powerful, but also much more expensive. These protocols differ substantially at points in the network. However, the protocol used between a cluster controller and a 3278 or 3279 terminal is essentially the same in the BSC and SNA/SDLC environments.

Protocols and Protocol Converters

Protocols are established rules governing communications. Whenever two pieces of equipment are connected together, certain rules must be preset in order for communications to take place. Transmission speed, how to verify connection, the organization of one's and zero's to identify characters, which characters are control characters, and which are data, and so forth, are just a few of these rules.

Therefore, a protocol provides a method for the orderly and efficient exchange of data by establishing rules for the proper interpretation of controls.

ASCII asynchronous communications are one type of protocol and EBCDIC synchronous BSC and SNA/SDLC are other types of protocols.

Some of the key tasks of a communications protocol are:

- Specify the Code Set - i.e. ASCII or EBCDIC

- Specify Data Format - Asynchronous or Synchronous - Full or Half Duplex

- Initiate and Verify a Communications Connection

- Identify Persons or Equipment on Each End

- Establish Order of Transmission and Precedence

- Handle Error Situations and Re-transmissions

The purpose of a protocol converter is to change from one protocol to another. From ASCII to EBCDIC, from Asynchronous to Synchronous, and from the control functions of environment to that of another.

It is hoped that this discussion has provided you with sufficient background to enhance your Appleline and Apple Cluster Controller sales efforts with the IBM 3270 user. For more detailed information you can refer to the information given in Chapter 8.

ASCII - Character Code for "A"

| 1 Mark | Start | 1 | 2 | 3 | 4 | 5 | 6 | 7 | No Parity 8 | Stop |
| 0 Space | | | | | | | | | | |

← ASCII - Character Code for "A"

EBCDIC - Character Code for "A"

| 1 Mark | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 0 Space | | | | | | | | |

← EBCDIC - Character Code for "A"

| Start Character Stop | Start Character Stop | Start Character Stop |

Asynchronous Transmission

←

| Sync | Sync | SOH | Header | STX | Data | ETB | BCC | BCC | Sync | Sync | SOH | Header |

Bisynchronous Transmission

←

| Begin Flag | Address | Control | Information | Frame Check | End Flag | Begin Flag | Address | Control | Information | Frame Check |
| 8 Bits | 8 Bits | 8 Bits | Multiple of | 8 Bits | 16 Bits | 8 Bits | | | | |

Synchronous Data Link Control (SDLC) Transmission

Customers' Requirements:

The integration of microcomputers, either as personal computers or as intelligent workstations, into the data processing environment of major organizations--corporate, governmental, and institutional--became a key issue of the data processing industry during 1983. The question is not whether microcomputers should be integrated into mainframe environments, but rather how this integration can best be accomplished for the most efficient utilization of an organization's computing resources.

The first generation of personal computers communicated through very slow 300 bit-per-second modems and were used primarily to link to the new information utilities. After 1980, however, as VisiCalc revolutionized the corporate professional's working methods, a major change began to occur. A demand for access to corporate information stored in mainframe data bases began to grow. It was led by managers and professionals who found that re-entering data from printed spreadsheets wasted time and effort when the same data was already stored in digital form on the corporate mainframe. During the past two years, the demand for access to mainframes through micros has reached a crescendo.

In making an attempt to replace DEC and IBM terminals with microcomputers, it is important to understand the different types of users and what their needs are. Following is a brief profile of the various terminal users and how we best answer their needs.

The 4 Types of Users:

1.   Casual - The casual user is usually a professional, who has minimal requirements for accessing the mainframe. He/She may query a database once or twice a day, he/she may use an electronic mail system, and check the prices of securities. Even though the requirements are small it is important to have this capability at his/her fingertips. These users are perfect candidates for the kind of capabilities Apple offers in the area of data communications. They usually do not want a lot of equipment on their desk; therefore, the concept of the integrated workstation is very attractive.

2.   Clerical - POWER ENTRY! This user probably spends about 7 1/2 out of 8 hours in a day at his/her terminal inputting data. Therefore the user is always in terminal mode. He/she may input inventory information, purchase order information, or some other type of major database information. More often than not this user is trained on a particular terminal type. It is possible to go after this type of terminal replacement. However, considering the differences between the Apple computer in terminal mode and the 3278, you may find resistance to change. Keep posted on future characteristics added to the software and hardware that give us the characteristics we emulate. Also, if this user is always in terminal mode and has no use for the rest of the functionality of the personal computer it makes it a tougher sell. Not impossible but not our perfect target.

3.   Professional - Not dissimilar to the casual user above, the professional has some requirements for terminal mode. He/she may access a corporate database a few times a day, may have access to a securities database, and perhaps use electronic mail. The professional probably has a greater requirement for things like spreadsheets, personal databases, minimal wordprocessing, and Mac or Lisa drawing packages. As with the casual user, the professional often wants the ability to tie into a mainframe but wants one integrated workstation that is easy to use instead of a cumbersome, complicated terminal in addition to his/her personal computer. Often, the professional requests the ability to leverage off of the information contained in the database by copying it and pasting it into a spreadsheet. This ability saves the user from having to copy the data on paper

when he/she is terminal mode and then re-keying the data into the spreadsheet. This powerful integration provides all the processing power right on the desktop. The professional is an ideal candidate for the sale of Mac's and Lisa's, which integrate the personal computing functions required by the individual and the terminal software with Appleline or Apple Cluster Controller to give him/her access to the mainframe.

4.   **Programmers** - IBM environment programmers are usually used to the functionality of the 3278 with all of its special keys and attributes. If they have spent a long time on this kind of terminal, they may be quite resistant to the changes when using a personal computer for this function. There are a few considerations here. First, are they used to a true terminal and are they resistant to learning variations? Second, do they have a need for the other applications on a personal computer? There are various levels of programmers. Some have the need to design projects, in which case they may use one of the project programs, they also may have the need to use word processing. Selling Apples as terminals is much easier when the user has other personal computer needs besides mainframe access.

Apple Personal Computers as Intelligent Terminals

Since Apple computers are programmable, they can emulate many different types of terminals, the most common being the DEC VT-100.

The IBM 3278 and 3279 display stations are dumb terminals. Replacing them with an intelligent terminal which has full stand-alone computing capabilities is a very attractive solution to IBM 3270 Network users. The most common of the IBM 3278's and 3279's can be replaced by an Apple Computer and a terminal emulation device. In particular, the IBM 3278 model 2, monochrome, character-only terminal, with a typewriter-style keyboard, is easily replaced by an Apple personal computer.

The biggest advantages and benefits for using personal computers as intelligent terminals instead of using dumb terminals are:

- Cost Advantages

- Ease of use with Lisa Technology, Mice and Pull-Down Menus

- Downloading and Remote Storage of Information

- Remote Processing

- Creating, Editing and Uploading of Information

- Elimination of Duplicate Equipment

- Eliminate Re-keying of Information

- The Capability of End-Users Writing Their Own Programs

- Remote Mainframe Program Creation, Testing, Updating.

- Running Applications Not Available on Mainframe Computers

  Such As:

  Spreadsheets

  Integrated Software Products

  Graphics Programs with Output to Plotters

  Project Management Software

Some of the other major terminals in the market are listed on the next page:

Terminal Types:

The following is a list of the most popular terminal types, beginning with IBM models and followed by mode.

3178   Models C1 and C2. Replacements for the 3278
3179   Color replacement for the 3279
3180   Monochrome replacement for 3278
3275   Discontinued Models 1,2,11,12,
3276   Control Unit Display Station. Models 1,2,3,4 11,12,13,14.
3277   Model 2 Display Station
3278   Models 2 3 4 5 Display Station
3278   Personal Computer Adapter
3278   Attachment Option. An adapter in the IBM PC to interface w/ 3278 keyboard
3279   Color terminal Models S2A, S2B, S3G, 2X, 3X
3280   Display Station replacement for 3278
3290   Plasma Information Panel Display
5150   Personal Computer. 3770, 3101 3278 emulation
5160   Personal Computer XT/370. Models 568 and 588. 3277 and 3101 emulation.
5251   Model 11/12 Terminal for the System 34, 36 and 38
5271   3270 Personal Computer

Terminals from other manufacturers:

ADDS Regent 25,60, Viewpoint 60, 78, 90, Executive 80, V210
Ampex 80,81
Anderson Jacobson 510,520, APL
Beehive DM5, DM78, Topper
Burroughs SR 110, TD830, MT983, ET 1100, ET 2130/2230
Data General Dasher D-100, D-200, D-400, 6052, 6053
DEC VT52, VT-61,VT100,101,102,125,131,132, VT200
Esprit 78,51
Hazeltine 1400's and 1500's, Esprit
Hewlett-Packard 86, 125, 2621, 2622A, 2624, 2626, 2641, 2645A
Honeywell VIP 7700, 7800
Lear Siegler ADM-3A, ADM-5, ADM 11, ADM 12, ADM 24E, 31
NCR 501, 796, 7900, Model 3, NCR-1, NCR-4
Microdata Sequoia and Reality
Perkin Elmer 1251
Prime PT45, PST100
Renex 278, 378,379
Soroc IQ-120
Sperry Uniscope 100, U200, UTS 20
Tektronix 4010 Series 4010,4012,4014,4016 and 4662 Option 31
Televideo 900 Series
Teletype Corp TTY KSR 33, 43, 5420
Texas Instruments 911
Visual 50,100,200,400,450,550
Zenith/Heath Z-19/H-19

THE BIG PICTURE USING APPLES AS TERMINALS
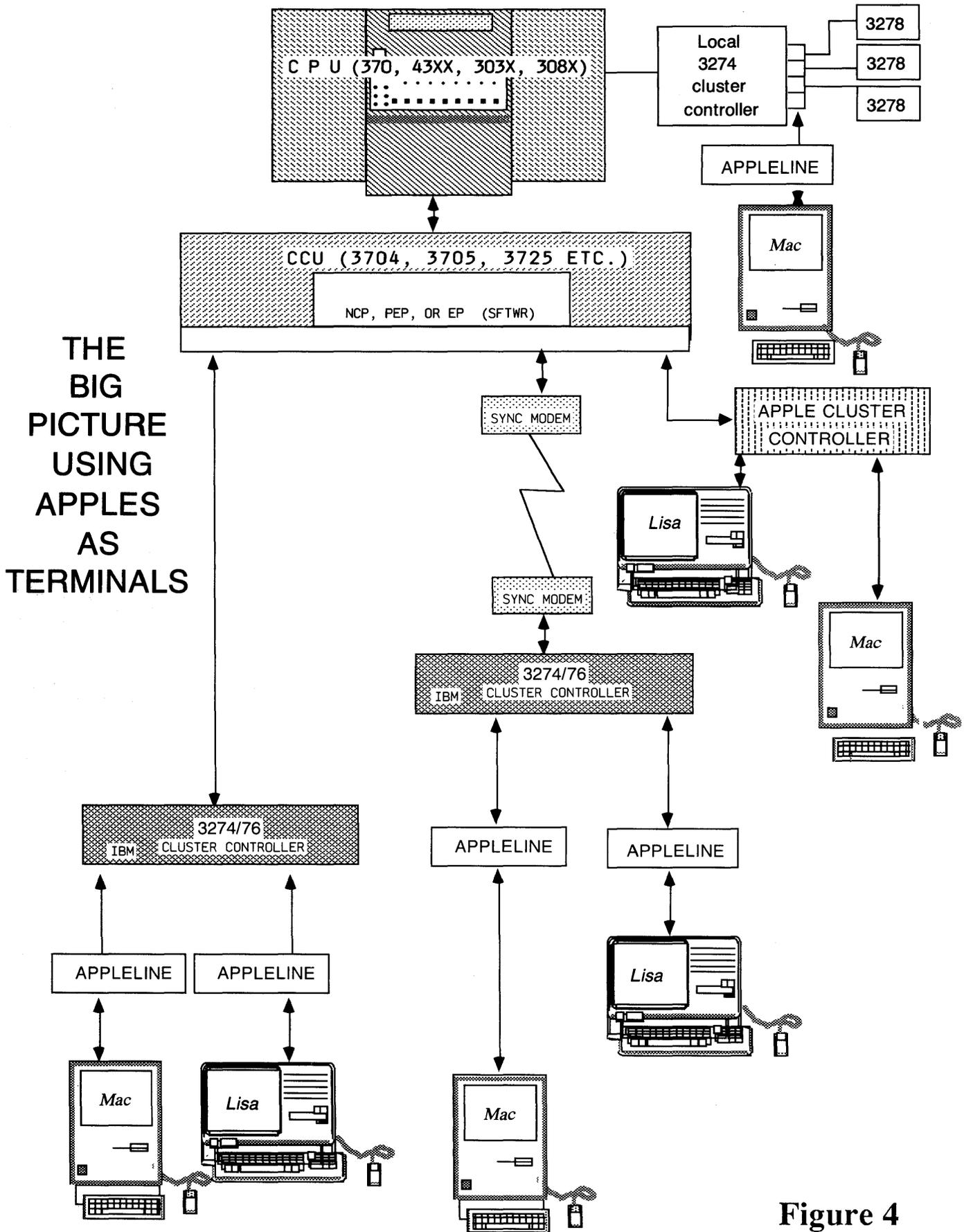
Figure 4

Chapter 3

APPLE SYNCHRONOUS PRODUCTS OVERVIEW

Following is a description of two solutions, Appleline and Apple Cluster Controller (ACC), for using your Apple computer as an IBM 3278-2 terminal. Refer to Figure 4 for a visual representation of where they fit in the IBM environment.

What is Appleline?

Appleline is a powerful, cost effective solution to terminal emulation and protocol conversion device that allows Apple computers to communicate in an IBM mainframe environment. Appleline allows Apple computers to emulate the functions of the 3278-Model 2 (3278-2) terminal (with typewriter-style keyboard).

Where does Appleline Fit?

Appleline is installed at a controller site via a direct coaxial cable connection to an IBM 3274, 3276, or integral terminal controller with Type "A" adapters. 3274 controllers can have either Type "A" or Type "B" adapters but 3276 controllers will have only Type "A". The protocol used between the IBM 3274/76 and the 3278-2 terminal is essentially the same in BSC and SNA/SDLC environments. Appleline operates with BSC or SNA/SDLC linked 3274 controllers that are either channel-attached or remote. The Apple computer communicating with the 3274 controller via the Appleline can be either remotely attached to the Appleline using a full-duplex modem or directly attached to Appleline by an RS-232 cable.

The two configurations described above for Appleline are described in Figure 4.

Corporations with large 3270 installations will find this solution attractive because it allows them to preserve their investment in coaxial cable. Customers who already have existing 3270 controllers can simply replace a 3278 display with an Apple and Appleline without changing host software or network configuration.

The Appleline solution expands the potential market for Lisa's and Macintosh's because it allows access to channel-attached 3270 controllers. It is estimated that 50% of the installed 3270 controllers are connected to the IBM mainframe via its channel (direct to host).

How does Appleline Work?

Appleline's on-board, high-speed microprocessor (8x305) handles the 3270 coaxial protocol. A second microprocessor handles the RS-232 protocol independently.

When the terminal emulator (VT-100 emulator i.e. LisaTerm or MacTerm) has been activated and the user has successfully logged-on to Appleline, the 3270 system protocol will be accepted and acknowledged.

Appleline's 3278-2 emulator package includes a menu-driven configuration routine. This routine is used to establish the communications requirements for the attached device and to select the passwords for Appleline. There is no additional software or special network configuration needed to accomodate Appleline.

To aid in the security of the network, multi-level password selection is provided in the configuration process.

Appleline Feature/Benefit Summary:

Feature: Coaxial cable protocol connector which works with IBM 3270 controllers (3274/6).

Benefit: Allows Apple Computers to attach to BSC to SNA/SDLC networks.
Preserves coaxial investment.

Feature :   Allows Apple Computers to emulate IBM 3278-2 terminals.

Benefit: Transforms a Macintosh, Lisa, Apple II, or Apple /// into a multi-functional workstation. Network flexibility.

Feature: Muti-level password scheme: one supervisor and 4 users.

Benefit :   Built-in security.

What is an Apple Cluster Controller?

The Apple Cluster Controller (ACC) is a stand-alone device manufactured by Protocol Computers, Inc. (PCI). This unit allows up to 7 serial devices--Apple Personal Computers, Imagewriters, Daisy Wheel Printer, or Scribe Printer to be attached to an IBM 3270 network. These devices are connected to the ACC via serial (RS-232C) ports. The ACC "looks like" an IBM 3274 or 3276 cluster controller to the IBM network.

How does the Apple Cluster Controller work?

The ACC communicates to the IBM mainframe with either IBM Binary Synchronous Communication (BSC) protocol, or IBM System Network Architecture/Synchronous Data Link Control (SNA/SDLC) protocol. (different ACC versions are required) It, in turn, communicates to Apple systems using a DEC VT-100 asynchronous ASCII protocol, instead of the 3278 high-speed coaxial protocol. In simple terms, the ACC acts like an IBM 3271/ 3274/ 3276 cluster controller to the IBM mainframe. On the terminal side, the ACC connects to almost any asynchronous serial terminal device. The Apple personal computers communicate to the ACC with VT-100 type protocol.

