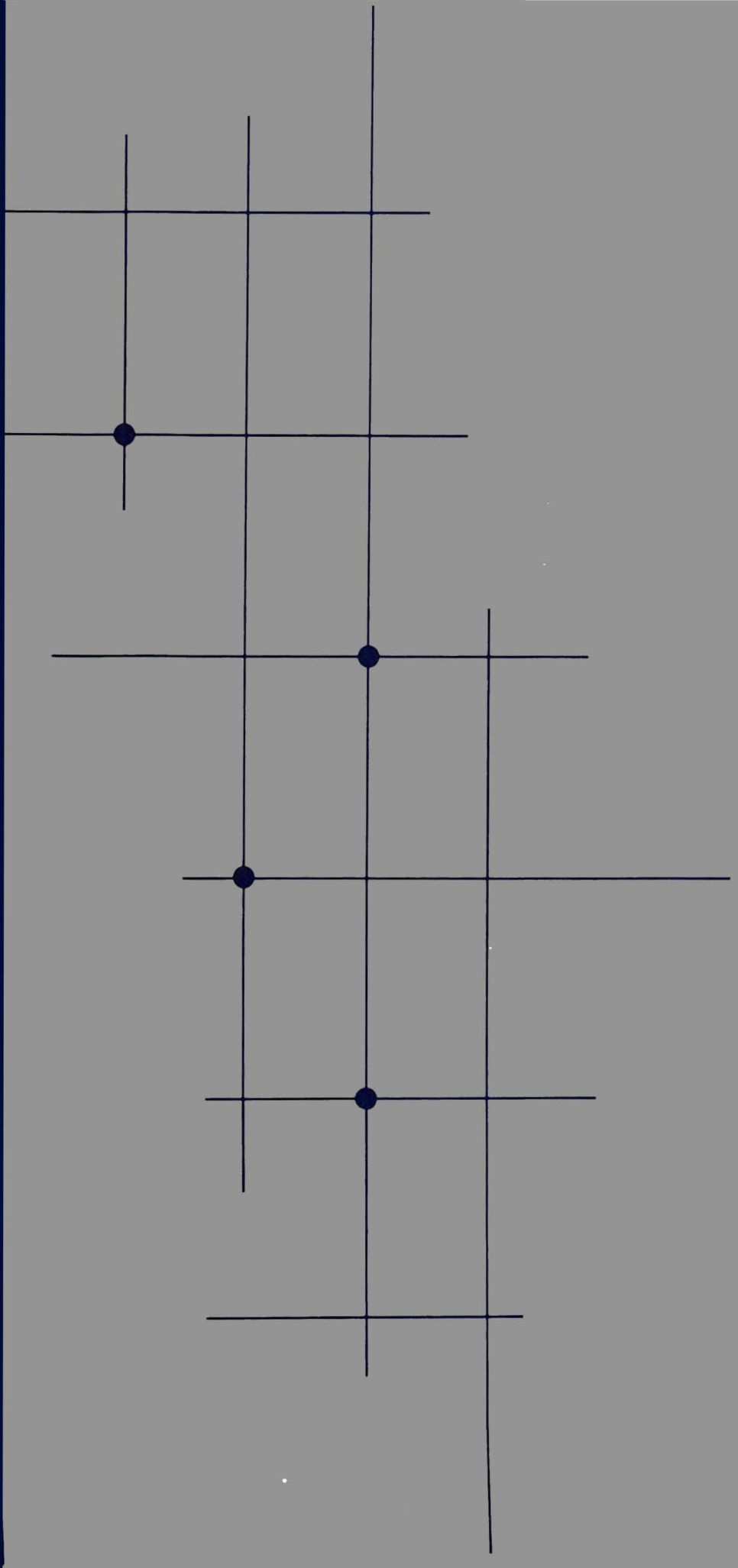
Systems Network Architecture



Concepts and Products

IBM

GC30-3072-3

Systems Network Architecture

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GC30-3072-3
File No. GENL-30 (SNA)

Fourth Edition (October 1986)

This edition obsoletes GC30-3072-2 and replaces it in its entirety.

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Preface

This book introduces IBM's Systems Network Architecture (SNA) to people who need to know about its basic concepts, potential benefits, and the IBM products that it supports.

Who Should Read This Book

Systems Network Architecture Concepts and Products is the basic book about SNA for customer executives, data processing managers, system designers, programmers, and other data processing personnel who are evaluating IBM's approach to data processing and communication.

How This Book Is Organized

Chapter 1 introduces SNA and tells you what it can do for your organization.

Chapter 2 provides an overview of the major components of an SNA network.

Chapter 3 describes basic SNA concepts.

Chapter 4 discusses some ways you can manage an SNA network.

Chapter 5 lists and describes some IBM products that you can use to implement an SNA-based communication network.

A list of abbreviations and a glossary of terms appear before the index.

What Else To Read

Refer to *Systems Network Architecture Technical Overview*, GC30-3073, for more detailed information about SNA.

The *Guide to SNA Publications* (GC30-3438) describes a number of other publications about SNA.

Contents

Figures

Chapter 1. Evaluating SNA

This chapter provides you with information to evaluate Systems Network Architecture (SNA).

What Is Systems Network Architecture?

As the needs of your organization continue to change and more people require fast and accurate exchanges of information, a plan for developing a communication network becomes more important. IBM designed Systems Network Architecture (SNA) to address your data processing and communication needs. As an architecture, SNA specifies how products connect and communicate with one another.

Consider the architectural plan for a house. You know what kind of house you want, but you do not know the intricate details involved in designing one. So you ask an architect familiar with those details to design the house, specify the building materials, and locate the house on the land. The completed house meets your needs, while maintaining a functional design.

Whether you're communicating within an office or across a continent, your network also needs a design. You know the needs of your organization, but may not know how to design a communication network. In effect, IBM is your organization's architect and SNA is your blueprint. IBM helps you design your network according to SNA specifications, select products, and install them in their geographic locations. Your SNA network meets your communication needs while providing a flexible, unified design for growth.

What Can SNA Do for Your Organization?

Many organizations depend on communication networks to perform their business functions. Read on to explore how SNA satisfies network user requirements efficiently and cost-effectively.

Protect Your Network Investment

Since 1974, IBM has produced communication products that conform to SNA specifications. Because IBM's products will continue to be compatible with this architecture, you can often substitute one type of SNA product for another. You can use your organization's current devices with the necessary modifications or interfaces. Newer, more functional devices can coexist with older ones. Even in the future, as your network grows and you add new workstations and advanced communication facilities, you will continue to be able to use the network applications developed today.

Provide Resource Sharing

By sharing network resources, you can control the cost of your network because (1) it is not necessary to install separate communication links for different types of workstations or dissimilar applications, and (2) you can reduce the number of programs and devices. Because networking enables you to access an application on any host processor, from any workstation, you can reduce resource duplication.

Enhance Network Dependability

Your network is dependable because SNA recognizes data loss during transmission, uses flow control procedures to prevent data overrun and avoid network congestion, identifies failures quickly, and corrects many errors with minimal involvement of network users. SNA also increases network availability through options such as the extended recovery facility, backup host, alternate routing capability, and built-in maintenance and recovery procedures in workstations, modems, and controllers.

Isolate Users from Network Considerations

SNA lets you add new functions and new technologies to your network without disrupting the flow of data or disturbing network users. Because SNA products have compatible interfaces, they can connect and communicate with one another. This ability reduces the amount of programming involved in systems integration. Programmers can develop new application programs, or revise existing ones, while knowing only the specific device characteristics that relate to their particular application. Network users can effectively use a network without knowing its operating details or the locations of its components.

Simplify Problem Determination

SNA helps you find and resolve problems that can occur in your network. SNA management services provides functions in each network component that assist in problem determination. In addition, NetView, which is network management software that runs on the host, has a component called the hardware monitor. The hardware monitor monitors, collects, and stores network data. Other system management functions built into NetView allow rapid problem determination, increase network availability, and decrease the personnel required to operate and maintain an SNA network.

Accommodate New Facilities

IBM will continue to maintain an open-ended architecture while developing new products to meet your data processing and communication needs. Your SNA network can accommodate such facilities as:

- Digital networks
- Digitized voice
- Distributed systems
- Electronic document distribution
- Fiber optics
- Graphics
- Public data network packet switching
- Satellites
- Token-Ring Network
- Videotex
- Viewdata.

Let Independent Networks Communicate

IBM provides the SNA network interconnection facility to help you exchange information with another independent organization, merge two organizations that have their own networks, or maintain several networks within your organization.

The SNA network interconnection facility allows users in one SNA network to access information and application programs in other SNA networks. Each interconnected network can maintain its existing management procedures and controls. A gateway between two or more SNA networks isolates the administrative characteristics of one SNA network from those of another. Network users are not aware of network boundaries.

Allow Non-SNA Products to Coexist in an SNA Network

Some products that were not originally designed according to SNA specifications can function in an SNA network because various IBM products serve as intermediaries between SNA and non-SNA resources. These products enable non-SNA resources to appear as SNA resources. For example, you can use the Non-SNA Interconnection program product to allow IBM binary synchronous communication remote job entry terminals to access an SNA network as though they were SNA facilities.

Provide Network Security

Because any workstation can access any application in an SNA environment, products designed according to SNA specifications provide logon security to protect a network from unauthorized use. Encryption facilities are also available for sensitive data that requires additional security.

Enable You to Install a Network Easily

After you have evaluated SNA and decided that it addresses your organization's data processing and communication needs, the steps for implementing your SNA-based communication network are:

1. Plan your network's configuration.
2. Order the appropriate products.
3. Educate your personnel.
4. Define your network operating procedures.
5. Set up your network management control desk.
6. Install the products.
7. Test your SNA network.