The ACC is an 8 bit Z-80A-based microcomputer configured with 16KB of ROM and 32KB of RAM. Each unit is equipped with its own internal power supply.

Apple Cluster Controller
Feature/Benefit Summary:

Feature: Enables Apple Computers to emulate an IBM 3278-2 terminal and 3287-1 printer attached to a 3271,3274, or 3276 cluster controller, either locally or remotely attached with either BSC or SDLC protocols.

Benefit :   Allows users access to mainframe database information.

Feature: Has diagnostic testing built-in for power-up and line monitoring.

Benefit: User is assured equipment is functioning properly when it is turned on and while it is operating.

Feature: Xon/Xoff flow control for printer operation.

Benefit: Printer functions at maximum speed without loosing characters.

Feature: Communication speed up to 9600 bps.

Benefit: Fast communication between mainframe computers and Apple personal computers.

Chapter 4

QUALIFYING THE PROSPECT

Selling Appleline and the Apple Cluster Controllers

Wherever IBM mainframes, Apple personal computers, and 3270 peripherals are found, Appleline and Apple Cluster Controllers are a great potential sale. Because of IBM's considerable marketing power, the list of qualified organizations includes the vast majority of governments, universities, financial institutions, utilities, and the coveted Fortune 1000 companies. The list doesn't stop there, however. The recent popularity of IBM's low-cost 4300 series mainframes has delivered 3270 Networks into the hands of tens of thousands of smaller concerns as well. In short, 80% of all medium to large corporations are probably prospects for Appleline, Apple Cluster Controller and the Apple personal computers it allows to attach.

Further qualifying should guide you towards the people in these organizations who can benefit most directly from Apple personal computers. Current Apple application programs support two major groups of users: executives and data processing professionals.

The executives are decision-makers whose jobs depend upon information. Often the information can be found on the organization's mainframe. The ability to access and process that information on their own Apple personal computer is extremely attractive to these people. They are prime candidates for Appleline sales.

The DP people create and use tools to access mainframe information. Though their own needs may not be great, they are still tremendously valuable to your sales campaign since they are developing tomorrow's tools for the executive. Their support is invaluable, and your greatest successes will come from customers whose DP shops are sold on Apples as terminals.

Once you have qualified the prospects in your area, visit them. If you believe corporate customers will walk into your place of business and ask to buy, you will lose out on the majority of corporate customers. These people expect to be courted. Despite what some trade publications claim, most corporate purchasing agents are not walking into stores to buy their personal computers.

The most important selling points of Apple computers connected to Applelines or Apple Cluster Controllers are:

Appleline:

1.   Combines easy-to-use Apple personal computers with the IBM mainframe environment. (BSC or SNA/SDLC)

2.   Transforms your Macintosh, Lisa, Apple ///, or Apple II into a multi-functional workstation.

3.   Network flexibility through dial-up capability (which cannot be done with an IBM 3278-2).

4.   Preserves investment in coaxial cable.

5.   If customer is currently tying ASCII terminals to IBM mainframes through the use of NTO software on the front-end controller. (NTO is very expensive and usually leased by customer--refer to discussion on NTO in the following section on WHEN TO SELL APPLE CLUSTER CONTROLLER OR WHEN TO SELL APPLELINE).

Apple Cluster Controller:

1.   Combines easy to use Apple personal computers with the IBM mainframe environment (BSC or SNA/SDLC).

2.   Provides less expensive solutions to users of IBM mainframe computers.

3.   Provides IBM mainframe users with more flexible network hardware solutions.

4.   Dial-up capability allows users access to the IBM network from remote locations.

5.   If customer is currently tying ASCII terminals to IBM mainframes through the use of Network Terminal Option (NTO) software on the front end controller. (NTO is very expensive and usually leased by customer--refer to discussion on NTO in the following section on WHEN TO SELL APPLE CLUSTER CONTROLLER OR WHEN TO SELL APPLELINE).

When To Sell Appleline:

Customer has an existing (or is about to purchase) a 3274 or 3276 cluster controller with type A adapters.

Customer has a channel-attached controller (approximately 50% of IBM mainframe world is channel-attached--Refer to Figure 2). ACC's do not connect to 3274's.

Customer wants a coaxial connection.

Customer has a fully loaded 3705 or 3725 and wants to connect a personal computer to the IBM network.

Customer has NTO (defined in glossary) on front-end to handle protocol conversion of ASCII terminals. NTO is a very expensive software extension to NCP, which customers lease and Appleline eliminates the need for NTO. If an organization has NTO on their front end, they are an excellant prospect for the sale of Apple systems.

When To Sell Apple Cluster Controller:

Customer is cost-conscious and wants cheapest connect cost per attachment. A 3 port ACC cost's $2,900, compared to 3 Appleline's, which would cost $3,885.

Customer has 3 or more personal computers in a remote location (not near an IBM 3274/76) and needs to dial into an IBM network asychronously.

Customer wants to replace IBM 3274/76 to have personal computers as terminals on the network.

Customer has various types of personal computers and wants to hook them all up to the same protocol converter.

Customer has NTO (defined in glossary) on front-end to handle protocol conversion of ASCII terminals. NTO is a very expensive software extension to NCP, which customers lease and Appleline eliminates the need for NTO. If an organization has NTO on their front end, they are an excellant prospect for the sale of Apple systems.

Customer needs to hook up printers directly to the converter or Apple computer.

The following is an APPLE/IBM pricing comparison:

APPLE SYSTEMS VS. IBM PC FAMILY

Appleline

IBM PC

Hardware (256K)	$2420
IrmaCard	$1195
	———
Total	$3420

IBM PC/XT

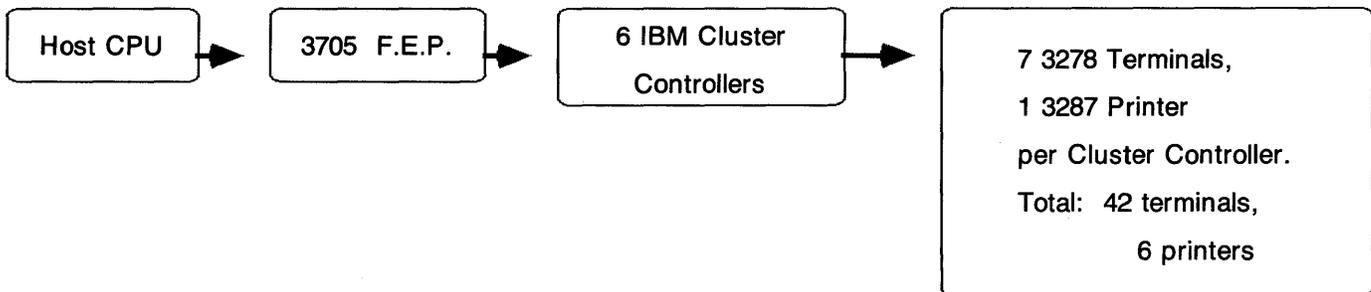|	
Hardware (256K)	$4395
IrmaCard	$1195
	———
Total	$5395

IBM 3270 PC

Hardware (256K)	$3785
Hardware (512K)	$4650
Hardware (512K/10MB)	$6210

SCENARIO I

Replacing IBM
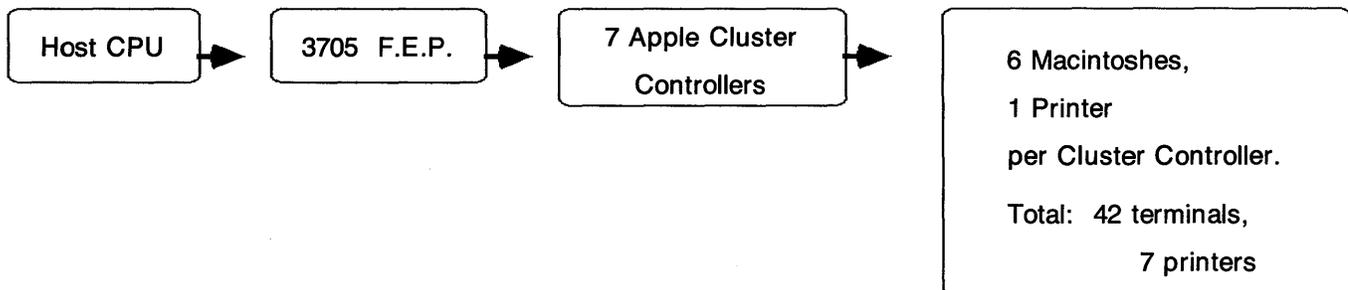# Communications Equipment

Assumed System Configuration with IBM Equipment:

| Host CPU | → | 3705 F.E.P. | → | 6 IBM Cluster Controllers | → | 7 3278 Terminals,
1 3287 Printer
per Cluster Controller.
Total: 42 terminals,
          6 printers |

Same Configuration with Apple Equipment:

| Host CPU | → | 3705 F.E.P. | → | 7 Apple Cluster Controllers | → | 6 Macintoshes,
1 Printer
per Cluster Controller.
Total: 42 terminals,
          7 printers |

SCENARIO I

Incremental Cost Comparison *

(Software not Included)

	IBM Solution	Apple Solution	Savings with Apple
IBM CPU	N/A	N/A	N/A
Fr. End Processor (3705)	N/A	N/A	N/A
6 Cluster Controllers	$ 36,000 ($6000 x 6)	$ 34,300 ($4900 x 7)	$ 1,700
Terminals (3278's, Mac's)	$ 96,600 ($2300 x 42)	$105,000 ($2500 x 42)	$<8,400>
Printers (IBM's, ASCII)	$ 36,000 ($6000 x 6)	$ 4,900 ($700 x 7)	$31,100
Total Incremental Cost	$168,000	$144,200	$24,400
Added Convenience of Having a P.C.	No	Yes	

NOTE: Average savings per Apple Cluster Controller:
$24,400 - 7 = $3,485. (Worth 1 additional PC
plus software and printer.)

* Items used in both solutions not included (e.g., 4800 baud modem included in both
solutions; therefore, no incremental charge for Apple).

SCENARIO II

Using AppleLine & Macintosh
vs.
IBM PC & Irmacard

	IBM 3278	IBM PC (256K)	Apple Macintosh
CPU	N/A	N/A	N/A
F.E.P.	N/A	N/A	N/A
IBM 3274	N/A	N/A	N/A
Terminal	$2,300	$2,420	$2,500
3278 Emulator (Irma, AppleLine)	N/A	$1,000	$1,295
Total Incremental Cost	$2,300	$3,420	$3,795

NOTE: PC solution is more expensive in comparison to terminal solution.
But added flexibility of owning a PC will make up for the difference.

IBM SYSTEM EQUIPMENT PRICES*

IBM Front - End Processor $46,600/10 lines

. Comes with 10 to 312 lines.

IBM 3274 Cluster Controller $ 6,000

. Can accomodate up to 32 terminals.

. Typically contains 7 terminals, 1 printer.

. Cost per port: $750

IBM 3278-2 Terminal $ 2,300

IBM 3287 Printer
        Model 1 (80 cps) $ 4,830
        Model 2 (120 cps) $ 5,150

   * Obtained from IBM product center. Prices do not include
service or maintenance charges. Lease charges vary by specific
contracts.

Comparative Pricing of Personal Computer Systems

with 3278 Terminal Emulation Capability

Remote Configuration

	IBM 3178	IBM PC	3270 PC	Macintosh
Terminal	$1650	$2505	$5285	$2495
3278 Emulator		$240		$1295
PC Attachment	$2400			
Comm Software	$700	$700		$99
Modems & Cables				
Total	$4750	$3950	$5285	$4384

The Following are the current prices for Appleline and Apple Cluster Controller:

Appleline: $1,295

Apple Cluster Controller:

3 port	$2,900	= $966/port
7 port	$4,900	= $700/port

Total System Prices - Appleline

MAC		APPLE //e		LISA	
Mac	$2,495	Apple //e	$1,295	Lisa 2/10	$5,495
Macterminal	$ 100	Super Serial Card	$ 140	Lisaterminal	$ 295
		Access //	$ 75	Office System	$ 295
Appleline	$1,295	Appleline	$1,295		Appleline
$1,295					
TOTAL	$3,890	TOTAL	$2,795	TOTAL	$7,380

Total System Prices for Apple Cluster Controller
- Per port price using price of 7 port ACC

MAC		APPLE //e		LISA	
Mac	$2,495	Apple //e	$1,395	Lisa 2/10	$5,495
Macterminal	$ 100	Super Serial Card	$ 140	Lisaterminal	$ 295
				Office System	$ 295
ACC	$ 700	ACC	$ 700	ACC	$ 700
TOTAL	$3,295	TOTAL	$2,235	TOTAL	$6,785

IBM 3278-2 terminal is currently priced at: $2,382
IBM 3274 controller is currently priced at: $5,587
            price per port: $ 699

Chapter 5

HOW TO DEMONSTRATE THE PRODUCTS

The following is a guide to assist you in demonstrating the Appleline and Apple Cluster Controller. Preparation and set up procedures are covered to assure your success. Appleline will be covered first followed by the Apple Cluster Controller.

Appleline:

Pre-demo preparation at customer site

There are various ways to demo Applelines to your customer. The most effective way is to tie the Appleline into the customers existing mainframe environment so that he/she can be assured that the two work together. It has a great effect on the customer see his IBM mainframe screens appear on the Apple computer. The other way is to subscribe to a timeshare service and tie into it. There is a section to follow on tieing into a timeshare service.

At this point, we will assume you are hooking up to the customers mainframe. There are two things you must ensure before you decide on an Appleline demo, they are:

1.There is a 3274/76 IBM cluster controller with type "A" adapters.

2.The IBM controller has a port generated for a 3278 model 2 terminal with typewriter keyboard.

If the answer is no to this question then you must work with the systems programer in charge of communications to gen a line for a 3278 model 2 in order to assure proper functioning of the Appleline.

When both of the above are ensured you may go on to the actual preparation of the equiment at the customer site.

Setting up the equipment for demo at customer site

If you will be replacing an existing 3278-2 on the customers system and if the 3278-2 is in operation at the time of your set up, ask the customer to properly log-off and power off his/her own system to assure that his/her system is not disturbed by you. If the customer has a port properly configured but does not have a true 3278-2 plugged in, all the better, you can just plug directly in without having to disconnect his/her terminal.

There are two possible set ups for the Appleline:

1). With the Appleline near an Apple computer (Refer to Figure 4) and;

2). With the Appleline away from an Apple computer (Refer to Figure 5).
The configuration with the Appleline near your Apple is covered first and the latter covered second.

Equipment needed:

1. Appleline
2. Apple serial cable
3. Gender changer provided with the Appleline
4. Coaxial cable up to 5000 ft. (customer usually provides this)
5. Wall mounting transformer, provided with Appleline
6. Self-test plug (loop back plug), provided with Appleline
7. Communications software; the following is a recommended software list to be used with the various Apples:

> LISA - Lisaterminal
> Macintosh - Macterminal
> Apple // - Access //
> Apple /// - Access 3270 or Access ///

In addition to the above items, the following equipment is needed when hooking up Appleline away from your Apple:

1. Set of full duplex, asynchronous modems (Apples modems work perfectly).

Installation steps for an
Appleline near an Apple computer

1. Connect coaxial cable to Appleline connector labeled controller.
2. Connect the other end of the coaxial cable to the 3274/76 configured for a 3278-2 terminal with a typewriter keyboard.
3. Connect wall mounting transformer to port labeled 24V AC and to power source in wall. (when Appleline is on it consumes 50 watts of power, as much as an electric clock)
4. Turn on Apple computer and create a document from the appropriate terminal software.
5. Configure terminal software. The following figures demonstrate the way set up must look using Lisaterminal and Macterminal.
Figure 6 is Lisaterminal and Figure 7 and 8 are Macterminal.
Reference the appropriate terminal manuals if necessary.

Appleline away from an Apple computer:

If an Appleline and an Apple computer must be more than 5 meters away from each other (in order for the Appleline to reach the IBM Control Unit), they can not be connected with ordinary cable. They must communicate by means of telephone lines and a pair of asynchronous modems, like the Apple Modems. In this case, attach one Apple Modem to the serial connector on the back of Appleline and a second Apple Modem to the serial connector on the back of your Apple computer.

The Appleline is still connected to the IBM 3274/76 controller via coax cable the same way it was described above. For instructions on operating the Apple Modem 300/1200, consult the appropriate manual. Once the installation of the modems is complete, the rest of the set up is the same as in local connect, eliminating step 3 of installation procedures.

7.   At this point there are a few avenues to take; we will make the assumption the Appleline has never been used and therefore there are two procedures which must be performed These are:

      a.   Sending the autobaud message
      b.   Using the supervisor program

Once this has been done it is not necessary to do it again.

Power on the Appleline (switch is located on right side, switch to 1)
Initially the red, green, and yellow LED's (on front) all blink.
The red LED then goes out.
Finally, the yellow and green blink alternately;
Appleline has gone through its self test sucessfully.

8.   a.   Press the BREAK key (labeled ENTER to the right of the space bar)
         then press the RETURN key. This is the autobaud message.

      b.   Your Appleline will respond by displaying an identification line across the top of your screen, followed by this message:

Press RETURN to begin log-on sequence.

9.   a.   Press RETURN. Your Appleline will reply with this prompting:

         Enter Password:

      b.   Type APPLES and press RETURN.

This is the default password to the Appleline's supervisor program. Your Appleline will reply with the prompting message:

         AppleLine has been reset to "factory" settings.
         Please log-on as Appleline SUPERVISOR using the
         supervisor password "APPLES" to get Appleline to your
         particular configuration.

A terminal type must be selected before you continue.

Possible selections:

> **A - Lisaterminal**
> **B - Macterminal**
> **C - Access 3270**
> **D - VT100**

Your selection [Lisaterminal]:

The Lisaterminal in brackets means that it is the default setting. For practice we'll change the terminal to Macterminal, assuming we are using a Macintosh to communicate and not a Lisa.

> c. Press B and RETURN.

This tells the Appleline that you are using Macterminal to communicate with it. Your Appleline will reply with this prompting message:

Current terminal type is "Macterminal". Is this correct [Y]?

> d. Press RETURN.

Pressing RETURN accepts the default response shown inside the brackets (in this case the default is Y, which stands for yes). Your Appleline will reply with this prompting message:

Appleline Supervisor Logged-ON

Possible selections:

> **A - Display terminal type and modem settings**
> **B - Modify terminal type and modem settings**
> **C - Change USER or SUPERVISOR passwords**
> **D - Log-off and hang up modem**
> **E - Log-off and return to logon screen**

Your selection [Log-off and return to log-on screen]:

At this point you can make any of the above 5 selections to:

    A - Display the communications parameters stored in Appleline
       for the communication between the Apple and Appleline.
    B - Modify the communications parameters stored in Appleline
       for the communication between the Apple and Appleline.
    C - Change the default passwords (supervisor or any of 4 user).
    D - Log-off the supervisor program.
    E - Log-off the supervisor and return to Appleline screen.

Select option "A" to make sure the default settings meet with your requirements. If the default settings do not match your needs, select option "B" and run through all of the currently stored options by pressing return to accept or by selecting the proper option and then pressing return to accept.

Refer to the Appleline User's Manual (Chapter 3 part 1) for specific information about Appleline parameter definitions.

9.   At this point you can make selection "E" and log-on to Appleline and
      begin demonstration.

Demonstrating Appleline:

1.   Press RETURN to begin log-on sequence. Appleline responds by asking
      for your password:

        Enter password:

2.   Type your user password. If no special password has been established through the supervisor program you can use any of the 4 provided by the default settings of Appleline; they are:

        APPLE1
        APPLE2
        APPLE3
        APPLE4

3.   When the Appleline recognizes your password, the screen will go blank and then a new message will appear on it, transmitted from the IBM mainframe. NOTE: If the Appleline does not recognize your password, it will ask to enter it again After 3 attempts, the Appleline will ignore further password attempts for 20 seconds.

4.   You are now ready to log-on to the IBM system. To best demonstrate the Apple-to-mainframe connection, hand the keyboard over to the customer and let him/her sign-on to the mainframe and use his/her own system.

Using Your Apple Computer Like an IBM Terminal

Now you can start using your Apple keyboard and monitor screen as if they were the keyboard and screen of an IBM Model 3278-2 terminal. The Operator Information Area, by which the IBM system informs you of its status, will appear as the bottom line on your (24 line by 80 column) Apple screen. (To see the twenty fifth line of the IBM 25 line by 80 column display, press the ESCAPE key twice.

Special IBM Keys

The Model 3278-2 terminal has keys with special labels on them ("ATTN," "SYS REQ," etc.) which do not exist on your Apple keyboard. However, all their functions are still available. To achieve the same result with your Apple as you would by pressing these keys on a 3278-2 terminal, you use a combination of keystrokes. These combinations are listed in Figure 9. In addition, Macterminal has a built-in pictoral keypad which allows you to select the IBM keys (also referred to as PF keys) by pointing and clicking with the mouse. (Refer to Figure 10).

5. Logging-off:

   A. Have customer log-off of his/her IBM environment.

   B. There are 3 different log-off procedures you can use
       to terminate a work session with your Appleline,
       depending on what you have been doing and what
       you want to do next. They are as follows:

       a. If you have been working with the mainframe
           and want to quit, just break off communication with
           your Appleline. How you break off communication
           depends on how your Appleline is connected:

       b. If the Appleline is connected directly to your Apple
           computer, simply quit the communication program
           you have been using. If you are not sure how to do
           this, consult the user's manual for your
           communication program.

       c. If it is connected through a pair of asynchronous
           modems like the Apple Modems, tell the modem
           connected to your Apple computer to "hang up";
           the modem at the other end will then disconnect
           itself from your Appleline.

If you have been working with the mainframe and want to switch to your Appleline's supervisor program, log the mainframe first and then press ESCAPE and then hold down CONTROL and press Z. Your Appleline will display the message:

Appleline User Logged OFF

but will not discontinue communication. Twenty seconds later, it will automatically return to the start of its log-on sequence. At this point you can log back on the Appleline with the supervisor password.

Subsequent Demonstrations of Appleline:

Assuming the default parameters have been defined, subsequent use of Appleline does not require resetting the parameters. Therefore, when Appleline receives power, the user will be prompted to enter the password. Enter the user password. If the password is acknowledged by Appleline, communication with the mainframe is established.

Problems During and After Installation

If you have any problems with Appleline in bringing it up during and after installation, there are a few things to be aware of.

Baud Rates:

1. If a line of garbage appears on the screen, the baud rates on Appleline and the terminal emulator do not match.

Solution: Appleline will autobaud by pressing the break key for several seconds and then hitting the enter key. If it doesn't work the first time, try again.

Framing Error:

2. Again the baud rates do not match. Try autobauding first. If this does not work, reset Appleline with the loopback plug (comes with the Appleline). This will set the baud rate to 4800. Set the terminal software to 4800 and try connection again. Following is the procedure for using the loopback plug:

a. Turn your Appleline's power switch to OFF.
b. Unplug its connection to your apple computer.
c. Replace the plug that went to your Apple with the loop-back plug.
d. Turn the power switch ON.
e. Your Appleline's yellow light should blink slowly to indicate that it is OK.

Errors on the Mainframe

After the connection is made, you may still have problems talking to the mainframe. Some common problems are:

X O 2% % - Appears on the status line, the keyboard is locked.

Solution: The port you're hooked up to is not gen'd for a 3278 mod 2 with typewriter keyboard. The typewriter keyboard is the problem. Have your mainframe support re-gen your controller port for typewriter keyboards.

To get around the problem in the meantime, a reset will clear it. This should be CONTROL-R.

Other strange numbers may appear on the status line. First check and make sure you are connected to port 'gened' for a 3278 model 2 or 3279 model 2A with typewriter keyboard.

Anytime you get a -F, you've typed on the keyboard before the controller is ready for you. A reset (control and R) should clear it.

If your screen is blank with a blinking cursor even after depressing the escape key twice. You are not getting a connection to your controller. Controller connection will always give you a 4A, 4B, 6A or 6B in the bottom left corner of the screen.

Solution:

A - Check coax connection
B - Check coax wire for breaks
C - Change coax
D - Check RS-232 connections
E - Check RS-232 for breaks
F - Repair or change RS-232 cable

Apple Cluster Controller:

Pre-demo preparation at customer site:

The following discussion assumes that you will be tying the Apple Cluster Controller (ACC) into the customers existing network. If you will be tying into your own system or a timeshare service then you will work out your own set-up for the ACC based on your services requirements. Tying into your own system has one advantage in that you need only set up the hardware once, however, it is not as convincing to the customer as tying into the customers existing network.

Before installing your Apple Cluster Controller, you should have a discussion with the operator of the IBM host computer. He/she will need to inform the host Network Control Program (NCP) of the addition of your ACC. Tell the host operator which ACC model you are going to install so that he/she can properly SYSGEN the host computer. Changes to the NCP when a Model 76 is added are the same as those required when an IBM 3276/12 or 3274 is added. Changes when a Model 71 is added are the same as those required when an IBM 3276/2 is added.

You also need to indicate to the systems programmer the type of devices which will be hooked up to the ACC. If your computer will be emulating a 3278-2, you indicate to the programmer that the device to be attached to the ACC is a 3278-2. If you are hooking up a printer, then you indicate to the programmer which ports on the ACC should be reserved for the printer.

The host operator will inform you of your user ID and password, and of any operating characteristics you need to know about in order to properly set up and configure your ACC to communicate with the IBM host.

If the customer is disconnecting an existing, functioning, IBM 3274/6 controller and replacing it with an ACC you need not do a gen on their system. In this case you need only set a couple of switches on your ACC. Refer to the subsequent discussions on defining the configuration and configuring the hardware.

If the customer has only a channel attached IBM controller, you cannot disconnect their controller and hook-up an ACC, the reason being that there is not channel cable connectors on the ACC. (If this is the case perhaps the solution is an Appleline).

Setting up the equipment for demo at customer site

Equipment Needed:

1. Apple Cluster Controller
2. RS232 cables (one for each computer or printer hooked up)
3. 2 RJ-11 phone cords
4. Power cord
5. Terminal software; the following list is recommended to be used with the various computers:

> Lisa - Lisaterminal
> Macintosh - Macterminal
> Apple // - Access //
> Apple /// - Access ///

There are three possible set ups for the ACC.

Deciding on Your Set Up

Your next step is to decide how you are going to physically set up your ACC and Apple computers and/or printers. You need to think about where they will be located and how you will assign printers.

Device Location

You can locate your ACC either in the same computer room as the IBM mainframe host to which it is connected or in a remote location. The former set up permits the fastest communication with the. IBM host. You can connect your ACC to as many as seven Apple computers or six printers, either directly or through individual asynchronous modems if you want to place your computers and/or printers in remote locations.

These options give rise to three possible set ups. The IBM mainframe host, the ACC, and the Apple computers and/or printers can all be located in the data center. In this situation the ACC is directly attached to the front end processor (3705, 3725, etc.). (Refer to Figure 12).

Alternatively, the IBM host and the ACC can be located in the data center while the Apple computers and/or printers can reside in remote locations and be linked to the ACC through asynchronous modems. (Refer to Figure 13).

Apple computers connected through individual modems need not all operate at the same speed; their speeds can range from 300 or 1200 bps.

The ACC with Apple computers attached directly can reside in a location remote from the IBM host and be linked to it through a synchronous modem. (Refer to Figure 14).

Defining The Configuration

To properly configure your ACC, you need to answer a few questions in advance. (Refer to the back panel of you ACC during this discussion)

SNA/SDLC (or BSC) Port

The first set of questions pertain to the SNA/SDLC (or BSC) port.

1.   How will the ACC be connected to the IBM front-end
      processor-directly, or through a modem?

2.   Does the IBM host use NRZI format coding?

3.   What is the polling address of the ACC? (This is normally a
      two-letter hexadecimal code, and should be the same address
      code as that of the IBM front-end processor).

4.   At what speed will the IBM host be operating? (This speed is
      normally specified in bps, and can be 1200, 2400, 4800, or 9600).

Asynchronous Ports:

The second set of questions pertain to the asynchronous ports.

1.   Will the ACC be connected to the Apple computer/printer directly, or through a modem?

2.   Do you want to set the port to autospeed? (Automatic speed detection) Autospeed allows the
      incoming data to set the speed of the ACC port. It is used when a port is connected to a
      modem whose data rate may change; usually between 300 and 1200 bps.

3.   At what speed will the port be operating? (This speed can be 300, 1200, 2400, 4800, or
      9600 bps; however, if a port is set to autospeed, then it must be set to 1200 bps).

4.   Will a printer be connected to the port?

5.   If so, what is the delay requirement of the printer?

This delay allows time for the paper and the print head to move after a carriage return or a line feed.
This information should be provided in the table of specifications in your printer manual. If you
connect more than one printer to your ACC, answer this question for the printer requiring the
shortest delay.

Configuring The Hardware

Once you and your customer have determined the configuration requirements, you must configure the ACC hardware itself to meet your specifications. Ideally the hardware configuration itself should be done before the day of the demo. The set up is not difficult, but it looks a little messy; therefore, you may want to spare the customer from this task.

Refer to the Cluster Controller User's Manual (A9L0301) Part 1: Reference, pages 16-23 for the details on the ACC configuration. Configuring the hardware requires you to take off the cover of the ACC and set quite a few switchs, etc. The ACC manual diagrams the internals very well.

NOTE: If you will always be demoing your own ACC via a timesharing network to which you have subscribed, you need only set up the ACC once to meet that system's requirements.

Installation Steps

1.   Place the ACC in its operating position. Make sure that all the cables you are planning to use can reach the rear of the unit.

2.   Connect the cable coming from the IBM front-end processor (either directly or through a synchronous modem) to the SNA/SDLC (or BSC) port on the rear of the ACC.

3.   If you are planning to use an asynchronous modem to connect either printers or Apple computers to the ACC, make sure that the modem is set as follows:

      Orginate mode
      Full duplex
      Speed set to match the printer or computer.

4.   Connect the cables coming from your Apple computers, printers, or modems to the asynchronous ports. Secure the cable connectors to the ACC.

      NOTE: There is no need for modem eliminator cables in this set up.

5.   Make sure that the POWER switch is turned OFF. Then plug the power cord into the connector marked 115 VAC 60 HZ at the rear of the ACC. Plug the other end of the cord into the wall outlet.

6.   Set up terminal software. Refer to the diagrams for the terminal set up modes. The only variation may be the baud rate used. The location of your ACC and the recipient baud rate will determine the baud rate for the terminal software.

Demonstration of the
Apple Cluster Controller:

1. Power on appropriate computer and create a terminal document with the proper settings. (Refer to diagram) (If the ACC is linked to the Apple computer via an asynchronous modem you must establish communications with the ACC at this point).

2. Power on the ACC and wait for self test to finish (green light on front panel will go on when complete). The following ACC banner message is displayed on your screen:

    <<Apple/SSS-N VY,Z AA BB CC DD RRRR TTTT LU:X>>

    This banner message gives information about your ACC's configuration:

Message Component	Meaning
SSS	SNA for Model 76
	BSC for Model 71
N	Number of ports recognized by the ACC
VY,Z	Internal software version number Y is a number Z is a letter
AA	SWO address setting of SNA/SDLC or BSC polling address
BB	SW1 terminal type setting
CC	SW2 prompting and autospeed detection settings
DD	SW3 printer optionsetting
RRRR	Current retransmission count from host to ACC
TTTT	Current retransmission count from ACC to host computer
LU:X	Refers to local address of the terminal

3. The terminal type must be identified to the ACC. Press ESCAPE CONTROL-B and the ACC displays a list of terminal types and asks you to choose one. Your response will depend on what type of Apple computer you have.

4. Press ESCAPE CONTROL-D, you will get a prompt:

    <<Enter XID:>>

    Enter your XID number in response to this prompt
    (this command is for dial-up mode).

5.	If you are communicating from the ACC to the front end via a synchronous modem you must establish communication at this time.(Sync modem set-up: plug modem to AC line (set switch on front plate to talk, phone line goes to connector on back of modem labeled DIAL LINE, plug phone into connector labeled TEL SET on back of modem, power on modem and check for dial tone).

6.	Dial phone number if using modem. When you hear tone set modem front plate switch to NORMAL mode.

7.	At this point you should get the host's banner screen transmitted to your computer.

8.	Your Apple computer is now an IBM 3278 terminal. If you are logged-on to the customer's system you should allow the customer to experiment using his/her own system.

Special IBM Keys

Refer to Figure 11 for the appropriate Lisa and Mac 3278-2 keyboard equivalents when using the ACC. Refer to the Apple Cluster Controller User's Manual for greater detail on the use of the ACC.

Using Timesharing Services for Demos

Following is a partial list of timesharing services to which you can
subscribe in order to demonstrate the Apple Cluster Controller and Appleline:

	Boeing Computer Services
	Litton-Mellonics
	Electronic Data Systems (EDS)

The greatest advantage to using a timeshare service is that you can control the demo to a greater extent. However, it is more believable to the customer if he can tie into his/her existing network.

Important Demoing Tips and Hints:

The best demos of Macintosh and Lisa Terminals show the ease of use and consistency of user interface, in addition to the integration capability. In order to emphasize these critical selling points, the following outlines a demo for Macterminal and Lisaterminal which you can duplicate on your respective systems.