Summary

SNA is IBM's foundation for dependable, extendable, and adaptable communication networks. To learn more about what SNA can do for your organization, contact your local IBM marketing representative or IBM system engineer. They can help you design and plan an SNA network to meet the specific business needs of your organization.

Chapter 2. SNA Network Components

This chapter describes the major components you can have in your SNA network and how they are interconnected.

Network Components

Figure 1 illustrates the major components of an SNA-based network. The functional responsibilities of each component are as follows:

- **Host processors** control all or part of a network. Some of the functions they provide include computation, program execution, access to data bases, directory services, and network management.

- **Distributed processors** provide functions similar to the host processor functions except for network management. Network users can access a host processor through a distributed processor. When there are multiple host processors in a network, some of them can function as distributed processors.

- **Communication controllers** manage the physical network, control the communication links, and route data through a network.

- **Cluster controllers** control the input/output operations of the devices connected to them.

- **Workstations** provide users access to a network. Workstations usually have input/output devices that enable network users to send and receive information.

- **SNA access methods** (1) logically control the flow of data through a network, (2) provide an interface between application subsystems and a network, and (3) protect application subsystems from unauthorized access. The most frequently used IBM SNA access method is the Advanced Communications Function/Virtual Telecommunications Access Method (ACF/VTAM). SNA access methods reside in host processors.

- **Application subsystems** support activities such as (1) developing programs interactively, (2) retrieving and updating information, (3) processing batch jobs remotely, and (4) presenting graphic information on displays and printers. The Customer Information Control System (CICS) and Information Management System (IMS) are examples of application subsystems. Application subsystems reside in processors.

- **Application programs** perform the functions that you want done, such as scientific computations, transaction services, or text editing. You can write application programs yourself, or buy them from IBM or other software sources. Application programs reside in processors, cluster controllers, and workstations.

- **Network management programs** (1) assist network operations, (2) detect and report errors, and (3) maintain statistics about network performance. The primary network management program is NetView, which is the focus of SNA management services. NetView/PC allows you to run application programs on an IBM Personal Computer to collect alert data from non-SNA devices. Each component in your SNA network performs functions that help you manage a network.

- **Network control programs** route data and control its flow between the communication controller and other network resources. IBM's primary network control program is the Advanced Communications Function/Network Control Program (ACF/NCP). Network control programs reside in communication controllers.

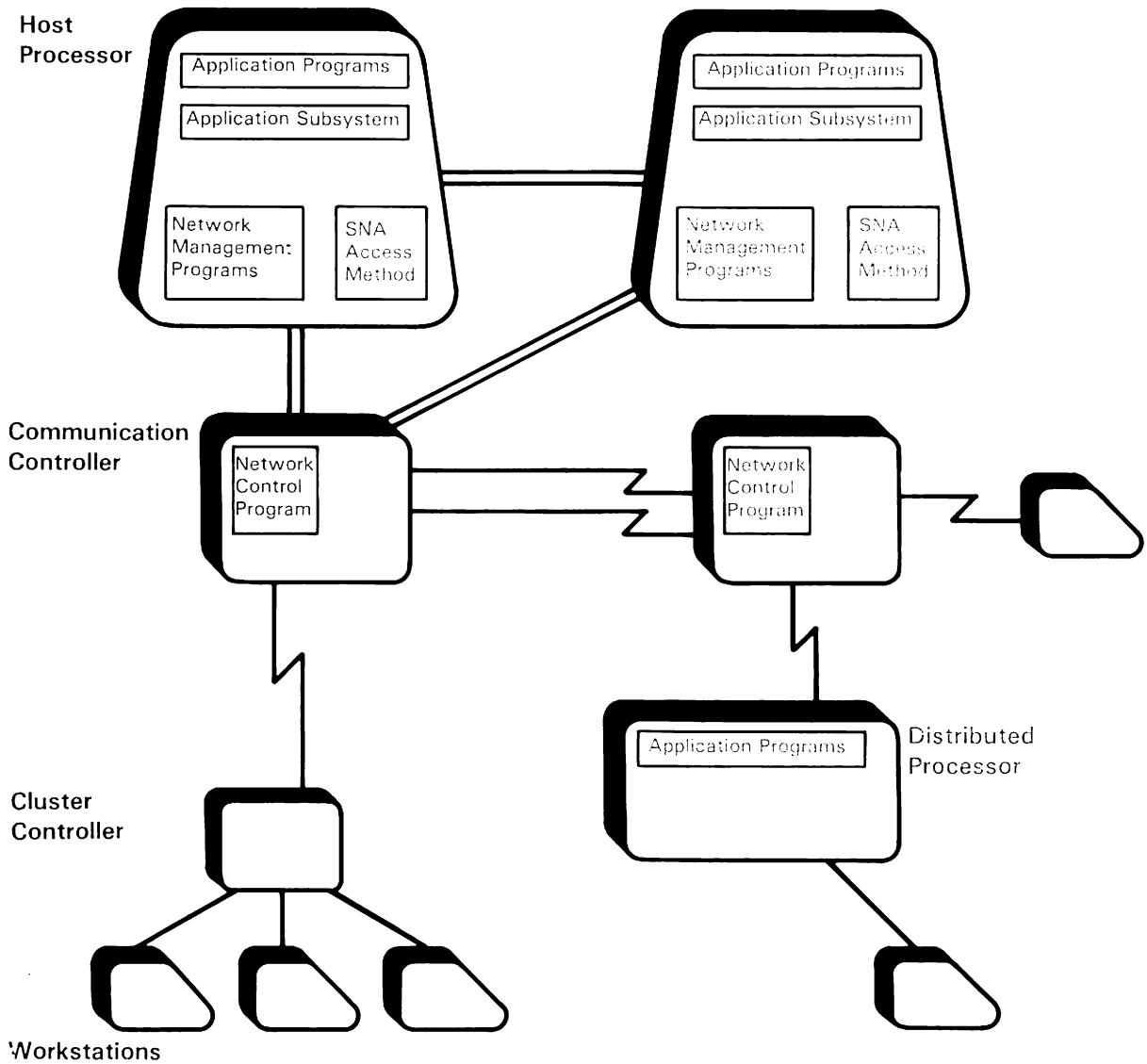


Figure 1. Network Components

Note: For descriptions of specific SNA products, refer to "Chapter 5. Selecting SNA Products."

Links

Figure 2 shows links connecting network components. A **link** consists of transmission media and a data link control protocol. The transmission media can include telephone lines, microwave beams, fiber optics, and coaxial cables. Data link control protocols specify how to interpret control data and transmit data across a link. SNA specifies the following data link control protocols:

- **Synchronous Data Link Control (SDLC)** is a discipline for connecting the network components using telecommunication links. SDLC:

  - Allows a number of messages to flow in one direction before receiving a response
  - Increases the amount of data that can be on a link
  - Reduces response times
  - Lowers administrative overhead
  - Detects errors and retransmits data
  - Allows any character to be included in the data.

  A modem at each end of a telecommunication link converts outgoing data for transmission over the link and converts incoming data for reception.

- **System/370 data channels** connect the various network components directly to a host processor in the same geographic location. If the host processor and the SNA access method support the integrated communication adapter, then an SDLC link can connect network components to a host processor.

- **Token-Ring Network** is a data link control protocol that has two parts: the logical link control (LLC) protocol and the medium access control (MAC) protocol. The IBM Token-Ring Network connects the SNA components in a physical ring.

SNA products also accommodate asynchronous and binary synchronous protocols.