First, create a data-set on your IBM mainframe within the environment that you will be tying into. For example, under TSO, you can create a data set under the ISPF editor. Your technical support person should be able to do this either by using the help facility under ISPF or by purchasing the appropriate user's guide from IBM. In some cases your timeshare service will create a data-set for a fee. The data-set should contain a small model (approximately 5x5 matrix) of numbers. It should also contain titles over the columns. Once the data set is stored you can use it as the permanent information to be copied and then pasted into a calc model. The data-set is on the mainframe and therefore can be accessed by Macintosh or Lisa using either the Appleline or ACC.

To set up the demo refer to the following discussions on Demonstrating Macterminal or Demonstrating Lisaterminal in 3270 environment.

Demonstrating MacTerminal in the 3270 Environment

Create a multiplan model containing titles and formulas to receive the data-set which will be copied from the mainframe. Remember to leave enough columns and rows blank (5x5 matrix), in order to paste the data successfully. The formulas must be put into the model in advance so that the calculations will be performed as the numbers are pasted.

Create a Macterminal document using the settings outlined in figures 7 & 8. Make your connection to the IBM mainframe, following the instructions for demonstrating Appleline or ACC depending on which one your using.

If you are using TSO;

    Type " TSO"
    Type "your user ID"
    Type "your password"
    Type "ISPF"
    Type "your demo data-set name"

Select the numbers you want copied (5x5 matrix)
Select COPY TABLE

Use the menu keypad PF keys to back out of ISPF. Stress the importance of the user interface and ease of use. The keypad feature is unique to Macterminal.

    Logoff of TSO
    Quit Macterminal
    Open Multiplan model
    Select 5x5 matrix

Paste numbers (columns are automatically formatted when copying from mainframe to Macterminal) Change a number or two to show the ability to calculate the pasted data-set.

Demonstrating LisaTerminal
in the 3270 Environment:

The most important aspects to demonstrate on Lisa are the multiple window, multiple session capability as well as the ease of use and integration capability. Lisaterminal does not have PF keys on the menu, therefore, emphasize the above features.

Create a LisaTerminal document and set the parameters as outlined in Figure 6.

Create a Lisacalc document and add the same titles and formulas to fit the data set from the mainframe.

Connect to the mainframe using the instructions on demonstrating appleline or ACC, depending on which one your using.

Access the data-set which you have stored on the mainframe in the same manner indicated for MacTerminal. LisaTerminal requires you to set tab stops in between columns on the mainframe before copying the data-set to be pasted into multiplan. Follow instructions in the Lisaterminal manual on copying numbers from mainframe to Lisaterminal.

Copy the data-set using the copy command on Lisa.

Open the LisaCalc model which you have previously set up.

Select the upper left cell contained in your matrix.

Paste the copied numbers into the model.

Chapter 6

COMMUNICATIONS SOFTWARE PRODUCTS

The Desktop to Database Dating Decision or
The Micro to Mainframe Software Marriage

Typical uses of corporate databases exist in the accounting, design and engineering, distribution, manufacturing, sales and marketing, research and development and service departments. When considering software for the micro to mainframe marriage, people should consider those packages that are easy to use by non-technical personnel: this software should not require a programmer/ analyst to operate it.

Here are a few important areas of software consideration:

o Access to corporate databases

   Ability to do file transfers and extract partial reports
   Upload and download screens of information
   View and change information as needed

o Accuracy, Integrity, Security, and Reliability of Information

   Systematic backup of information
   Passwords to restrict access to people with a need to know
   Error checking built into hardware and software

o Auditibility - being able to trace transactions from input to update to output
o Application Software - on the Mainframe and on the Micro

   Accounting - A/P, A/R, G/L, Payroll, Inventory
   Communications - Text File Transfer, Graphics Transfer
   Databases -

      Mainframe: IDB, IMS/DB, IDMS-R, Nomad, Ramis
      Micro: dBase II,III, DB Master, QuickFile

   Decision Support Software / Financial Modeling

      SAS/ETS econometric & modeling software
      DSS/F

   Graphics Packages

      Mainframe: SAS/Graph
      Micro: MacPaint, LisaDraw,

Integrated software packages for multiple use applications

Appleworks from Apple Computer
Lotus 1-2-3 and Symphony
Framework from Ashton-Tate
3 EZ Pieces from Haba Systems

Spreadsheets

Mainframe: IFPS
Micro: Visicalc
Supercalc
Multiplan

Statistics

BMDP,SPSS,Statpro

Specialized and Vertical Market

Medical, Insurance, Banking, Construction, Legal

Wordprocessing

Applewriter from Apple
Wordstar from Micropro
Microsoft Word
Appleworks / 3 EZ Pieces from Apple and Haba Systems

o Cost controls governing software purchase should be put in place
o Documentation that is easy to read and comprehensive is a must
o Operating Environment on Mainframe and on Micro:

Mainframes and Minis:

CICS, CMS, TSO, OS, DOS/VSE, MVS, VM, VTAM, IMS/DC,
MVS/XA, ISAM, NCP with NTO, UNIX

Micro:

DOS 3.3, CP/M, UNIX, ProDOS, MS-DOS, UCSD p-System

o Training and support from the dealers and vendors
o User friendliness of software is of primary importance to first time users.

On the following pages is list of major vendors of micro to mainframe software:

Software Products for Micro to Mainframe Links

The following is a list of compatible and competitive software products for use on either the mainframe end or the microcomputer end of a communications link. The reason that both compatible and competitive products are given is that products that are one day competitive are the next day compatible in this fast moving business. We are trying to get as many of the competitive companies, compatible as soon as possible.

Apple Computer
20525 Mariani Ave.
Cupertino, CA 95014
408-996-1010

Apple Access // $75.00

Digital Equipment Corportation VT-100, and VT-52 terminal emulation. 110 to 9600 bps. Includes data capture to disk and file transfer. ProDOS Based. Macro Capability. Transfers Appleworks files.

Apple Access /// $150.00

Digital Equipment Corportation VT-100, and VT-52 terminal emulation. 110 to 9600 bps. Includes data capture to disk and file transfer. Transfers all SOS files.

Apple Access 3270

Based on Access /// with PF and PA keys on numeric keypad.

Apple MacTerminal

Emulate VT-52, VT-100,IBM 3278 and TTY Terminals at 50-19,200 bps, 80 or 132 column width, XMODEM protocol, Pull down PF keys. Make files into tables for spreadsheet.

Apple LisaTerminal Plus

VT-52, VT-100 Emulation, Pull down menus, Simultaneous Sessions, Cut & Paste, 80 or 132 column.

ABW Corp.
P.O. Box M 1047
Ann Arbor, MI 48106
313-971-9364
Teksim - Tektronics Terminal Emulation

Addison Wesley
Applications Software Division
6 Jacob Way
Reading, MA 01867
617-655-9191
DSS/F Decision Support Software with Log-On communications program

Applied Data Research
Route 206 & Orchard Road, CN-8
Princeton, NJ 08540
201-874-9000
ADR/PC
Datacom/DB/DC
Empire Decision Support Tool
ADR/Librarian

AT&T Technology Licensing
P.O. Box 25000
Greensboro, NC 27420
919-697-5087
UNIX

BMDP Statistical Software, Inc.
964 Westwood Dr.

Cincom Systems
2300 Montana Ave.
Cincinnati, OH 45211
800-543-3010
513-661-6000 662-2300
TOTAL DBMS $13K-80K
TIS 4th generation procedural language $250K
Optional components: Intelligent Query,
Comprehensive Retrieval,
Intelligent Reporter, Decision Support.
Manage User Series:
Mancalc: $19,500, Mantext, Mangraf: $16,500,
Mantis

Computer Associates International
125 Jerico Turnpike
Jerico, NY 11753
516-333-6700
800-645-3003
Owns IUS/Sorcim
CA Universe/Relational DBMS $85K-102K

Communications Research Group
8939 Jefferson Highway
Baton Rouge, LA 70809
504-923-0888
BLAST - Blocked Asynchronous Trans

Computer Solutions Inc. - VisiCorp
992 South Saratoga-Sunnyvale Rd.
San Jose, CA 95129

Comshare, Inc.
3001 South State Street
Ann Arbor, MI 48104
313-994-4800
Distributed W is a personal computer
version of Comshare's mainframe W Software.

Context Management Systems
23864 Hawthorne Blvd.
Suite 101
Torrence, CA 90505
Context MBA integrated software, with built-in
communications capability

Cullinet Software
400 Blue Hill Drive
Westwood, MA 02090-2198
617-329-7700
IDMS
IDMS/R Relational database
IDMS-DC
On-Line Query

Digital Equipment Corporation
146 Main Street
Maynard, MA 01754
617-897-5111
RSTS/E $6-12K
VAX/VMS

Diversified Data Resources
25 Mitchell Boulevard Suite 7
San Rafael, CA 94903
415-499-8870
Acom - Asynchronous Communication
up to 9600 bps, CRC error checking,
IBM PC file transfer.
AcomHFT $3,000
AcomFT $240
Acom $120

D & B Computing Services
187 Danbury Rd
Wilton, CT 06897
203-762-2511
NOMAD 2 $135K

Elcom Systems Peripherals
439 Harrison St. Suite A
Corona, CA 91720
714-734-8220

EPS Consultants
1 Industrial Drive
Windham, NH
603-898-1800
FCS-EPS modeling software

Ergonomic Software, Inc.
305 East 86th Street
New York, NY 10028
212-427-2373

Execucom Systems Corp.
3410 Far West Boulevard
Austin, TX 78766
800-531-5038
512-346-4980
Interactive Financial Planning System (IFPS)
Goal Seeking, Monte Carlo (risk), Consolidation,
Sensitivity and Impact Analysis
Options: Graphics, Foreign File Interface,
Multiple Linear Regression,
Runs On: IBM, DEC, Prime, CDC, Honeywell, H-P,
Wang
IFPS Decision Support Software $64K
IFPS/SENTRY data entry and validation system
$12K
IFPS/DATASPAN transfers data into IFPS files
$10K
IFPS/Personal

Ferox Microsystems, Inc.
1201 North Ft. Meyer Drive
Arlington, VA 22209

IBM Corporation
1133 Westchester Ave
White Plains, NY 10604
914-696-1900
IMS/VS/DB/DC $1,310/Month+
DOS, DOS/MVT/VSE, DOS/VS
OS/VS1, OS/VS2 (SVS and MVS),
SSX - Small System Executive/VSE $15-20K

IE Systems, Inc.
BiSync Emulation $1195.00
P.O. Box 359, 98 Main Street
Newmarket, NH 03857
(603) 659-5891.

Enables a CP/M based Apple /// to communicate
with remote computers using bisynchronous
protocols. When combined with bisynchronous
software products from Micro-Integration, an
Apple /// can emulate an RJE (remote job entry)
terminal using either 3780, 3741, 2780, and 2770
protocols or a 3271/77, 3274/78, 3275, and 3276
bisynchronous device.   Cost with serial I/O
board and bisynchronous software product is
$1195.00.

Informatics General Corporation
210 Ventura Boulevard
Woodland Hills, CA 91364
213-887-9040
401 Park Ave. South
New York, NY 10016
212-696-5700
Answer/DB - VisiAnswer
TAPS Transaction Processor, Application
Development Tool
Relational Datamanager

Information Builders, Inc.
1250 Broadway
New York, NY 10001
212-736-4433
FOCUS $66K $1680/Month Lease
PC/FOCUS

Intelligent Technologies
151 University Ave
Palo Alto, CA 94301
415-328-2411

ISSCO
10505 Sorrento Valley Road
San Diego, CA 92121
619-452-0170
Tellegraf

Lotus Development
161 First Street
Cambridge, MA 02141
617-492-7171
800-343-5414
1-2-3 on IBM PC, XT, PCjr 3270 PC and PC
Compatibles
Symphony Plus on Macintosh
Symphony on 3270/PC
Symphony on IBM PC,/XT, PCjr

Management Science America (MSA), Inc.
3445 Peachtree Road
Atlanta, GA 30326
404-239-2000
PeachLink, Executive Peachpak II, DIF Interface
with Lotus 1-2-3, Multiplan, Visicalc

Mathmatica
A Martin Marietta Data Systems Company
P.O. Box 2392
Princeton, NJ 08540
609-799-2600
RAMIS II $40K-80K

Time Sharing: ADP, AVCO, Boeing Computer
Services,
Informatics, Litton, Mellonics, Martin
Marietta
National CSS, Time Sharing Resources
RamLink for IBM PC and XT
DIF for Visicalc and Lotus 123

McCormack & Dodge
560 Hillside Avenue
Needham Heights, MA 02194
617-449-4012
PC Link

Mesa Graphics
P.O. Box 506
Los Almos, NM 87544
Tekalike

Microcom
1400A Providence Highway
Norwood, MA 02062

Microsoft, Inc.
10700 Northrup Way
Bellevue, WA 98004

Microstuf, Inc.
1845 The Exchange
Atlanta, GA 30339
Crosstalk

Micro Tempus, Inc.
4 Farnham Place Bonaventure
PO Box 1339
Montreal, Quebec H5A 1H1
514-861-3335

NCA Corporation
388 Oakmead Parkway
Sunnyvale, CA 94086
408-245-7990

On-Line Software International
Fort Lee, NJ
OmniLink, OmniMicro

Oracle Corporation
2710 Sand Hill Rd
Menlo Park, CA 94025
415-854-7350
Oracle R-DBMS $12K

Pathway Design
177 Worchester Street
Wellesley, Massachusetts 02181
617-237-7722
800-343-0515

Pansophic Systems, Inc.
709 Enterprise Drive
Oak Brook, IL 60521
312-986-2260
Easytrieve

Ross Systems, Inc.
1860 Embarcadero Rd
Palo Alto, CA 94303
415-856-1100
Management Aid for Planning Strategies (MAPS)
MAPS/DB $12K-30K
DEC PDP-11, VAX-11 with RSTS/E and VMS

SAS Institute, Inc.
SAS Circle, BOX 8000
Cary, NC 27511
919-467-8000
SAS Statistical Analysis
SAS/Graph

Seed Software
2300 Walnut Street Suite 734
Philadelphia, PA 19103
215-568-2424

Simware, Inc.
Ottawa, Ontario, Canada
SIM3278, AZPC 2

Softronics, Inc.
6626 Prince Edward Place
Memphis, TN 38119
901-755-5006
Softerm 1 and 2 - Terminal emulation software
for the Apple //e.

Software AG of North America.
11800 Sunrise Valley Drive
Reston, Virginia 22091
703-860-5050
Natural - 4th generation language
ADABAS - Adaptable Data Base System
Runs on S/360, S/370, 303X, 4300, most
compatibles. Runs under DOS, DOS/VS,
DOS/VSE,OS, OS/VS.

SPSS, Inc.
444 Michigan Ave. Suite 3000
Chicago, IL 60611
312-329-2400
SPSS Data Analysis System

Tominy, Inc.
4221 Malsbary Rd.
Cinncinati, OH 45242
513-984-6605
Data Base-Plus

Tymnet/Tymshare, Inc
2710 Orchard Parkway
San Jose, CA 95134
408-946-4900
InfoTym/PC

United Software Industries
ASCII Express "Professional"
1880 Century Park East Suite 311
Los Angeles, CA 90067
619-562-9111
213-556-2211

Viking
2726 S. Moline Ct.
Aurora, CO 80014
303-337-2608

VisiCorp
2895 Zanker Road
San Jose, CA 95134
408-946-9000
VisiAnswer, VisiLink, Visiterm

VM Personal Computing
60 E. 42nd Street
New York, NY 10165
212-697-4747
New York, N.Y.
Please, Relay

Chapter 7

COMPETITIVE PRODUCT LISTING:

The following is a list of manufacturers of competitive hardware for connecting personal computers to mini and mainframe computers.

AT&T Information Systems
P.O. Box 13970
Orlando, FL 32859
800-247-1212
Personal Computers with 3270 capability

AT&T Communications
800-821-2121
Value Added Network
3270 emulation in the phone lines

Avatar/ 3R Computers
18 Lyman Street
Westboro, MA 01581
617-366-5300
PA-1000 PA-1500 Protocol Converters

AST Research, Inc.
Irvine, CA
714-540-1333
Protocol Converters for IBM PC

Base 2 (PTY) LTD.
P.O. Box 56126
Pinegowrie
2123
South Africa
Telex 4-22183 S.A.
Protocol Conversion Software

Black Box Corp
Pittsburgh,PA
Protocol Converters

Boeing Computer Services
Data Network Services
Value Added Networks

Burroughs Corporation
Burroughs Place
Detroit, MI 48232
313-972-7000
3270 Terminals

Braegen Corp.
3340 East La Palma Ave.
Anaheim, CA 92086
3270 Emulation with PC added-on

Carterphone Communications Corp.
Dallas, TX
Protocol Converters

Computer Communications, Inc.
2610 Columbia Street
Torrence, CA 90503
800-421-1178
213-320-9101
Protocol Converters

C. Itoh Electronics
CIE Terminals
2505 McCabe Way
Irvine, CA 92714-6297
800-854-5959
800-432-3687 in Calif.
3270 Terminals with PC's added-on

Codex
A Motorola Information Systems company
20 Cabot Blvd.
Mansfield, MA 02048
High Speed Synchronous Modems
Desktop computers with 3270, 3780 protocols

Commspecialists
206 East Park
Lebanon, OH 45036
513-932-8998

Commware
5710 Paradise Drive
Corte Madera, CA 94925
415-924-1777
Protocol Converters

Control Data
8100 34th Avenue South
Minneapolis, MN 55440
612-853-8100
3270 Terminals

Core Technology Corp.
1000 University Drive
Suite 109
Rochester, MI 48063
313-651-6421

CXI
3606 W. Bayshore Rd.
Palo Alto, CA 94303
415-424-0700

CXC Corporation
2852 Alton
Irvine, CA 92714
714-760-7171
PBX with 3270 emulation

Data General Corp.
4400 Computer Drive
Westboro, MA 02090

DataNetComm Inc.
P.O. Box 881283
San Francisco, CA 94188-1283
Protocol Conversion Devices

DCA/TAC
120 W Wieuca Road, N.E.
Atlanta, GA 30042
404-252-1045
Protocol Converters

Digital Equipment Corporation
146 Main Street
Maynard, MA 01754
VT-100/200 Terminals

Digital Communications Associates, Inc. (DCA)
303 Technology Park
Norcross, GA 30092
404-448-1400
Protcol Converters

Elcom Systems Peripherals
439 Harrision Street, Suite A
Corona, CA 91720
714-734-8220
Protocol Converters

Fibronics International Inc.
218 W. Main Street
Hyannis, MA 02601
617-778-0700

Forte Data Systems
1500 Norman Avenue
Santa Clara, CA 95050
408-980-1750
800-233-3278
Protocol Converters

Gateway Communications, Inc.
16782 Redhill Ave.
Irvine, CA 92714
714-261-0762

General Electric Information Services Company (GEISCO)
401 North Washington Street
Rockville, MD 20850
Value Added Network with 3270 emulation

GTE Spacenet Corporation
1700 Old Meadow Road
McLean VA 22102
703-790-7700
Value Added Network with 3270 emulation

IBM
National Accounts Division
1133 Westchester Avenue
White Plains, NY 10601
3270 Systems

IBM
National Marketing Division
4111 Northside Parkway
P.O. Box 2150
Atlanta, GA 30055
3270 Systems

IBM
Entry Systems Division
P.O. Box 1328
Boca Raton, FL 33432
3270 Systems

IDEAssociates, Inc.
7 Oak Park Drive
Bedford, MA 01730
Protocol Converters for IBM PC

Informer Computer Terminals, Inc.
22936 Mill Creek Road
Laguna Hills, CA 92653
3270 Terminals

InteCom, Inc.
601 InteCom Drive
Allen, TX 75002
214-727-9141
PBX with built-in 3270 emulation

ITT Courier
1515 West 114th Street
Tempe, AZ
800-528-1400
3270 Terminals, IBM PC work-alikes

JBM Electronics
6020 N. Lindbergh Blvd
St. Louis, Missouri 63042

Lee Data Corporation
7075 Flying Cloud Drive
Minneapolis, MN 55344
800-328-3998
3270 Terminals

Lemcom Systems, Inc.
2104 W. Peoria Avenue
Phoenix, AZ 85029
602-944-1543

Le Roux International
3090 Acushnet Avenue
New Bedford, MA 02745
617-995-8519

Local Data
2701 Toledo St.
Suite 706
Torrance, CA 90503
213-320-7126

MA/Comm Data Communications Group
11717 Exploration Lane
Germantown, MD 20874-9989
Modems, Multiplexers, Error Controllers

Memorex Corporaton
1125 Memorex Drive
Santa Clara, CA 95052
3270 Terminals, Cluster Controllers

NCR Corporation
Box 606
Dayton, OH 45479
Mainframes, Terminals, PC's

NCR Comten
2700 Snelling Ave. North
St. Paul, MN 55113
Communications Equipment

Northern Telecom
259 Cumberland Bend
Nashville, TN 37228
PBX's with built-in protocol conversion

Northern Telecom
Business Communications Systems
1001 East Arapaho Road
Richardson, TX 75081

Northern Telecom
Terminal Systems Division
Data Park, P.O. Box 1222
Minneapolis, MN 55405

Phaze Information Machines, Corp.
7650 East Redfield Road
Scottsdale, AZ 85260
800-423-2994

Phaser Systems, Inc.
24 California St.
San Francisco, CA 94111
415-434-3990

PCI/ Protocol Computers, Inc.
6150 Canoga Avenue
Woodland Hills, CA 91367-3773
800-423-5904 213-716-5500 in Calif.

Personal Systems Technology, Inc.
Persyst Products
15801 Rockfield Blvd Suite A
Irvine, CA 92714
714-859-8871
Protocol Converters

Renex Corporation
6901 Old Keene Mill Road
Springfield, VA 22150
703-451-2200
Protocol Converters

Rolm
4900 Old Ironsides Drive, M/S 626
Santa Clara, CA 95050
800-538-8154
408-986-3025
PBX's with built-in 3270 emulation

Rixon, Inc.
2120 Industrial Parkway
Silver Spring, Maryland 20904
301-622-2121
Synchronous Modems

Sperry / Univac
Township Line & Jolly Rd.
P.O. Box 500
Blue Bell, PA 19424
Mainframes, Communications Equipment

Teletype Corporation
5555 Touhy Ave. Dept 3223-E
Skokie, IL 60077
800-323-1229
3270 Terminals

Thomas Engineering
1040 Oak Grove Road
Concord, CA 94518
Protocol Converters

Tymnet, Inc.
Division of MacDonald-Douglas
2710 Orchard Parkway
San Jose, CA 95134
Value Added Network

Telenet
Division of GTE
Network Systems & International Services
8229 Boone Boulevard
Vienna, VA 22180
703-442-1000
Value Added Network

Uninet, Inc.
10951 Lakeview Ave.
Lenexa, KS 62219
800-642-9606
Value Added Network

Universal Data Systems
A Motorola Information Systems company
5000 Bradford Drive
Huntsville, AL 35805
Synchronous modems

Viking Associates
2726 S. Moline Court
Aurora, CO 80014
303-632-7004
Protocol Converters

Wang Laboratories, Inc.
One Industrial Avenue
Lowell, MA 01851
Minicomputers, Terminals, 3270 emulation

Winterhalter, Inc.
3853 Research Park Drive
P.O. Box 2180
Ann Arbor, MI 48106
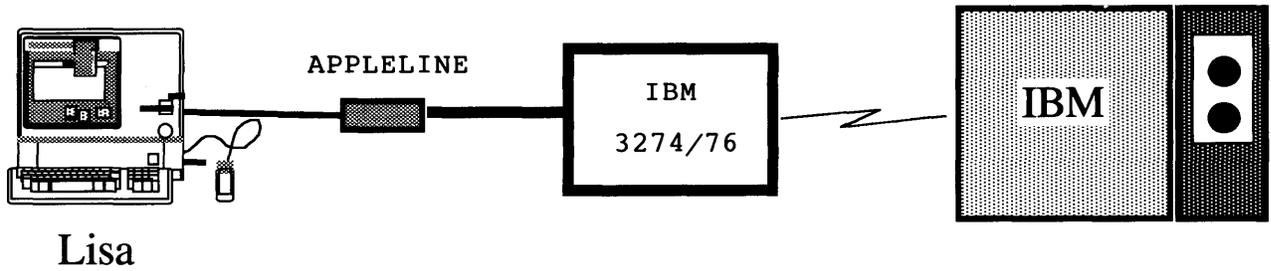800-321-7785
313-662-2002 in Michigan
Protocol Converters

APPLELINE NEAR APPLE COMPUTER

APPLELINE

IBM
3274/76

IBM

Lisa

APPLELINE AWAY FROM APPLE COMPUTER

Mac

apple modem

apple modem

APPLELINE

IBM
3274/76

IBM
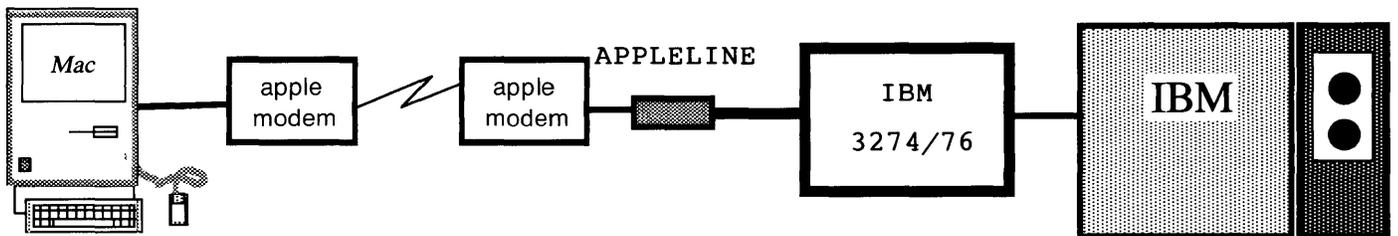
Figure 5

LISA AND MAC KEYBOARD EQUIVALENTS FOR 3278-2 USING ACC

IBM	LISA	IBM	LISA
ATTENTION	ENTER	PF24	TILDE – g
ENTER	RETURN	PA1	TILDE – z
PF1	TILDE – 1	PA2	TILDE – x
PF2	TILDE – 2	PA3	TILDE – n
PF3	TILDE – 3	CLEAR	TILDE – m
PF4	TILDE – 4	SYS REQ	TILDE – ;
PF5	TILDE – 5	BACKSPACE	command – h
PF6	TILDE – 6	DUPLICATE	command – n
PF7	TILDE – 7	FIELD MARK	command – w
PF8	TILDE – 8	HORIZ. TAB	command – i
PF9	TILDE – 9	BACK TAB	command – o
PF10	TILDE – 0	ERASE EOF	command – x
PF11	TILDE – .	ERASE INPUT	command – r
PF12	TILDE – =	INSERT MODE	command – y
PF13	TILDE – q	DELETE	command – t
PF14	TILDE – w	NEW LINE	command – j
PF15	TILDE – e		
PF16	TILDE – r		
PF17	TILDE – t		
PF18	TILDE – y		
PF19	TILDE – u		
PF20	TILDE – i		
PF21	TILDE – o		
PF22	TILDE – p		
PF23	TILDE – f		