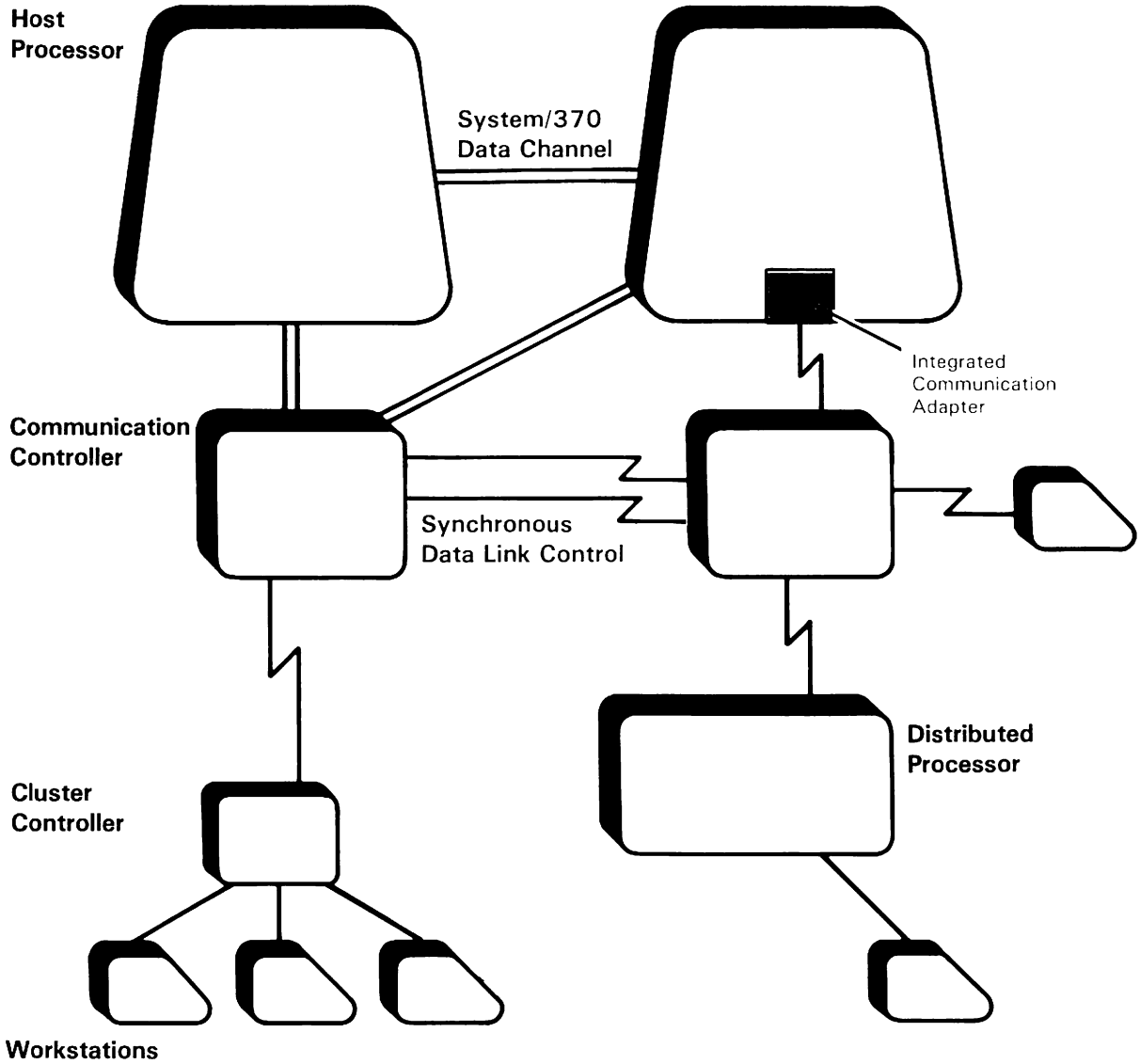


Figure 2. Links

Chapter 3. SNA Concepts

This chapter describes basic SNA concepts

End Users

A person at a workstation and the application program that the person is using at a remote location are both **end users**. End users submit information to and receive information from a network. For example, suppose a bank teller at a workstation wants to know a customer's account balance. The following events occur:

1. The bank teller gains access to a network by entering a logon or password.
2. The bank teller selects the appropriate application program.
3. The bank teller enters the customer's account number.
4. The network routes the request to the appropriate application program residing in a processor.
5. The application program processes the request and generates a reply.
6. The network routes the reply to the bank teller's workstation.

In this example, both the bank teller and the application program are end users. Figure 3 illustrates the relationship between end users in a network.

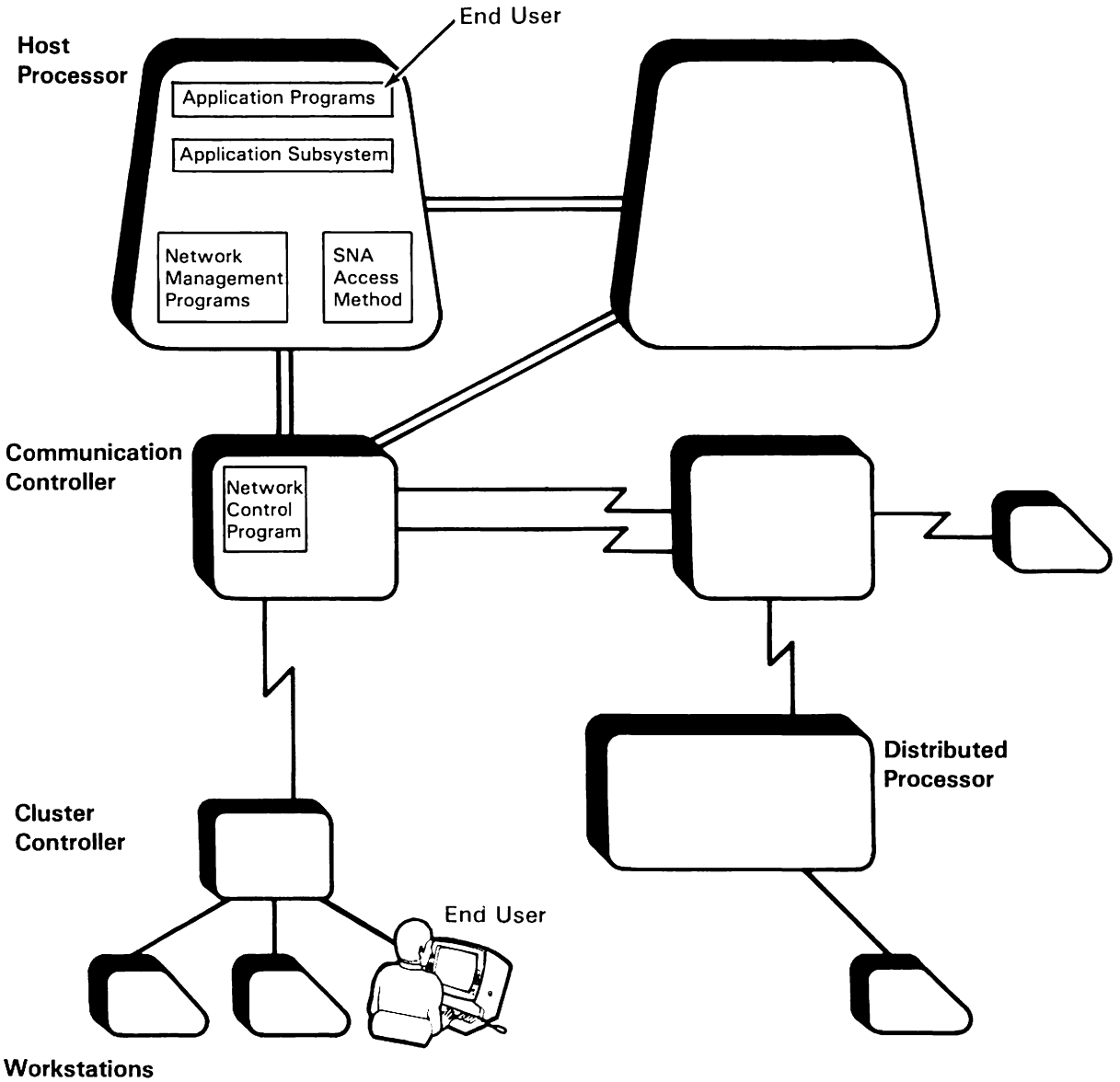


Figure 3. End Users

Nodes

SNA **nodes** are processors, controllers, and workstations that links interconnect. Your network can have many host, communication controller, and peripheral nodes. You can locate these nodes in different geographic locations according to your processing and communication needs. Figure 4 shows the following different kinds of nodes:

- A host processor that contains an SNA access method such as ACF/VTAM is a **host node**. Host nodes control the network components in all other nodes.

- A communication controller with a network control program such as ACF/NCP is a **communication controller node**. This node, under direction from the host node, controls the links and workstations that are attached to it.

- A **peripheral node** is usually associated with a workstation, a cluster controller with several workstations, or a distributed processor. Peripheral nodes are sources and destinations of data.

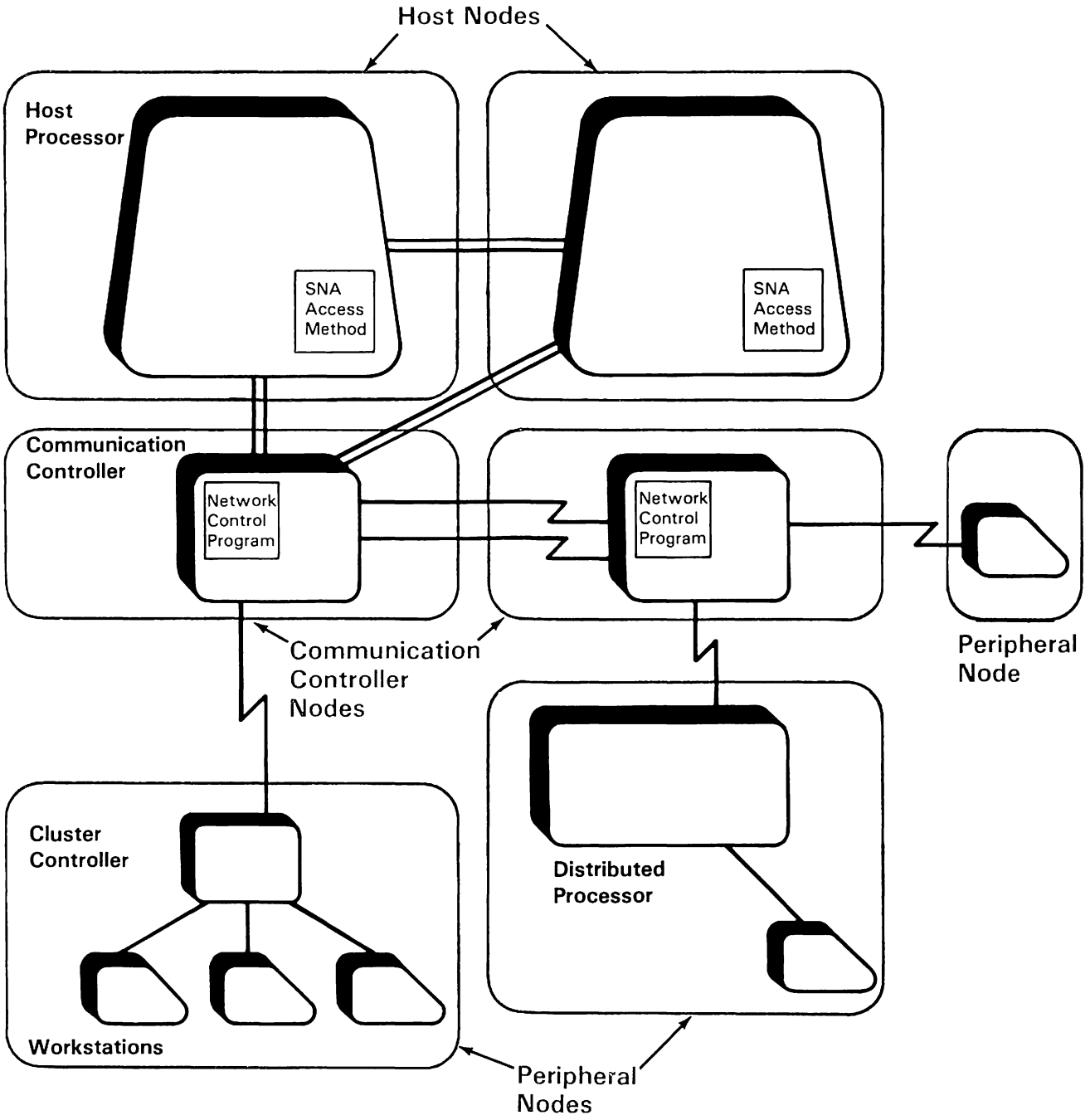


Figure 4. Nodes

Transmission Groups

Transmission groups are links (System/370 data channel and SDLC) between adjacent subarea nodes as shown in Figure 5. Regardless of the number of links in a transmission group, subarea nodes treat the transmission group as a single link. If one or more links in a transmission group fails, a subarea node can automatically place data traffic on the remaining active links. This avoids loss of data and disruption to the end user.

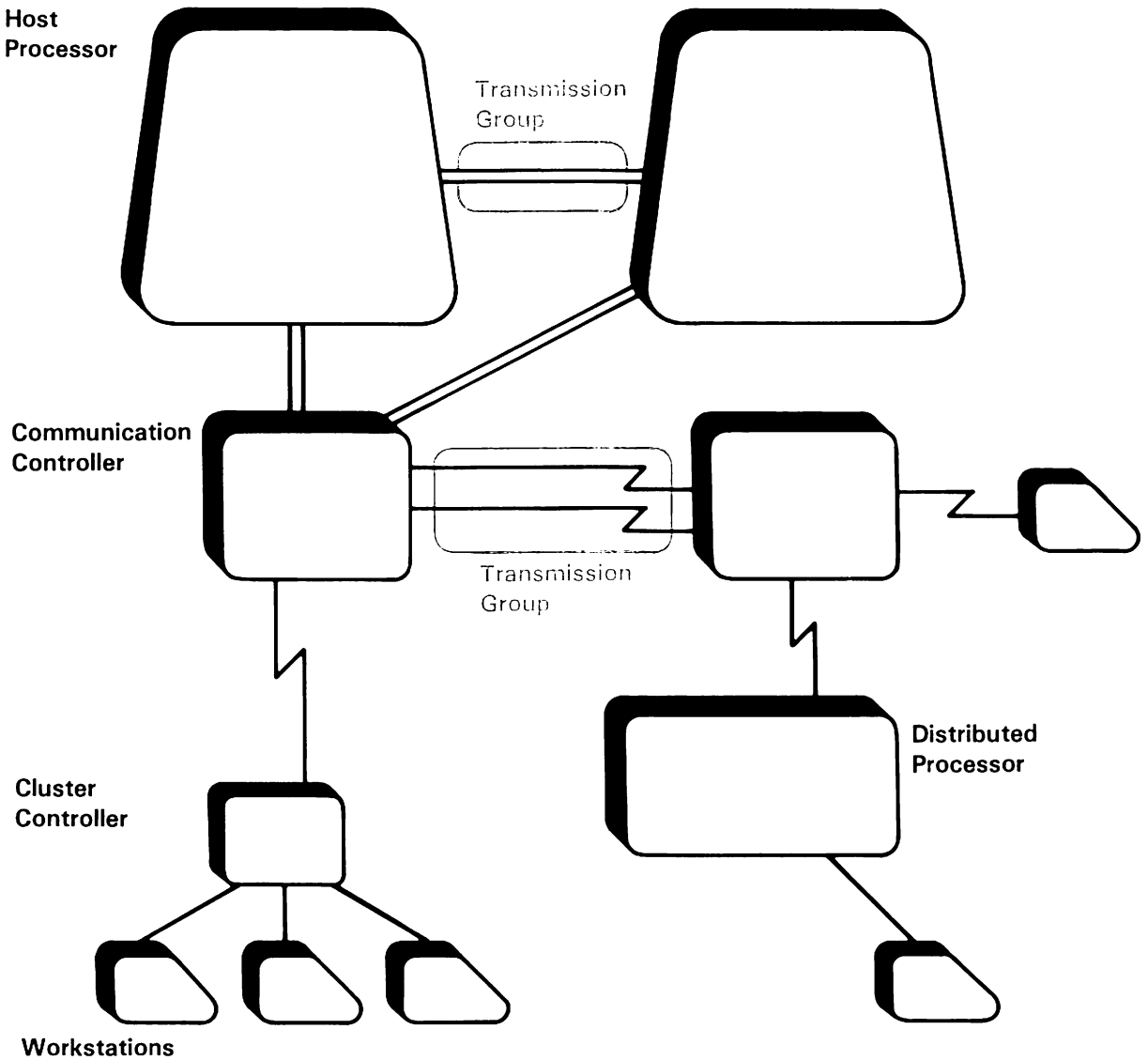


Figure 5. Transmission Groups

Subareas

A **subarea** consists of a host or communication controller node and its peripheral nodes. The host node or communication controller node in a subarea is called a subarea node. Each subarea has a unique number. For example, in Figure 6 the subarea numbers are 1, 12, 5, and 9. Data processing personnel defining a network use the subarea numbers to identify network components.

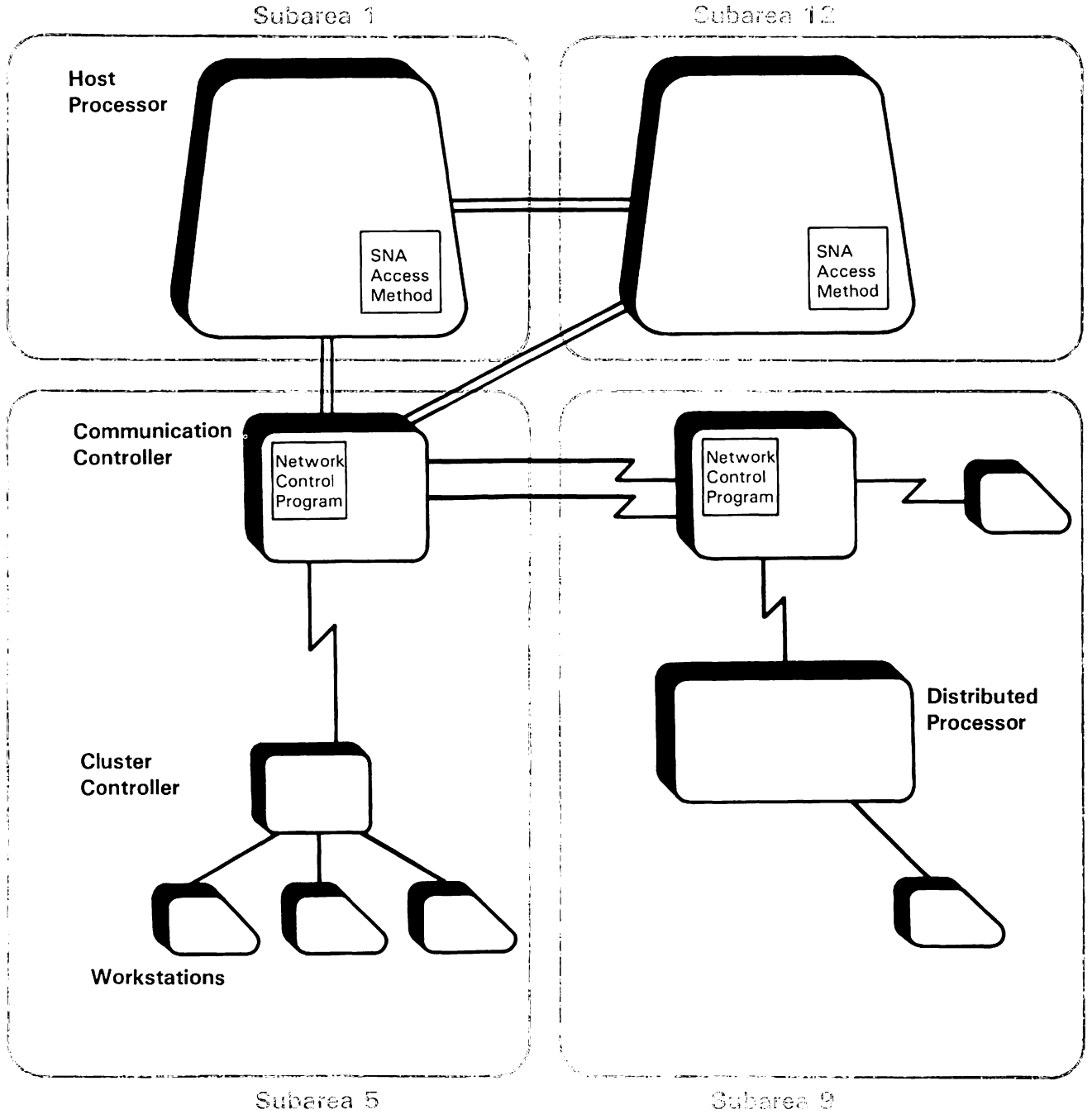


Figure 6. Subareas

Network Addressable Units

Network addressable units have addresses that identify their routing location, so that end users can transmit data to each other. Figure 7 shows network addressable units in nodes of a network. Network addressable units include logical units, physical units, and system services control points:

- A **logical unit (LU)** provides end users access to network resources and manages the transmission of information between end users. Peripheral and host nodes can have more than one logical unit. Every end user in a network has a logical unit that enables it to communicate with other end users.

- A **physical unit (PU)** resides in each node and provides services to manage and monitor that node's resources. The SNA access method manages the resources for a host node. The network control program manages the resources for a communication controller node.

- A **system services control point (SSCP)** is the central point of control for a domain. An SSCP resides in a host node and provides services for monitoring and controlling network resources. An SNA access method implements the SSCP.