Figure 6

MAC AND LISA KEYBOARD EQUIVALENTS FOR 3278-2 USING APPLELINE

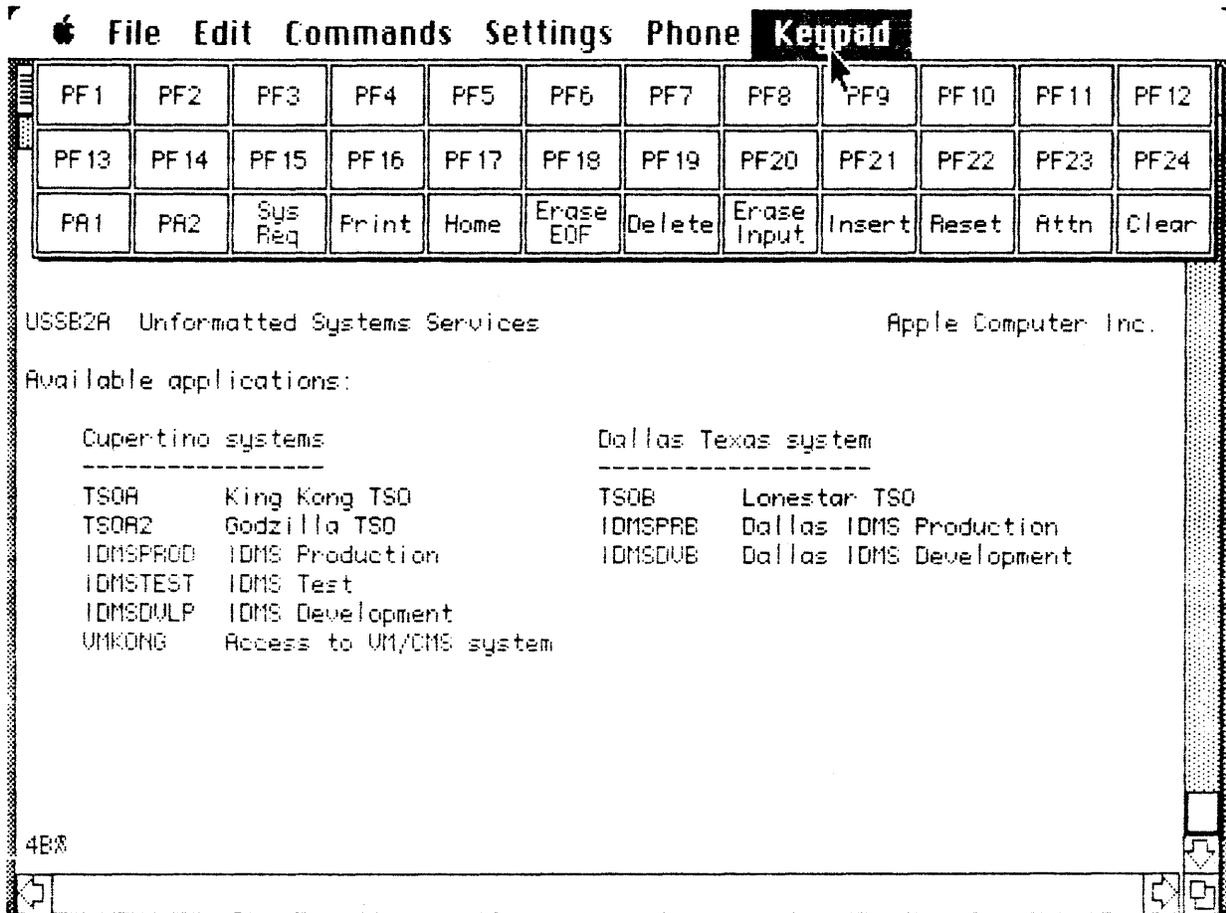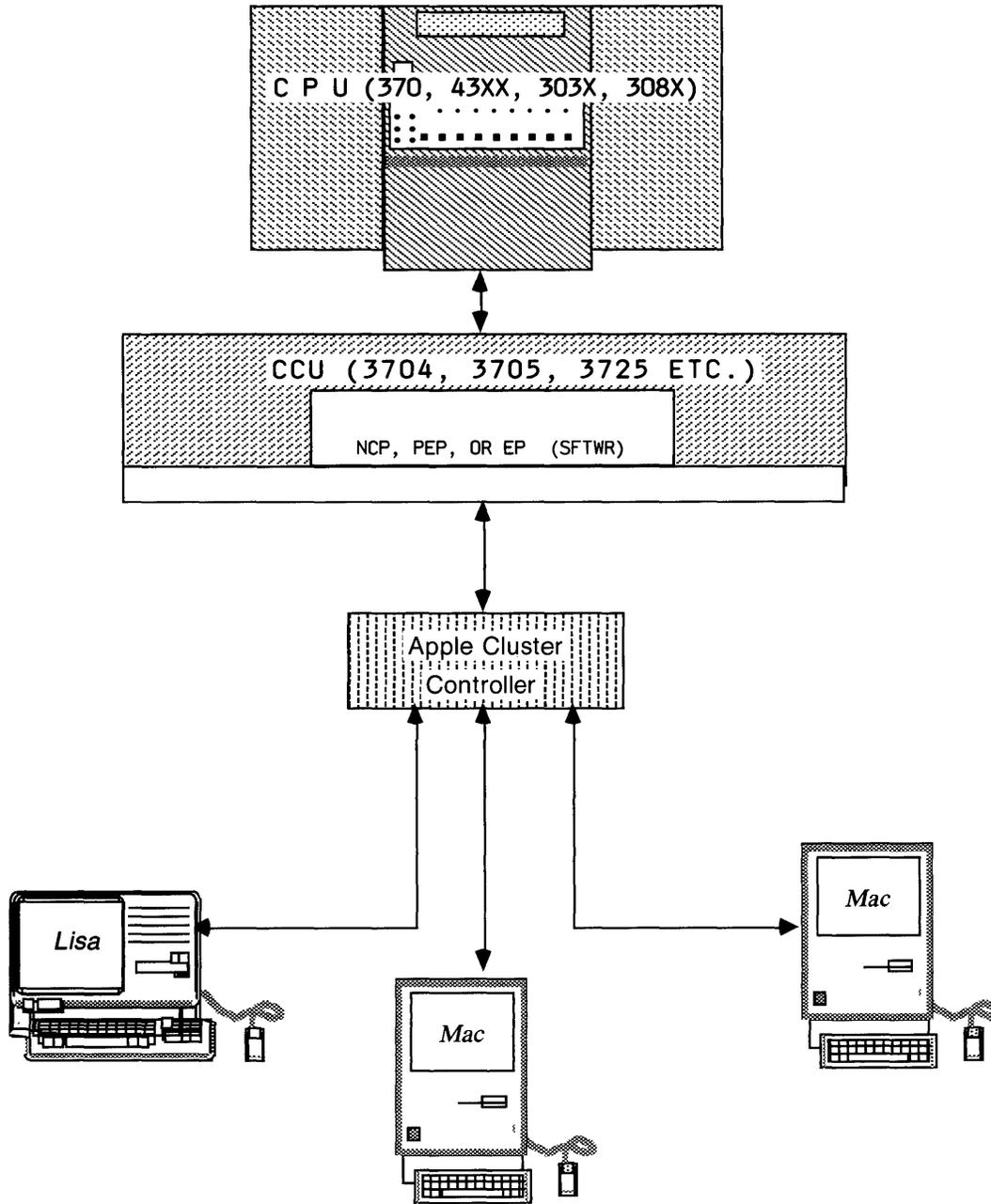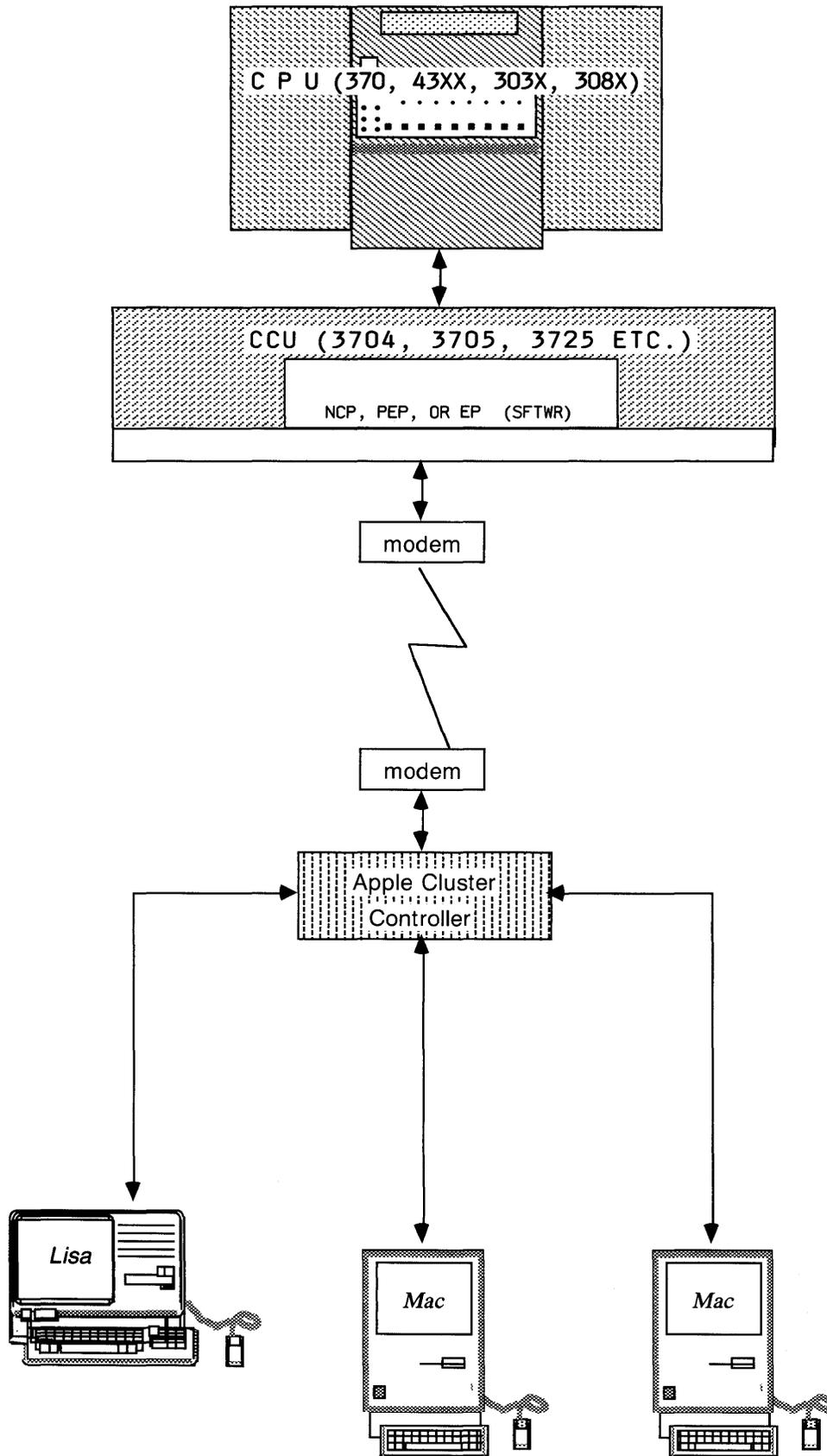| IBM KEYS	APPLE KEYSTROKES	IBM KEYS	APPLE KEYSTROKES
DUP	CONTROL U	PF22	ESCAPE)
FIELD MARK	CONTROL Y	PF23	ESCAPE _
PA1	ESCAPE [	PF24	ESCAPE +
PA2	ESCAPE]	NEW LINE	RETURN
PF1	ESCAPE 1	TAB	TAB
PF2	ESCAPE 2	BACK TAB	CONTROL K
PF3	ESCAPE 3	HOME	CONTROL /
PF4	ESCAPE 4	LEFT CURSOR	CONTROL ←
PF5	ESCAPE 5	RIGHT CURSOR	CONTROL →
PF6	ESCAPE 6	UP CURSOR	CONTROL ↑
PF7	ESCAPE 7	DOWN CURSOR	CONTROL ↓
PF8	ESCAPE 8	ATTN	CONTROL A
PF9	ESCAPE 9	SYS REQ	CONTROL B
PF10	ESCAPE 0	CURSR SEL	CONTROL D
PF11	ESCAPE -	CLEAR	CONTROL E
PF12	ESCAPE =	ERASE INPUT	CONTROL L
PF13	ESCAPE !	ERASE EOF	CONTROL F
PF14	ESCAPE @	PRINT	CONTROL P
PF15	ESCAPE #	IDENT	CONTROL V
PF16	ESCAPE $	TEST	CONTROL T
PF17	ESCAPE %	RESET	CONTROL R
PF18	ESCAPE ^	DEV CNCL	CONTROL X
PF19	ESCAPE &	INSERT	CONTROL]
PF20	ESCAPE *	DELETE	CONTROL _
PF21	ESCAPE (	ENTER	ENTER

Figure 6

53

Figure 7

CPU (370, 43XX, 303X, 308X)

CCU (3704, 3705, 3725 ETC.)

NCP, PEP, OR EP (SFTWR)

Apple Cluster
Controller

Lisa

Mac

Mac

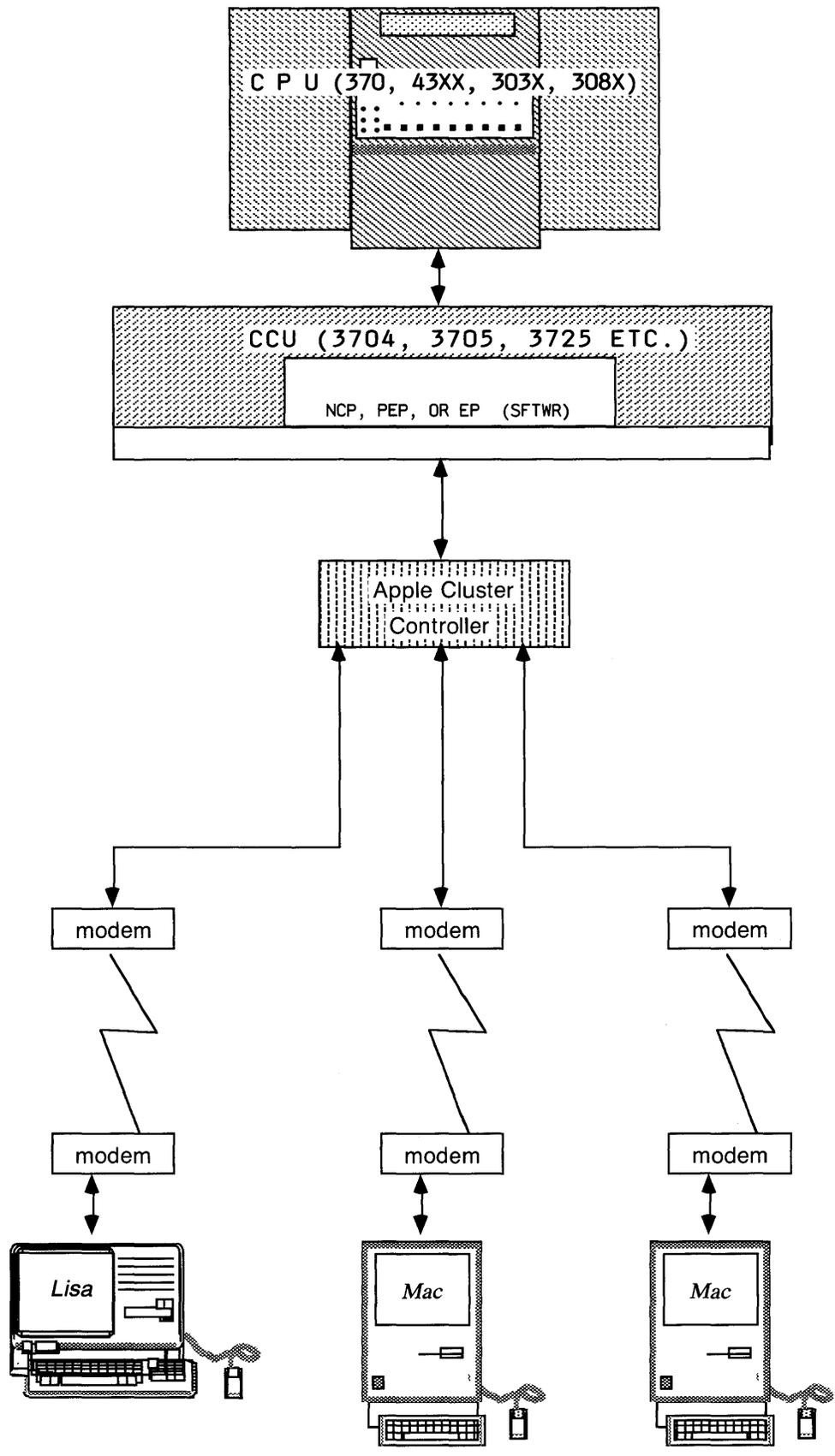## Figure 8

Figure 9

Figure 10

Glossary and Abbreviations

Access

Generally the obtaining of data, from a storage device or peripheral.

Access Method

The technique and/or program code for moving data between main storage and I/O devices. Existing access methods include: basic access method, basic direct access method, basic indexed sequential access method, basic partitioned access method, basic sequential access method, basic telecommunications access method, queued indexed sequential access method, queued sequential access method, queued telecommunications access method, telecommunications access method.

Access Time

The time interval between when data is called for or requested to be stored in a storage device and when delivery or storage is completed.

"Acknowledge Character" (ACK)

A transmission control character transmitted by a station as an affirmative response to the station with which a connection has been set up. An acknowledge character may also be used as an accuracy control character.

Acronym

A word formed from the first letter (or letters) of the words in a phrase or name.

Acoustic Coupler

A type of low-speed modem frequently used with portable terminals. It sends and receives data using a conventional telephone handset and does not require a permanent connection to the line.

Address

A coded representation of the destination of data, or of their originating terminal. Multiple terminals on one communication line, for example, must have unique addresses. Telegraph messages reaching a switching center carry an address before their text to indicate the destination of the message.

Advanced Communications Function/Telecommunications Access Method (ACF/TCAM)

A high-level access method which supports a large selection of terminal (BSC, S/S, Local Attachment and SDLC) and offers support for most MVS and VS1 applications.

Advanced Communications Function/Virtual Telecommunications Access Method (ACF/VTAM)

Provides an "operating system" for the network. Its functions are analogous to the function of a host operating system in terms of resource sharing and logical handling of user requests.

Advanced Data Communications Control Protocol (ADDCP)

A communications protocol endorsed by the American National Standards Institute. It is a bit-oriented protocol.

Advanced Program to Program Communication (APPC)

American National Standard Code for Information Interchange. (ASCII)

(1) A coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of alphanumeric characters, control characters, and graphic characters. (2) A wide ly used asynchronous protocol based on ASCII code.

Analog

Referring or pertaining to a signaling tech- nique in which a transmission is conveyed by modulating (varying) the frequency, amplitude, or phase of a carrier. An analog signal is typified by a continuous wavelike pattern. Analog signaling is generic to the public switched telephone network, as well as to certain other audio frequency and radio frequency facilities. A digital baseband signal generated by a business machine must be converted to analog form in order to transmit that signal over an analog facility, e.g., a voice-grade telephone line.

Applicaton Layer

In SNA, the functional layer of each individual session in which the end user's application program is executed.

Asynchronous

Occuring without a regular or predictable time relationship to a specified event, e.g., the transmission of characters one at a time as they are keyed. Contrast with synchronous.

Asynchronous Transmission

Digital data transmission format in which start and stop bits identify the beginning and ending of each character. Also called start-stop bits.

Auto-Answer

A modem capability that allows automatic "pick-up" when the phone rings.

Auto-Dial

The ability to automatically make a connection with another modem.

Automatic Send Receive

A teleprinter terminal with paper tape or magnetic tape devices, or editable internal memory. Refers to any keyboard terminal with off-line storage capabilities that permits a message to be generated off-line for later transmission.

Baud

A measure of data rate, often used to denote bits per second. A baud is equal to the number of discrete conditions or signal events per second. There is disagreement over the appropriate use of this word, since at speeds above the 2400bps, the baud rate does not equal the data rate in bits per second.

Balanced Circuit

A circuit terminated by a network whose impedance balances the impedance of the line so that the return losses are negligible.

Baseband

The frequency band occupied by information-bearing signals before they are combined with a carrier in the modulation process.

Basic Telecommunications Access Method (BTAM)

An access method that permits read/write communications with remote devices.

Batch Processing

A technique of data processing in which jobs are collected and grouped before processing. Data is collected over a period of time and then submitted to the host machine for processing.

Batched Job

A job that is grouped with other jobs as part of an input stream to a a computer system.

Binary

A numbering system using 2 as its base and only the symbols 0 and 1. It is especially well adapted to computer use since 0 and 1 can be represented as on and off or negative charges and positive charges. The binary digits appear in strings of 0's and 1's. Most computers do their calculations in binary.

Bit

The commonly used abbreviation for binary digit. A bit is the smallest unit of information recognized by a computer, and is a unit of information corresponding to a choice between two alternatives (such as one and zero).

Bits Per Second (bps)

The basic unit of data communications rate measurement. Usually refers to rate of information bits transmitted.

Bit Error Rate Testing (BERT)

Testing a data line with a pattern of bits which are compared before and after the transmission to detect errors.

Bit Rate

The rate at which bits (binary digits) are transmitted over a communications path. Normally expressed in bits per second (bps). The bit rate is not to be confused with the data signaling rate (Baud) which measures the rate of signal changes being transmitted.

Block

A group of characters, bytes, or words communicated as a unit.

Blocking

A condition in a switching system in which no paths or circuits are available to complete a call and a busy tone is returned to the calling party. In this situation there is no alternative but to hang up and try the call again. Also referred to as denial or busy condition.

Block Error Rate Testing (BLERT)

Testing a data line with groups of information arranged into transmission blocks for error checking.

Burrough's Data Link Control (BDLC)

A bit-oriented protocol.

Binary Coded Decimal (BCD)

A binary-coded notation in which each of the decimal digits is represented by a binary numeral, e.g., in binary-coded decimal notation that uses the weights 8-4-2-1, the number "twenty three" is represented by 0010 0011 (compare its representation 10111 in the pure binary numeration system).

Binary Synchronous Communications

A half-duplex, character-oriented data communications protocol originated by IBM in 1964. It included control characters and procedures for controlling the establishment of a valid connection and the transfer of data. Also called bisync and BSC. Although still enjoying widespread usage, it is being replaced by IBM's more efficient protocol, SDLC.

Bell Operating Companies (BOC's)

The 7 Regional Operating Companies created since divistiture of AT&T.

Bypass

The act of going around the local central telephone company office, with customer premises equipment.

Carrier

A signal of known characteristics (for example, frequency) that is altered (modulated) to transmit information. Knowing the expected signal, the receiving terminal interprets any change in signal as information. Changes to the signal made by outside influences (noise) can cause the receiving terminal to misinterpret the information transmitted.

Centrex

A type of private branch exchange service where incoming calls may be dialed direct to extensions without operator assistance. Out-going and intercom calls are dialed by extension users.

Channel

(1) In data communications, a one-way path along which signals can be sent between two or more points. Contrast with circuit. (2) In telecommunications, a transmission path (may be one-way or two-way, depending on the channel) between two or more points. Provided by a common carrier; also called a link, line, circuit, or facility.