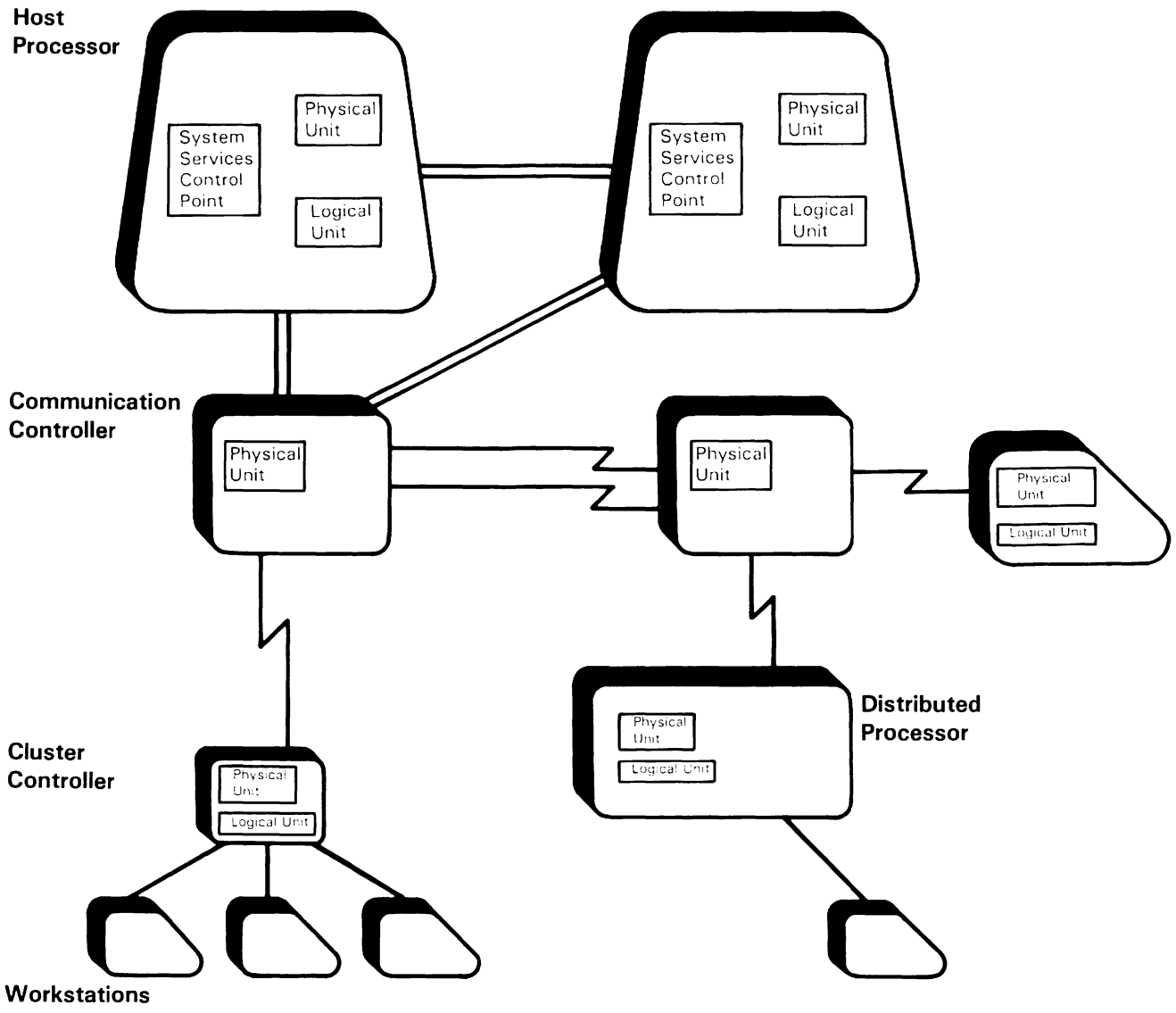


Figure 7. Network Addressable Units

Boundary Function

The **boundary function** provides services and control functions at a subarea node to enable peripheral nodes to easily connect to a network.

Domains

A **domain** consists of an SSCP and the network resources that it can control. Two or more SSCPs in a network can provide backup for failing SSCPs in other domains, cooperatively control network components, and help establish sessions between logical units. For example, if one of two host processors fails, the other host processor may be able to take over the resources controlled by the SSCP in the failing host processor. Figure 8 illustrates a network with two domains.

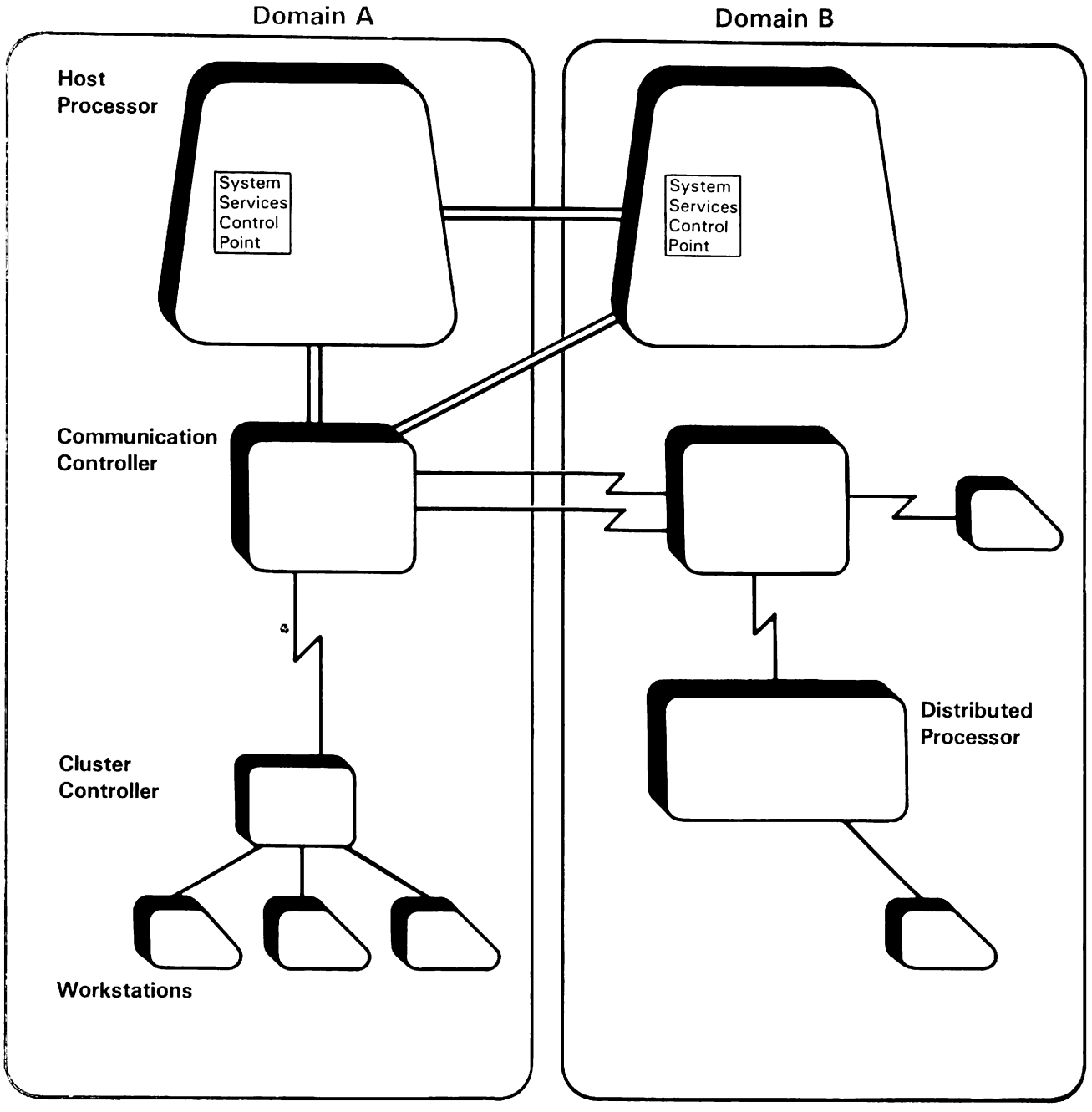


Figure 8. Domains

Sessions

A **session** is a logical connection that enables two network addressable units to communicate with each other. Sessions between logical units enable end users to exchange data. The SSCP obtains and maintains control over all network resources by first activating sessions with the physical unit in the node, then with each logical unit. The following sessions can exist:

- An **SSCP-SSCP** session, between a system services control point (SSCP) in one domain and an SSCP in another domain, is used to assist in the process of activating sessions between logical units in different domains. ACF/VTAM in one domain communicating with ACF/VTAM in another domain is an example of an SSCP-SSCP session.

- An **SSCP-PU** session, between an SSCP and a physical unit (PU), is used to control a node and its resources. An SSCP can request the PU to activate resources associated with its node, perform traces, or provide resource monitoring services. The physical unit in each node reports errors and component failures within its node or attached links to the SSCP. This information is useful to personnel maintaining a network or determining the cause of a problem. ACF/VTAM communicating with a 3274 cluster controller is an example of an SSCP-PU session.

- An **SSCP-LU** session, between an SSCP and a logical unit (LU), is used to mediate the activation of LU-LU sessions. The SSCP maintains a record of LU-LU sessions. ACF/VTAM communicating with CICS is an example of an SSCP-LU session.

- An **LU-LU** session, between two logical units, is used to allow one end user to communicate with another. CICS communicating with a workstation (LU) is an example of an LU-LU session.

In the previous example on page 15, the bank teller initiates a session by entering a logon or password; the session continues as long as the bank teller requests account balances. During this session each account balance request initiates a new conversation.

Data Types

Different types of data are transmitted in a network. **End-user** data is specific to an application. Examples of end-user data are parts inventory, payroll, and personnel records. **Control** data initiates and terminates sessions and controls communication between network components.

Routes

An **explicit route** consists of a series of nodes and the transmission groups that connect them. During a session, data is transmitted over a route from one node to another. If two applications communicate over multiple sessions that use different routes, the failure of one route does not disrupt the other sessions.

Data processing personnel can assign pacing and message traffic priorities to an explicit route to form a **virtual route**. These virtual routes control data flow in a network. **Pacing** is a means of regulating message traffic to minimize network congestion. **Message traffic priorities** permit message traffic for a time-dependent session to be transmitted through a network ahead of other message traffic. For example, message traffic for interactive processing may have a higher priority than batch processing.

SNA Layers

An important feature of SNA is the organization of functions into multiple layers. The SNA layers are arranged in a hierarchy, with the physical control layer being the lowest and the transaction services layer being the highest. A given layer in one node communicates with an equivalent layer in another node. SNA specifies peer protocols for communication between equivalent layers; this peer communication enables network components to communicate. Figure 9 shows the SNA layers and the functions they perform.

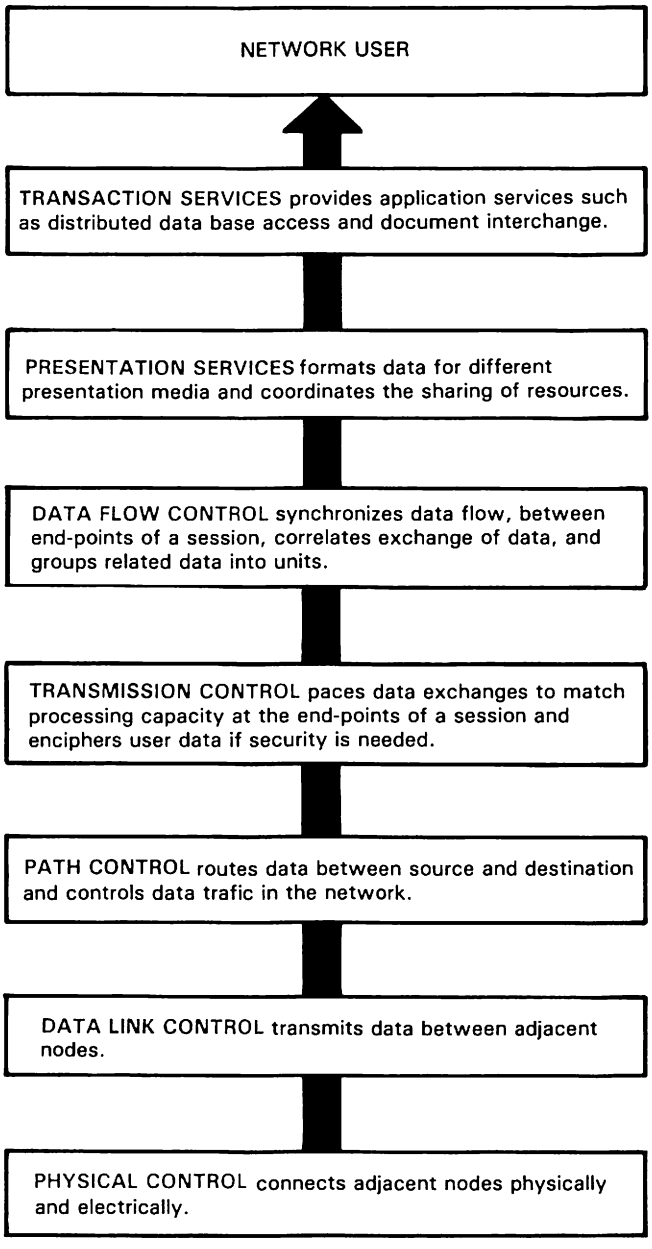


Figure 9. SNA Layers

The SNA layer approach:

- Enables IBM to enhance or replace one layer without affecting the other layers
- Lets your SNA network adapt to new technologies
- Permits SNA networks to attach to all types of transmission facilities throughout the world.

Other Architectures within SNA

IBM has a family of interrelated architectures that are a part of SNA. These architectures provide for the interchange of information and control requests in an office environment:

- **Document Content Architecture** defines a uniform formatting of documents to be interchanged in an office environment. It controls formatting functions such as paginating, highlighting, creating headings, and centering. The document can be in either draft or final form. Whereas you can modify the content of a draft, you can only print or display a document that is in final form.

- **Document Interchange Architecture (DIA)** allows the interchange of documents and other information between separate office systems within a network. DIA allows you to distribute office system functions across a variety of products.

- **SNA Distribution Services (SNADS)** is an architecture for asynchronous distribution of information between end users. SNADS enables you to distribute information to one or more other network users.

Summary

Your data processing personnel use the terms presented in this chapter when describing the network components to the appropriate IBM system using ACF/VTAM and ACF/NCP. Internally an SNA network is complex, but this is not discernible to a network user. SNA:

- Provides flexibility in establishing, maintaining, and terminating sessions

- Helps you control and maintain communication within your network

- Notifies you and corrects problems that may occur in your network

- Enables you to use your network components in a cost effective and efficient manner

- Allows network users to access an application residing in any processor in a network.

Chapter 4. Managing an SNA Network

This chapter discusses some management techniques and program products available to manage your network.

Managing an SNA Network

Whether your network is small or large, you must have an effective means of operating, managing, and controlling it. To perform these functions, SNA provides **management services**, which are distributed throughout an SNA network in hardware and software products. The focus of management services is NetView, which is network management software that runs on the host. Management services separates the needed functions into four broad categories and then provides specific services in those categories. The four categories of management services functions, which are listed below, are described briefly in the following paragraphs.

- Problem management
- Performance/accounting management
- Configuration management
- Change management.

Problem Management

Problem management manages a problem from the time it is detected to the time it is resolved. A problem, in this case, refers to some condition that results in an end user losing access to a system resource. Problem management has five elements:

- Problem determination — detecting and isolating a problem or an impending problem
- Problem diagnosis — finding out the cause of the problem
- Problem bypass and recovery — using the resource or another resource until the problem is corrected
- Problem resolution — correcting the problem
- Problem tracking and control — following up the problem management procedure.

Performance and Accounting Management

Performance and accounting management monitors the operation of the network, starts problem management procedures if the performance is not what it should be, and fine-tunes the operation of the network to improve its performance. Performance and accounting management has seven elements:

- Response-time monitoring — monitoring the response times of end users and starting problem management procedures if the times are too great
- Availability monitoring — monitoring the availability of a component

- Utilization monitoring — tracking how much resources are used and starting problem management procedures if one resource is used too much
- Component delay monitoring — monitoring delays at critical components
- Performance tuning — improving performance based on information from performance tracking and control
- Performance tracking and control — collecting and reporting performance information
- Accounting — recording and tracking usage charges for system resources.

Configuration Management

Configuration management controls information relating one resource to another. Other management services functions can then use the information that configuration management controls. For example, problem management can use the information to determine the name, address, and organization responsible for servicing a failed resource. Configuration management involves knowledge of two types of information:

- Physical identification of resources
- Logical relationships between resources.

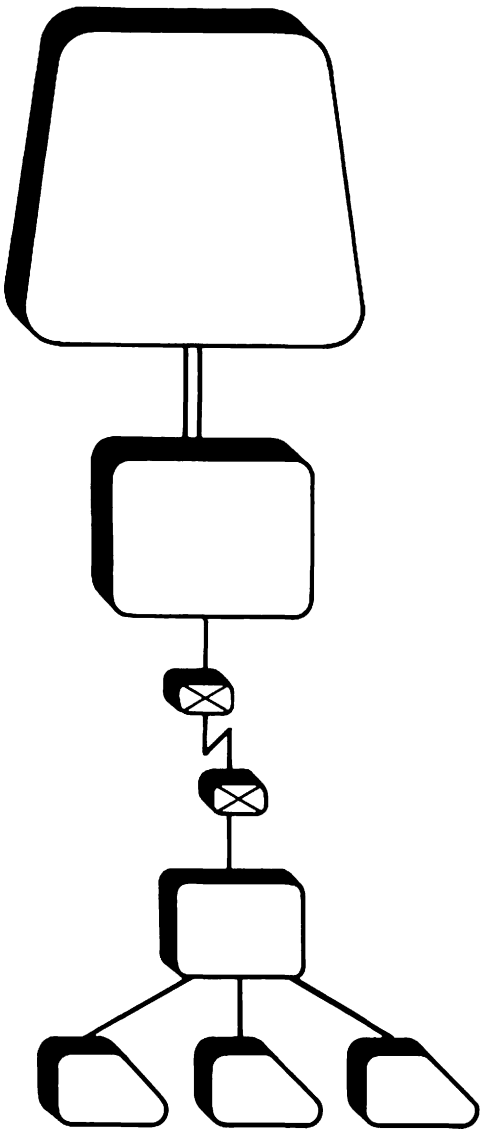
Change Management

Change management plans, controls, and applies changes to the network. Change management is similar to configuration management in that configuration management deals with the existing state of the network, and change management deals with how that state will change. Change management is concerned with three types of changes:

- Hardware changes
- Microcode changes
- Software changes.

Management Functions of SNA-Based Products

IBM simplifies the task of managing a network by including management functions in SNA hardware and software products. NetView is the key product for centralizing management services. Figure 10 describes some of these management functions.



Host Processors:

- Collect network statistics
- Provide centralized network control
- Display the status of network components
- Allow you to monitor and change a network.

Communication Controllers:

- Analyze attached links and devices
- Detect and record errors
- Recover automatically from most errors.

Modems:

- Provide status information about links
- Help determine the specific point of failure in a link.

Synchronous Data Link Control:

- Detects transmission errors
- Uses recovery procedures at the link level.