Character

A language unit composed of a group of bits.

Character Error Rate Testing (CERT)

Testing a data line with test characters to determine error performance.

Circuit

A two-way path along which signals can be sent between two or more points. Also see channel.

Clocking

Time synchronizing of communications information.

Cluster

A group of user terminals co-located and connected to a single controller through which each terminal is afforded the opportunity to access a single communication line.

Cluster Control Unit

A device, such as the 3274 Control Unit, that can control the input/output operations of more than one terminal, such as a group (cluster) of 3278 Display Stations.

Common Carrier

A company that furnishes communication services to the general public at public regulated prices. In data communications, a public utility company that is recognized by an appropriate regulatory agency as having a vested interest and responsibility in furnishing communication services to the general public; Bell, MCI, GTE.

Communication

Transmission of intelligence between points of origin and reception without alteration of sequence or structure of the information content. See also data communication.

Communication Controller

A type of communications control unit whose operations are controlled by a program stored and executed in the unit. Examples are the IBM 3704 and 3705 Communication Controllers.

Computerized Branch Exchange (CBX)

A telephone switch that controlled by a computer.

Computerized in-house telephone system.

Concentrator

An electronic device which interfaces in a store-and-forward mode with multiple low-speed communication lines at a message level and then retransmits those messages via one or more high-speed communications lines to a processing site.

Consultative Committee on International Telephone and Telegraph (CCITT)

This United Nations group is currently setting up worldwide communication standards.

Contention

Competition by users for the use of the same communications facilities; a method of line control in which terminals request or bid to transmit. If the channel is not free, the terminals must wait until the channel is free.

Control Character

A coded character which does not print but initiates some kind of machine function such as a carrier return.

Conversational Monitor System (CMS)

A component of VM/370 which provides a high performance, interactive computing system suitable for general problem solving and program development and which can serve as a base for interactive applications.

Customer Information Control System (CICS)

An IBM data base/data communication (DB/DC) program product that provides an interface between the operating system access methods and applications programs to allow remote or local display terminal interaction with the data base in the central processor. Different versions include Time Management facilities and support for bisync, dial-up, PL/1 support and expanded data base control items such as file browsing, dynamic file open and close.

Converter

A device capable of converting impulses from one mode to another, such as analog to digital, or parallel to serial, or from one code to another.

Cyclic Redundancy Check

A powerful error detection technique. Using a polynomial, a series of two 8-bit block check characters are generated that represent the entire block of data. The block check characters are incorporated into the transmission frame, then checked at the receiving end.

Data

Any type of information, such as numbers, letters, or symbols that can be processed by a computer.

Data Access Arrangement (DAA)

A telephone-switching system protective device used to attach non-telephone-company-manufactured equipment to the carrier network.

Data Communication Equipment (DCE)

The equipment installed at the user's premises which provides all the functions required to establish, maintain and terminate a connection, the signal conversion and coding between the data terminal equipment and the common carrier's line, e. g., data set, modem.

Data Communications

A broad term covering any exchange of information between computers or similar systems over telephone lines.

Data Compression

A technique that saves storage space by eliminating gaps, empty fields, redundancies, or unnecessary data to shorten the length of records or blocks. For data transmission a byte string of data is transmitted as a count plus a string value.

Data Integrity

A performance measure based on the rate of undetected errors. See also integrity.

Data Language/I (DL/I)

Used for reducing application program and file maintenance while allowing more sharing of data by multiple programs and users.

Data Link

The physical connection and the connection protocols between units that exchange data over a communication line.

Dataphone Digital Service (DDS)

An AT&T leased line service offering digital transmission at speeds ranging from 2400 bps to 1.544M bps.

Data Terminal

Data processing equipment that is used for collection, use, or transfer of data.

Data Terminal Equipment (DTE)

Equipment comprising the data source, the data sink, or both that provides for the communication control function (protocol). Data termination equipment is actually any piece of equipment at which a communications path begins or ends.

Decibel (dB)

Power level measurment unit. 1/10 Bel.

Demodulation

The opposite of modulation; the conversion of a signal from analog to its original (e.g., digital) form.

Dial-up Line

A communications circuit that is established by a switched circuit connection.

Dibit

A pair of bits treated as one information element. In modulation schemes with more than two states, multiple bits are represented by each state. The term "dibit" originally was used for the AT&T 201 series of modems, which used four phase states to encode information; each state could therefore represent two bits.

Digit

A character used to designate a quantity. The decimal system uses the digits 0-9; binary sytem: 0-1; hexadecimal system: 0-F. See also binary digit.

Digital

Referring or pertaining to a signaling technique in which a transmission is conveyed by generating pulses of electromagnetic energy in a discontinuous (i.e., on/off) coded pattern representing, for example, bits in a data stream. Contrast with analog.

Digital Data Communications Message Protocol (DDCMP)

A Digital Equipment Corporation data communications line protocol.

Digital Service Unit or Data Service Unit (DSU)

A device for amplifying, timing and converting unipolar digital signals into bipolar digital signals suitable for transmission to the Central Office.

Direct Access Storage Device (DASD)

A device in which the access time is effectively independent of the location of the data.

Direct Distance Dialing (DDD)

A means for making long-distance telephone calls over the switched telephone network without operator assistance.

Disk Operating System/Virtual Storage Extended (DOS/VSE)

Disk resident virtual storage operating system. Runs on S/370 (Model 115-158), 3031 and 43XX.

Distributed Office Support System (DISOSS)

A collection of systems and software that is aimed at integrating the various pieces of the IBM office product. It is the foundation for much of the work in the DIA/DCA area.

DPPX/Data Base and Transaction Management System (DPPX/DTMS)

An online transaction system which runs on the 8100 under DPPX. Similar to CICS/VS for 370 users.

DPPX/Interactive Productivity Facility (DPPX/IPF)

DPPX/SP

A program product which provides a simplified, full-screen, interactive interface to the DPPX command facility.

Document Interchange Architecture (DIA)

An access protocol to allow the transmission of documents over an SNA type of network. It relies heavily on the Advanced Program to Program Communication (APPC) technique.

Document Content Architecture (DCA)

A method of defining the rules and format of documents which are known to programs and other systems. This scheme requires the program to format and store or transmit known formats between applications.

Dual In-Line Package (DIP)

The most common integrated circuit package having dual, or parallel rows of pins at 0.1 inch intervals.

Dumb Terminal

A device with a keyboard for inputting data and a display screen for the output of data but lacking local processing capability. A dumb terminal provides remote access to a computer but can not itself be programmed.

Duplex

(1) (ISO) In data communication, pertaining to a simultaneous two-way independent transmission in both directions. Synonymous with full duplex. (2) Contrast with half-duplex.

Electronics Industries Association (EIA)

A standards organization specializing in electrical and functional characteristics of interface equipment.

Electronic Switching System (ESS)

A type of telephone switching system which uses a special-purpose stored program digital computer to direct and control the switching operation. ESS permits the provision of custom calling services such as speed dialing, call transfer, three way calling, etc.

Emulation

The use of programming techniques and special machine features to permit a computing system to execute programs written for another system. This form of imitation is primarily done via software. Emulation is generally used to minimize the impact of conversion from one computer system to another, and is used to continue the use of production programs--as opposed to "simulation" which is used to study the operational characteristics of another (possibly theoretical) system.

Error Detection and Correction

A system employing an error detecting code and so arranged that a signal detected as being in error automatically initiates a request for retransmission.

Extended Binary-Coded Decimal Interchange Code (EBCDIC)

A coded character set consisting of 8-bit coded characters. EBCDIC is the usual code generated by synchronous IBM devices.

Facsimile (FAX)

A system for the transmission of images. The image is scanned at the transmitter, recontructed at the receiving station, and duplicated on some form of paper.

Federal Communication Commission (FCC)

A board of commissioners empowered to regulate all interstate communications between the U.S. and abroad.

Foreign Exchange Service (FEX)

A service that connects a customer's telephone to a remote exchange. This service provides the equivalent of local telephone service to and from the distant exchange.

Forward error correction (FEC)

The technique which provides for the transmittal of additional information with the original bit stream such that if an error is detected the correct information can be recreated at the receiving end without a retransmission.

Four-wire Channel

Provision of two wire pairs (or logical equivalent) for simultaneous two-way transmission.

Four-wire Circuits

Indicates the capability of the switching system to accomodate connections to special 4-wire circuits.

Framing bits

In data transmission, noninformation carrying bits used to make posssible the separation of characters in a bit stream. Synonymous with sync bits.

Frequency division multiplexing (FMD)

Division of the available transmission frequency range into narrower bands eachof which is used for separate channels.

Frequency modulation (FM)

A method of transmission whereby the frequency of the carrier wave is changed to correspond to changes in the wave signal.

Frequency shift keying (FSK)

A method of frequency modulation in which frequency is made to vary at significant instants by smooth as well as abrupt transitions.

Front end

An auxiliary computer system which performs network control operatons, relieving the host computer system to do data processing.

Full/full duplex

A protocol which, when operating on a multidrop line, is capable of transmitting from the master location to one of the slave sites and, at the same time, the master location can receive a transmission from a different slave site on the same line.

Front-end Processor

A communications processor to regulate the flow of information between the host computer and other elements of a communications system.

Full/full duplex

A protocol which, when operating on a multidrop line, is capable of transmitting from the master location to one of the slave sites and, at the same time, the master location can receive a transmission from a different slave site on the same line.

Front-end Processor

A communications processor to regulate the flow of information between the hostcomputer and other elements of a communications system.

Full-duplex

Pertaining to the capability to transmit in two directions simultaneously.

Geosynchronous

A communications satellite orbit at the correct distance from the earth and at the correct speed to appear fixed in space as the earth rotates.

Half-duplex

Pertaining to the capability to transmit in two directions but not simultaneously.

Handshake

An exchange of control sequences between two locations to set up the correct parameters for transmission.

Houston Automatic Spooling Priority (HASP)

A computer program that provides supplementary job management, data management, and task management functions such as control of job flow, ordering of tasks, and spooling.

High level Data Link Control (HDLC)

An ISO standard data communications line protocol.

Information Management System/Virtual System (IMS/VS)

IBM data base management software system that also provides communications monitor functions.

Integrated Services Digital Network (ISDN)

Intelligent Terminal

A terminal that can do editing, error checking and is programmable.

Interactive Processing

The exchange of information and control between the user and a computer on a current basis; not in batch mode. Also called conversational.

Interface

A shared boundary. An interface might be a hardware component to link two devices or it might be a portion of storage or registers accessed by two or more computer programs.

International Standards Organization (ISO)

An international federation of national standards organizations which also becomes involved in developing standards, including communication standards.

Institute of Electrical and Electronic Engineers (IEEE)

Job Entry Subsystem (JES)

A system facility for spooling, job queuing, and managing I/O under MVS.

Leased Line/Private Line/Dedicated Line

A communications line for voice and/or data leased from a communcations carrier on a monthly basis.

Limited Distance Modem

A short-haul modem or line driver that operates over a limited distance. Some limited distance modems operate at higher speeds than modems that are designed for use over analog telephone facilities, since line conditions can be better controlled.

Line Driver

An alternative device to a modem when transmitting via EIA cable over short distances, (e.g., a few hundred feet.) The line driver amplifies the signal and reshapes distorted pulses.

Line Hit

A disturbance causing a detectable error on a communications line.

Line protocol

A control program used to perform data communications functions over network lines. Consists of both handshaking and line-control functions which move the data between transmit and receive locations.

Local Area Network

A user-owned, user-operated, high-volume data transmission facility connecting a number of communicating devices (computers, terminals, word processors, printers, mass storage units, robots, etc.) within a single building or campus of buildings.

Loop Current

A teletypewriter to line interface and operating technique without modems.

Management Information System (MIS)

(1) Management performed with the aid of auto-matic data processing. (2) An information system designed to aid in the performance of management functions.

Mark

The signal (communications channel state) corresponding to a binary one. The marking condition exists when current flows (current-loop channel) or when the voltage is more negative than -3 volts (EIA RS-232-C channel).

Metallic circuit

A physical wire between two points as opposed to microwave or fiber optics.

Modem Eliminator

A device for connecting two DTE interfaces physically and logically without requiring intervening modems.

Multidrop or Multipoint

A single line which can have one or more terminals connected. Communication is done on a time shared basis.

Multiplex

Combines signals of multiple channels into one channel.

Modem

A device to convert computer signals into a form that is suitable for transmission over telephone lines.

Modulation

The application of information onto a carrier signal by varying one or more of the signal's basic characteristics (frequency, amplitude or phase); the conversion of a signal from its original (e.g., digital) format to analog format.

Multiple Virtual Storage (MVS)

An alternate name for OS/VS2, release 2.

"Negative Acknowledge" Character (NAK)

A transmission control character that indicates a block of data was received incorrectly.

Network

A computer communications system consisting of one or more terminals communicating with a single host computer system, which acts as the network control component through internal programming or perhaps through a front end processor. The chief characteristic of a network is the single, controlling host computer system, which may include multiple processors. The general use of the word "network" to mean a collection of interconnected components is no longer precise, just as the word "system" no longer carries the connotation of close proximity of components.

Network Address

In SNA, the address, consisting of subarea and element subfields, that uniquely identifies a link or the location of a network addressable unit. The conversion from a local address to a network address, or vice versa, is accomplished as part of the boundary function in the node attached to a cluster controller node or a terminal node.

Network Control Program (NCP)

Resides in the 3705 Communications Controller and provides the physical management of the communicaton network. Its main function is to control attached lines and terminals, perform error recovery and route data through the network. NCP communicates with the host through VTAM, EXTM, ACP, TCAM or through another NCP.

Network Terminal Option (NTO)

A software protocol converter that resides in the front-end processor

Non-Return-To-Zero (NRZ)

Pertains to both magnetic recording and communications

Non-Return-To-Zero-Inverted (NRZI)

Non-Switched Lines

A communications link which is permanently installed between two points.

Off Hook

Activated (in regard to a telephone set). By extension, a data set automatically answering on a public switched system is said to go "off hook."

On-line System

A data communications system associated with a computer which processes data as it is received by the computer.

Open System Interaction (OSI)

Layered data communication model, or architecture, developed by the International Standards Organization.

Operating System/Virtual Storage 2 (OS/VS2)

A compatible extension of the IBM System 360 Operating System that supports relocation hardware and the extended control facilities of System/370.

OS Disk Operating System/Virtual Storage Extended (OS/ DOS/VSE)

Partitioned Emulation Program (PEP)

Packet Assembler/Disassembler (PAD)

A software module that receives characters from terminals, assembles them into packets and sends them down the line. The receiving end disassembles the packets and sends the characters to the terminal.

Packet Switching

A data transmission technique in which a long message is broken into smaller units called packets. These packets can be individually addressed and routed throughout the network using several different routes. The receiving end node ascertains that all packets are received and in the proper sequence before forwarding the complete message to the addressee.

Parity

A constant state or equal value. Parity checking is one of the oldest error checking techniques. Character bit patterns are forced into parity (total number of one bit odd or even) by appropriately adding a one or zero bit as appropriate, as they are transmitted; the parity (odd or even) is then verified upon receipt by the receiving device.

Parity Bit

A check bit appended to an array of binary digits, to make the sum of all the binary digits, including the check bit, always off or always even.

Phase Shift Keying (PSK)

A method of modulation that uses the differences in phase angle to indicate a certain bit or dibit. A reference oscillator determines the phase angle change of the incoming signal, which in turn determines which bit or dibit is being transmitted.

Point-to-Point

Pertaining or referring to a communications line where exactly two stations are connected. Contrast with multipoint.

Polling

A procedure which asks a terminal on a network if there is any information to transmit; usually done on a multipoint line.

Private Automatic Branch Exchange (PABX)

An automatic switchboard for handling large concentrations of telephones (extensions). Synonymous with PBX.

Professional Office System (PROFS)

A IBM VM based product that supports the functions of calendar management, electronic mail, project scheduling, and the execution of a variety of analysis tools. Its focus is the manager or the professional.

Protocol

A set of procedures for establishing and controlling transmissions. Examples include BSC and SDLC.

Protocol Conversion

The process of translating the protocol native to an end-user device (e.g., a terminal) into a different protocol (e.g., ASCII to BSC), allowing that end-user device to communicate with another device (e.g., a computer) with which it would otherwise by incompatible. Protocol conversion can be performed by a dedicated device (a "protocol converter"), by a software package loaded onto an existing system, such as a general-purpose computer, front-end processor, or PBX system, or by a value-added network, such as Telenet.

Pulse Modulation

The modulation of the characteristics of a series of pulses in one of several ways to represent the information-bearing signal. Typical methods involve modifying the amplitude. (PAM), width or duration (PDM), or position (PPM). The most common pulse modultation technique in telephone work is pulse code modulation (PCM). In PCM, the information signals are sampled at regular intervals and a series of pulses in coded form are transmitted, representing the amplitude of the information signal at that time.