Cluster Controllers and Workstations:

- Performs diagnostic checks on circuits and network components
- Provide status information about links
- Maintain an incident log of terminal errors
- Give causes for errors when you attempt a nonsupported function.

Figure 10. Management Functions of SNA Products

Controlling Network Operations

IBM recognizes the need to provide points of control to support network management functions. The **command facility**, a component of NetView, allows network operators to:

- Control and monitor an entire network from any location

- Automate various operator tasks so that they can be invoked by entering only one word or a single command
- Share network control responsibilities
- Accumulate network statistics.

Determining Causes of Network Problems

Another component of NetView, the **hardware monitor**, resides in the host processor to support problem management by providing on-line problem determination. The hardware monitor performs the following functions:

- Collects and stores on a disk file all the data that the network components generate
- Maintains a history of errors and network statistics
- Determines the probable cause of a failure from the network error data
- Recommends user actions for specific network errors
- Indicates a failing component, including a telecommunication link.

Another problem determination aid that is also a component of NetView is the **session monitor**. Network operators use the session monitor because it:

- Provides information needed to solve problems that are not hardware related
- Collects and correlates data about sessions
- Helps the operator identify and isolate network problems that do not provide error messages
- Gathers and displays actual data for end-user response time.

Solving Network User Problems

A network is more efficient and effective when you use the problem management functions to recognize network problems, minimize their impact, and track them to resolution. You can establish a **network control center** to manage your network's resources and increase its availability. A network control center can have a user help desk, a network operations group, and a technical support group.

Studies have shown that the vast majority of all user problems are not complex, and involve such minor difficulties as power plugs accidentally pulled out, paper jams in printers, and uncertainty as to what to do next when using an unfamiliar application. The user help desk staff addresses these problems. A network

operations group solves most of the rest of the network problems, and the technical support group solves the remainder.

A **user help desk** can provide a point of contact where all network users can solve their problems. These problems can be operational, functional, procedural, or administrative. Individuals who are knowledgeable about the network configuration, application programs, procedures, and administrative requirements should staff the user help desk. Their tasks include:

- Responding to network problems in friendly, nontechnical language
- Helping end users with procedures
- Answering questions on applications
- Tracking problems to their resolutions
- Keeping a log of resolved problems on-line so that a second occurrence can be quickly resolved
- Performing first-level problem determination
- Routing complex problems to a network operations or technical support group.

Network operations personnel manage and control the network and applications. This activity includes:

- Activating links, controllers, and workstations
- Providing physical and logical connections to the application programs
- Performing second-level problem determination.

The **technical support group** can consist of the organization's system programming staff. Their primary responsibilities are:

- Supporting the operation of network resources
- Understanding the applications, systems, and common-carrier facilities
- Performing third-level problem determination.

Having a network control center places the responsibility for solving network problems on specific people instead of several technical and nontechnical personnel. Therefore, other specialized personnel can concentrate on their own technical tasks rather than spend time solving simple problems for users.

Changing a Network Configuration

Managing network changes involves planning, coordinating, and monitoring changes across all data processing and communication functions. The **Information/Management** program product allows the operator to create, update, and display data records that document changes, problems, and network configuration.

Providing Management Services to Non-SNA Networks

You can use SNA management services to manage a non-SNA network with the Netview/PC program product. Netview/PC runs on an IBM Personal Computer and allows application programs to gather Alert and other network management information from non-SNA networks, ROLM CBXs, some other manufacturers' PBXs, and the IBM Token-Ring Network. Netview/PC can use the Alert information to maintain a local problem log or, if the Personal Computer is connected to the host, pass the Alert information on to NetView. Some examples of application programs for Netview/PC are:

- The IBM Token-Ring Network Manager
- The NetView/PC ROLM Alert Monitor
- The Netview/PC ROLM Call Detail Collector.

Summary

Management services functions are distributed throughout an SNA network in hardware and software products. Proper management of a network can enhance user satisfaction, increase network availability, and improve network user productivity.

Chapter 5. Selecting SNA Products

This chapter provides brief descriptions of some IBM hardware and software products that conform to SNA specifications. It does not describe all such products, and for each product included it does not mention all functions, features, or dependencies on other products.

Please contact your IBM representative or your local IBM branch office for detailed information on available SNA products.

Hardware

The following section describes some of the IBM processors, systems, controllers, and workstations that you can use as components in your SNA network. These hardware products work with IBM program products (which are discussed in a later section) to satisfy your network requirements.

Host Processors

In an SNA network, a processor can function as either a host processor or a distributed processor. A host processor (with its associated programs) provides the major network control functions and is a central managing component of an SNA network. Host processors:

- Enable network users to access data bases and application programs
- Provide directory services within a domain, across domains within a network, and across independent SNA networks
- Perform computation functions for problem-solving applications
- Provide network management functions.

The following processors can function as host processors in an SNA network.

System/370

The IBM System/370 is a collection of computing devices that can be configured into many different systems to accommodate the needs of almost any industry. The System/370 processors vary in storage size and processing rate, but because they share a common machine language, they can use the same data and programs.

30XX Processors

The 30XXs are a set of System/370 processors that make it easy for you to expand and upgrade your SNA network. The 30XX processors include the 3080 and 3090 series. You can connect 30XXs into configurations called processor complexes, which you can manage as either a single, large processor or as multiple processors. As your computing needs grow, you can obtain more processing power by using different configurations of 30XXs or by upgrading your present 30XXs to more advanced models.

4300 Processors

The IBM 4300 Processors are a group of closely related, compatible processors consisting of the 4321, 4331, 4341, 4361, and 4381. Each of these processors can communicate with the System/370. Large Scale Integration (LSI) in the 4300s provides fast data processing and reduces electrical power, space, and cooling requirements. The 4321, 4331, and 4361 processors have a communication loop adapter that allows you to attach a variety of workstations, printers, and protocol converters to the processor. This adapter increases the versatility of the above processors when you connect other devices to them.

System/88

The System/88 is a mid-range, high-availability system designed to provide highly reliable online processing. The major components of the System/88 are duplicated, which makes the system fault-tolerant without requiring additional programming. In addition, you can replace System/88 components without interrupting system operation.

Distributed Processors

Distributed processors provide a set of processing functions for a network. For example, one distributed processor may perform computations for an accounting department; another may distribute memos throughout a network. The following processors can function as distributed processors in an SNA network. These systems can also function as stand-alone systems, except as noted.

8100 Information System

The IBM 8100 Information System is designed specifically for the distributed processing environment. The 8100 has several processor models and supports a variety of workstations, printers, and input/output devices. Two operating systems, the Distributed Processing Program Executive/System Product (DPPX/SP) and the Distributed Processing Control Executive (DPCX) support the 8100. The 8100 can function as a stand-alone system when it operates with DPPX/SP, but it must be attached to a host processor when it operates with DPCX.

Series/1

The IBM Series/1 is a family of small processors with a variety of input/output features, including workstations, printers, disk and diskette storage units, and magnetic tape units. The system is modular, so you can purchase only the devices that you need in the quantities that you need. The Series/1 also has communication features that allow you to attach non-SNA devices, making it an excellent interface between SNA and non-SNA environments.

System/36

The IBM System/36 is a general purpose system capable of data processing, document handling, office management, business graphics, and communication applications. The System/36 satisfies a new user's requirement for easy operation, while providing the functional capabilities required by an experienced user. The System/36 allows you to:

- Install the system yourself
- Tailor the system to your needs with a question-and-answer configuration process
- Use a wide range of industry-specific and cross-industry applications
- Select tasks with easy-to-use menus
- Use an extensive HELP and tutorial system.

System/38

The IBM System/38 is an advanced data processing system that allows local and remote workstations to share programs, files, processing power, and other system resources. The System/38 is designed specifically to enhance interactive computing, where the user and the processor alternately send and receive information. Like the System/36, the System/38 is easy to use.

Industry-Specific Systems

The systems that are described below provide functions for the financial, manufacturing, and retailing industries.

4700 Finance Communication System

The IBM 4700 Finance Communication System is designed to meet the needs of the financial industry. For example, this system allows tellers to debit and credit customer accounts, post interest, record loan payments, and access customer account information. Accountants can use this system to maintain cash flow records. IBM can tailor the 4700 system to perform the specific operations of a particular financial organization.

3650 Retail Store System

The IBM 3650 Retail Store System permits chain retail stores to communicate with a central data processing center. The sales, accounting, and inventory departments in any store can access a host processor. For example, while at a branch store you can execute a sales analysis program residing in the store headquarters' processor and receive printouts of this analysis at the branch store. Because the 3650 is programmable, it can easily be tailored to the needs of any organization.

3660 Supermarket System

The IBM 3660 Supermarket System allows cashiers to check out customers quickly and accurately. Using either a key-entry or a scanning system as an input device, the cashier can receive accurate price information directly from the supermarket's host processor.

3680 Programmable Store System

The IBM 3680 Programmable Store System extends the capabilities of a point-of-sale station beyond those of a conventional cash register. The 3680 system allows salespeople to process transactions efficiently. Salespeople can use a keyboard or wand reader to quickly enter transaction information to the host processor. This information can be used for inventory control, audit procedures, and marketing reports. The 3680 provides many of the same functions as the 3650, but the 3680 is designed to meet the needs of a single store rather than those of a chain of stores.

IBM 4680 Store System

The IBM 4680 Store System provides an adaptable, effective point-of-sale store system to help you meet the needs of today's merchandising environment. It can adapt to changing store environments and and can change as your requirements change. It provides point-of-sale checkout support, on-line credit processing, store support and administrative functions, expanded accounting, multiple tender processing, report creation from data recorded daily, and other functions.

You can install the IBM 4680 Store System as an independent store system to process your point-of-sale operations. You can also install it to operate with a host processor located either in the store or in another location. Your personnel can set up and install the store controller and point-of-sale terminals.