Public Data Network (PDN)

A networking service which fulfills all communication needs between the host computer and other processors and terminals.

Physical Unit (PU)

Quadrature Amplitude Modulation   (QAM)

16 level encoded Amplitude Modulation.   Speed is
usually 9,600 to 14,400 BPS.

Real Time

Pertains to a computer application whose
response is a time frame almost simultaneous
or within milliseconds of the actual event.

RS-232-C

A physical and electrical interface between
computers, terminals, modems, and communications
lines. A recommended standard developed by the
Electronics Industries Association.

RS-422 and RS-423

Recommended Standards published by the Elec-
tronic Industries Association establishing the
interface requirements between modems and ter-
minals or computers.

Remote Job Entry (RJE)

An HP software program which allows you to sub-
mit jobs grouped together. Also called batch
processing.

Serial Transmission

The transmission of a character or byte of data
one bit at a time. Contrast with parallel.

Session

(1) The engaging of two end-user processes
in a logical connection.   (2) Layer 5 of the
International Standards Organization (ISO) Open
Systems Interconnection(OSI) reference model for
network architectures.

Signal-to-Noise Ratio

The relative power of signal to the noise on a
line. As the ratio decreases, it becomes more
difficult to distinguish between information and
interference.

Simplex

Pertaining to the capability to transmit in one
direction only.   Contrast with half-duplex and
full-duplex.

Single-wire Line

A transmission line that uses the ground as one
side of the circuit.

Smart Terminal

A terminal that can input data, receive results,
and be preprogrammed

Space

(1) An impulse which, in a neutral circuit,
causes the loop to open or causes absence of
signal, while in a polar circuit it causes the
loop current to flow in a direction opposite
to that for a mark impulse. A space impulse is
equivalent to a binary 0.   (2) In some codes,
a character which causes a printer to leave a
character width with no printed symbol.

Star

A network topology in which each station is
connected only to a central station by a
point-to-point link, and communicates with all
other stations through the central station.

Start Bit

In asynchronous transmission, a signal used to
signify the beginning of the transmission of a
character.

Stop Bit

In asynchronous transmission, the quiescent
state following the transmission of a character;
usually required to be at least 1, 1.42, 1.5 or
2 bit times long.

Switch Hook

A switch on a telephone set, associated with the
structure supporting the receiver or handset.
It is operated by the removal or replacement of
the receiver or handset on the support.

Switched Line

One of a series of lines that can be inter-
connected through a switching center; a line on
the public telephone network. Contrast with
"leased line".

Synchronous

Having a constant time interval between suc-
cessive bits, characters, or events. Synchronous
transmission uses no redundant information (such
as the start and stop bits in asynchronous
transmission) to identify the beginning and end
of characters, and thus is faster and more effi-
cient than asynchronous transmission. The
timing achieved by transmitting sync characters
prior to data; usually, synchronization can be
achieved in two or three characters times.

Synchronous Communications Binary

A set of operating procedures for synchronous transmission used in IBM teleprocessing networks. With BISYNC, some system batch terminals automatically perform error checking on all incoming data and request retransmission of a message whenever it is not received exactly as sent. As a transmitting terminal, the system automatically retransmits messages when they are not accurately received by the remote station. Because of the reliability of data transmissions using binary synchronous methods, it becomes economical to collect and store large amounts of data at the processor using either cassettes or a mass memory subsystem and to later transmit the data to computers or terminals, including other systems.

Synchronous Data Link Control (SDLC)

An IBM communications line discipline or protocol associated with SNA. In contrast to BSC, SDLC provides for full-duplex transmissions and is more efficient.

Synchronous Transmission

A mode of data communcations by which the bit stream and character stream are slaved to accurately synchronized clocks at the receiving and transmitting stations. Start and stop pulses are not required with each character.

System

An organized collection of parts or procedures united by regulated interaction and interconnected to perform a function.

Systems Network Architecture (SNA)

The total description of the logical structure, formats, protocols, and operational sequences for transmitting information units through the communication system. Communication system functions are separated into three discrete areas; the application layer, the function management layer, and the transmission subsystem layer. The structure of SNA allows the ultimate origins and destinations of information--that is, the end users--to be independent of, and unaffected by, the specific communication-system services and facilities used for information exchange.

System Generation (SYSGEN)

The process of using an operating system to assemble and link together all of the parts that constitute another operating system.

Tariff

The published rate for a specific unit of equipment, facility, or type of service provided by a communications common carrier. Also the vehicle by which the regulating agencies approve or disapprove such facilities or services. Thus the tariff becomes a contract between customer and common carrier.

Telecommunications

Transmission of electrical signals over long distances, such as by radio, telegraph or telephone lines.

Teleprocessing

A communications system combining two technologies, data processing and telecommunications. Originally, an IBM trademark.

Telex

A generic name for the international network of teleprinter subscriber services. Western Union provides such services within the U.S. and abroad under its Telex and Telex II trademarks. International record carriers (IRC'S) are now permitted to extend their telex services to the domestic U.S.

Terminal

Hardware device connected to a computer, used for inputting and receiving data. See Dumb Terminal, Smart Terminal, Intelligent Terminal.

Time Sharing Option (TSO)

A full-function time sharing system that provides interactive computing for the large system environment. It is an integral part of MVS.

Transparency

A transmission mode in which control character recognition is "suspended", allowing any bit pattern to be transmitted without unexpected results. The rules for control code recognition are changed so that commands involving specific operations, for example, Escape sequences, are not acted upon, but simply transmitted as data. Even in transparency mode, certain commands remain active; otherwise, once in transparency mode, there would be no way to get out of it.

Token Passing

A local area network access technique in which participating stations circulatea special bit pattern (the token) that grants access to the network to each station in sequence, often used in networks with a ring topology.

Topology

The logical or physical arrangement of stations on a network in relation to one another. See ring and star.

Touch-Tone

An AT&T trademark for tone signaling equipment, which is superseding rotary dial equipment. Use of tones simplifies the switching system design and greatly expands the potential for adding features to telephone systems. It also speeds up the dialing operation for a person making a call.

Two-wire channel

A circuit containing a single wire pair (or logical equivalent) for non-simultaneous (i.e., half-duplex) two-way transmission.

Teletypewriter Exchange Service (TWX)

A switched teletypewriter service in which suitably arranged teletypewriter stations are provided with lines to a central office for access to other such stations throughout the U.S. and Canada.

Value Added Network   (VAN)

A common carrier service which has been upgraded by a communication service.

Virtual Storage (VS)

The national storage space that may be regarded as addressable main storage by the user of a computer system in which virtual addresses are mapped into real addresses. The size of virtual storage is limited by the addressing scheme of the computing system and by the amount of auxiliary storage available, and not by the actual number of main storage locations.

Virtual Storage Access Method (VSAM)

An access method for direct or sequential processing of fixed and variable-length records on direct access devices. The records in a VSAM data set or file can be organized in logical sequence by a key field (key sequence), in the physicalsequence in which they are written on the data set or file (entry-sequence), orby relative-record number.

Virtual Telecommunications Access Method/Network Control Program (VTAM/NCP)

A set of programs that control communication between terminals and application programs running under DOX/VS, OS/VS1, AND OS/VS2.

Voice-grade Channel

A channel with bandwidth equivalent to a telephone line obtained through the public telephone network. The maximum potential bandwidth of a voice-grade channel is approx- imately 20K hertz; however, most voice-grade channels in a transmission facility are usually spaced 4000 Hz apart, and not all of the band- width is generally available to a user due to the presence of noise-limiting loading coils; the telephone network itself is usually defined in terms of channels with frequencies of from 300 Hz to 3400 Hz.

V.21

300 bps duplex modem standard for use on the general switched network

V.22

1200 bps duplex modem standard for use on the general switched telephone network and on leased circuits.

V.23

600/1200 bps modem standard for use on the general switch network

V.24   CCITT equivalent to EIA RS-232C standard

Wideband channel

Referring or pertaining to an analog circuit that provides more bandwidth than a voice-grade telephone line, i.e., a circuit that operates at a frequency of 20K Hz or greater. Wideband (also known as broadband) channels are used for high-speed voice and data communications, radio and television broadcasting, some local area data networks, and many other services.

Workstation

An intelligent terminal.

X.3

Packet Assembly/Disassembly facility (PAD) in a public data network

X.21

Interface between DTE and DCE equipment for synchronous operation on public data networks.

X.25

A protocol developed by CCITT, the standards writing organization for international tele- phone carriers, for packet swtiching procedures (governing the exchange of data units between the public data network and the user).

IBM by the Numbers

Series 1 Minicomputer Model 495X, 32K-512K,
System 23 Datamaster / 8086 Microprocessor 64K-128K
System/34

> General purpose minicomputer system for all types
> of smaller businesses. Uses the SSP operating
> system. Supports the 5250 Information Display
> System family of terminal and printers in local and
> remote environments. BSC or SDLC communications is
> supported. Supports programming in RPG II, COBOL,
> and BASIC.

System/36 General Purpose minicomputer
System/38

> Multi-user, general purpose SP sytem with a virtual
> design. Uses the CPF operating system. Supports
> the 5250 Information Display System family of
> terminals and printers in local and remote
> environments. Only SDLC data communications is
> supported. Supports programming in RPG and COBOL.

360 Mainframe Computer
370 Mainframe Computer

> Models 138, 148, 158, 168, 195

XT/370 Mainframe in a micro box 68000 & 8088
650 Discontinued Mainframe
1401 Discontinued Mainframe
1403 Printer
1443 Printer
2250 Display Unit
2550 Single Cluster Feature
2551 Dual Cluster Feature
2704 Discontinued Front End Processor
2770 Bisync batch workstation
2780 Bisync batch workstation

303X (1,2,3) Maniframe

> Full range of high performance processor for large
> system environements with 2-32 MB processor
> storage. 5 - 2 block multiplexor channels.

308X (1,3,4) IBM's largest series of processors

3178 Display Station Models C1, C2 - Less expensive 3278
3179 Display Station - cheaper 3279 type color display
3180 Display Station
3203 Line Printer, up to 1200 lpm
3211 Line Printer, up to 2000 lpm
3230 Dot Matrix Printer, up to 350 cps
3262 Line Printer, Model 1,5 - 650 lpm, Model-11 325 lpm
3268 Printer 340 cps
3270 PC - Communications Terminal & computer
3271 Bisync cluster controller

Device Control Unit - a controller for the 3270
Information Display System family of displays and
printers (type B devices).

Models:

1 - 480-character buffer/BSC line control
2 - 1920-character buffer/BSC line control
3 - 480-character buffer/SDLC line control
4 - 1920-character buffer/SDLC line control

Features:

Remote cluster - up to 32 devices attachable
Line speed up to 7200 bps for BSC (9600 via RPQ)
Line speed up to 9600 bps for SDLC

3272 Device Control Unit (type B devices)

Models:

1 - 480-character buffer
2 - 1920-character buffer

Features:

Local cluster - up to 32 devices attachable
Data transfer to channel up to 650,000 bps

3274 Models 21A, 21B, 21D, 31A, 41A, 41D (local)

Floor standing Cluster Controller

3274 51C, 61C Models A,B,C,D

Model 51C - Features Attaches up to eight type A
and four type B devices. Supports full range of
3270 display and printer products.

3275 Bisync workstation, terminal and printer
3276 SNA cluster controller and terminal
3276 Models 1, 2, 3, 4, BSC or SDLC
     Models 11, 12, 13, 14 SDLC protocol

Control Unit Display Station

Models:

1 - 960-character buffer/BSC
11- 960-character buffer/SDLC
2 - 1920-character buffer/BSC
12- 1920-character buffer/SDLC
3 - 2560-character buffer/BSC
13- 2560-character buffer/SDLC
4 - 3440-character buffer/BSC
14- 3440-character buffer/SDLC

Features:
Remote small cluster - up to 8 devices attached
Lease line facility up to 7200 bps (BSC) or 9600
bps (SDLC). Public switched network up to 4800 bps.

3277 Batch Terminal
3278 Display Station

Models:

1 - 960-character buffer (12x80)
2 -1920-character buffer (24x80)
3 -2560-character buffer (32x80)
4 -3340-character buffer (43x80)
5 -3564-character buffer (27x132)

Features:
Attaches to 3274 and 3276. Model 5 not attachable to 3274B or 3276.

3279 Color Display Station

Models:

2A - 1920-character buffer (24x80) Four colors.
3A - 2560-character buffer (32x80) Four colors.
2B - 1920-character buffer (24x80) Seven colors.
3B - 2560-character buffer (32x80) Seven colors.

3287 Printer

Models:
1 - 80 cps, 132 print positions
2 - 120 cps, 132 print positions
11- 80 cps, 132 print positions
12- 120 cps, 132 print positions

Features:
Model 1 and 2 attachable to 3271, 3272, 3274, 3276,

3289 Line Printer, up to 120 cps
3290 Plasma Display Information Panel
3299 Multiplexer
3330 Disk Storage Unit
3333 Disk Storage Unit
3370 Disk Storage Unit
3375 Disk Storage Unit
3540 Diskette Input/Output Unit
3600 Banking System
3601 Finance Controller
3650 Retail System
3660 Supermarket System
3694 Document Processor
3701 EIA/CCITT Interface
3704

Communications Controller. Withdrawn from production in August 1978. Contains 64K bytes of storage and can handle up to 34 half-duplex lines.

3705

Communications controller that provides for the physical management of the communcatons network. It can be locally attached or can operate as a remote communications controller. The 3705 has a maximum storage capacity of 512K memory which is used to store the control program and to buffer incoming and outgoing traffic. The control program can be NCP (Network Control Program) or EP (Emulation Program-270X emulation). Provides attachment facilities for asynchronous, binary synchronous (BSC), and synchronous data link control (SDLC) protocols.
Can handle up to 352 lines.

3725 Communications Controller
3736 Daisy Wheel Printer
3740 8" Diskette Format
3776 Batch/Cluster Controller/workstation
3777 Batch Terminal
3790 Programmable Terminal
3800 Printer Model 1 and 3
3830 Storage Control Unit Models 2 and 3
3851 Mass Storage Facility
3880 Storage Control Unit
3865 Model 1 (2400/1200 bps) modem
3864 Model 1 (4800/1200 bps) modem
3865 Model 1 and 2 (9600/4800 bps) modem
3872 Model 1 (2400/1200 bps) modem

4321

Minicomputer - Pre-configured entry-level 4300 processor with 1MB processor storage. Display/Printer Adapter which permits attachment of 3278 Model 2A or 3279 Model 2C plus up to 15 additional A-type devices such as 3262 line 1C and 2C, or 3289 line printers Model 4.

4331

Mid-size minicomputer processor with 1-4MB processor storage. One standard byte multiplexor channel. One standard block multiplexor channel which can support up to 128 devices. Console/printer adapter for up to 15 A-type printers/displays.

4341

High performance and high function System/370-compatible 4300 processor with 2-16MB processor storage. 2 block multiplexor channels. Console/printer adapter.

4381 4-16 Megabytes, 12 I/O channels, air cooling
4701 Finance Controller
4962 Disk Storage Unit
4963 Disk Subsystem
4964 Diskette unit
4969 Magnetic Tape Subsystem
497X Printers
497X Display Stations
4987 Programmable Communications Subsystem
5110 Desktop Computer
5120 Desktop Computer
5150 IBM PC
5160 IBM PC XT
5203 Printer Model 3
5210 Daisy wheel printer
5211 Line Printers up to 300 lpm
5213 Printer
5224 Printers Model 1 - 140 lpm, Model 2 - 240 lpm
5225 Printers

Model 1 - 280 lpm Model 2 - 400 lpm,
Model 3 - 490 lpm Model 4 - 560 lpm

5234 Time Entry Station
5235 Data Entry Station
5251 -11 Display Station
5251 -12 Cluster Controller/display terminal
5252 Dual Display Station

5256 Printers

    Model 1- 40cps, Model 2- 80 cps, Model 3- 120 cps

5280 Distributed Data System
530X Workstation Controller
5500 Modem 1200 bps, Nonswitched
550X Modem 1200 bps, Switched
5520 Administrative System
564X Modem 2400 bps
574X Modem 4800 bps
5798-RHE System 38 Front End Processor - Software
6670 Information Distributor
7426 Terminal Interface Unit - Protocol Converter
7850 Teletypewriter Adpater
81XX Distributed processing computer series

    8130
    8140
    8150

9000 Instrumentation System 68000 - Xenix

Reading List - Synchronous Products

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Box 880 Cochituate Road
Framingham, MA 01701

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McGraw-Hill
1221 Avenue of the Americas
New York, NY 10020

Data Decisions
20 Brace Road
Cherry Hill, NJ 08034

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Kenneth Sherman
Reston 1981

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IBM Corporation, Information Development,
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Jerry FitzGerald & Tom S. Eason
John Wiley & Sons 1978

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Reston Publishing 1983

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