The store controller is a selected model of the IBM Personal Computer AT that has one or two store loop adapters installed. It performs the functions of a store controller and still retains the capabilities of the Personal Computer AT. It can perform the processing tasks unique to a store system, as well as performing administrative tasks and other functions. With a printer attached, the store controller can print reports to assist management in many areas. With optional hardware installed, the store controller can provide backup support for another store controller.

Software for the IBM 4680 includes support for point-of-sale applications in general merchandise and in supermarket environments.

Communication Control Devices

The following devices can alleviate the load on a host processor by assuming some of its network control responsibilities.

3725 Communication Controller

Although the host processor performs the main control functions in an SNA network, the IBM 3725 Communication Controller can handle some of the host processor's responsibilities. The 3725 (with its associated programs) controls the data flow between host processors and workstations. The 3725 accepts data from workstations operating at different transmission speeds and protocols and sends this data to one or more host processors. Because the communication controller relieves a host processor of routing responsibilities, the resources of a host processor are more available to handle your computing needs.

The 3725 is a technological improvement over the older 3705 Communications Controller. Because the 3725 uses Large Scale Integration (LSI), it has the following advantages over the 3705:

- Smaller physical dimensions
- Faster instruction execution time
- Larger storage capacity
- Enhanced functions
- Increased throughput of data.

The 3725 offers extended link problem determination capabilities with certain IBM modems. In addition, certain models of the 3725 can attach to the IBM Token-Ring Network.

The design of the 3725 allows you to connect and disconnect components easily, making it simple and practical to change the configuration of your network. Because the 3705s and 3725s can operate together, you can upgrade a network by replacing 3705s with 3725s one at a time.

3720 Communication Controller

The IBM 3720 Communication Controller offers the same functions as the 3725 Communication Controller, but at a lower capacity. The 3720 can support up to one-third the capacity of the 3725.

Workstations

The products that are described below enable people to send and receive information through a network.

3270 Information Display System

The IBM 3270 Information Display System is a family of control units, workstations, and printers. The 3270 system allows you to:

- Send information to a processor
- Receive information from a processor on a display or printer
- Update information
- Develop interactive programs
- Process transactions
- Display graphics.

IBM Personal Computer

The IBM Personal Computer is a small, low-cost system capable of business, education, and home applications. The Personal Computer can:

- Function as a stand-alone unit
- Communicate synchronously with a host processor by emulating a 3270 or 3770 workstation
- Communicate asynchronously with a host processor by emulating an IBM 3101 Display Terminal or a Western Union Model 33/35 teletypewriter
- Allow PC application programs to exchange (through the Application Programming Interface/Communication Services facility of NetView/PC) SNA network management information with NetView in a host a capability useful to extend SNA network management to non-SNA networks
- Execute IBM-provided NetView/PC application programs that extend SNA network management services to ROLM CBXs and IBM Token-Ring networks.

5550 Multistation

The IBM 5550 Multistation is a product designed for users who speak Japanese and Chinese. With the appropriate programming, the 5550 can function as a:

- Japanese or Chinese Personal Computer
- Japanese workstation, emulating a 3270 or 5250 workstation
- Japanese word processor.

8775 Display Terminal

The IBM 8775 Display Terminal is a high-function, single-station, microprocessor-controlled, cathode ray tube terminal that lets you enter data into, and receive data from, an 8100 Information System and System/370, 30XX, and 4300 processors. A keyboard, a selector light pen, or both, permit easy operation. Also offered are an audible alarm, security keylock, and a magnetic slot reader. Among optional features are;

- Multiple partitions and scrolling—The display screen can be divided into as many as eight rectangular areas; the operator may scroll vertically within any defined partition without intervention by host software.
- Programmed symbols—The operator can use up to six sets of user-defined symbols, each containing up to 190 symbols.
- Enhanced function with magnetics—Allows data to be read via a magnetic slot reader, a dual-entry magnetic slot reader, or a magnetic hand scanner.

8815 Scanmaster, 3117 Scanner, and 3118 Scanner

These machines scan any document, translate its image into electronic information, and send this information to a 4300, System/370, or 30XX processor or to an IBM Personal Computer. The Scanmaster can also transmit documents directly to another Scanmaster through modems and can serve as a convenience copier. Examples of documents that can be scanned and transmitted are:

- Charts
- Drawings
- Forms
- Photographs
- Signatures
- Typed or handwritten text.

Modems

IBM modems enable you to send and receive information over telephone lines. Some modems also help you isolate failures in an SNA network to a communication controller, workstation, modem, or link.

3863, 3864, 3865, and 3868 Modems

The IBM 3863, 3864, 3865, and 3868 modems are microprocessor-based modems that can help you isolate failures in an SNA network to a communication controller, workstation, modem, or link. You can customize the above modems to your requirements using the following optional features:

- Multiterminal fanout allows you to connect more than one device to one modem.
- Data multiplexing allows several signals to travel over one link.
- Extended diagnostic card helps you determine the causes of problems.

5811 and 5812 Modems

The IBM 5811 and 5812 modems are both used where distances are short and the sophisticated capabilities of voice-grade modems are not needed. The 5811 modem also has network management services capabilities, which let you use software in the host for problem determination and isolation.

5841 Modem

The IBM 5841 modem is a microprocessor-based modem that offers the functions of the 3863 and 3864 modems together with a lower speed. The IBM 5841 also does not provide the network management capabilities of the 3863 and 3864 modems.

5865, 5866, and 5868 Modems

The IBM 5865, 5866, and 5868 modems provide communication products with a means of transmitting and receiving data over voice-grade telecommunication channels (normally telephone lines). The 5865 and 5866 operate at up to 9,600 and 14,400 bits per second, respectively. The 5868 operates at up to 9,600 or 14,400 bits per second, depending on the model. These are synchronous, high-performance, advanced microprocessor-based modems designed for the SNA network management services environment. They can also be used in a non-network-management-services environment.

These modems have an integrated keypad and display panel, which are used to configure the modem, display modem statistics, and execute diagnostic tests. The modems can measure and report a number of communication line parameters.

The NetView capabilities of the IBM 5865, 5866, and 5868 modems allow the network operator to isolate problems to the line, local modem, remote modem, or elsewhere in the network.

Data Encryption Devices

Data encryption devices provide transmission security by encoding and decoding the information sent over communication links. Encryption devices are used in pairs in an SNA network. A data encryption device at one end of a session codes information; a data encryption device at the other end decodes it. The IBM 3848 Cryptographic Unit and Cryptographic Unit Support Program are available to provide encryption for ACF/VTAM.

IBM Token-Ring Network

The IBM Token-Ring Network is a high-speed communications network for information-processing equipment. The network has network management capability and permits data transmission at 4 million bits per second.

IBM Personal Computer Attachment

The IBM Personal Computer software that supports the Token-Ring Network includes:

- An IBM Personal Computer NETBIOS programming interface to the network, the PC Network program, and the PC Network SNA 3270 Emulation program
- An IBM Token-Ring Network/IBM PC Network Interconnect
- Advanced Program-to-Program Communication/Personal Computer (APPC/PC)
- Printer support for the IBM 3820 and 3812 Pageprinters.

Software

IBM has developed a library of software products to help you make the most of your hardware investment. The programs described in this section are concerned with the operating functions of a network. These programs enable end users to access application programs, share the resources of a network, and transmit information through a network.

Network Management Programs

The focus of SNA network management services is in the NetView program product. The following components of NetView provide specific network management functions:

- Command Facility
- Hardware Monitor
- Session Monitor
- Status Monitor.

For more information about network management programs, refer to "Chapter 4. Managing an SNA Network."

SNA Access Methods

Access methods reside in host processors and provide the major control of an SNA network. An SNA access method participates in establishing, monitoring, and terminating sessions between end users, allowing them to exchange data.

ACF/VTAM

The Advanced Communications Function/Virtual Telecommunications Access Method (ACF/VTAM) is the foundation for major IBM communication subsystems. It provides the interface between application programs in a host processor and other resources in an SNA network. ACF/VTAM also monitors the performance of a network, determines where problems may occur, and helps a network recover from failures. ACF/VTAM runs under the Multiple Virtual Storage (MVS), Virtual Machine/System Product (VM/SP), and Virtual Storage Extended (VSE) operating systems. Running under MVS, ACF/VTAM enables independent SNA networks to communicate with each other.

Application Subsystems

When an end user requests to use an interactive application program, an application subsystem locates the application program, loads it into the main memory of a processor, and transmits data between the end user and the application program. The following products are application subsystems in an SNA network.

Information Management System/Virtual Storage

The Information Management System/Virtual Storage (IMS/VS) program consists of the Data Base Facility and the Data Communication Facility. The Data Base Facility makes the information in the data base available to the end users. The Data Communication Facility sends this information through a network accurately and efficiently.

Customer Information Control System/Virtual Storage

The Customer Information Control System/Virtual Storage (CICS/VS) program product reduces the effort otherwise needed for terminal-oriented transaction programming. The Intersystem Communication feature of CICS/VS allows application programs in one CICS/VS system to access data bases of other CICS/VS systems and IMS/VS systems. Thus, application programs can obtain information from data bases throughout a network.

Airline Control Program/Transaction Processing Facility

The Airline Control Program/Transaction Processing Facility (ACP/TPF) is a reliable, responsive application subsystem. ACP/TPF is designed for applications such as travel, car rental, and hotel reservations; credit checks; and loan payment processing. ACP/TPF systems are usually characterized by:

- A large number of workstations
- A wide geographic area
- Short message length
- Short response time (usually less than three seconds).

Through a program called Network Extension Facility (NEF) running in a 3725 communication controller, an ACP network can be integrated into the SNA network environment.

Office Systems

IBM office systems are aimed at providing end users with three essential functions:

- Productivity applications to allow users to create, print, process, and analyze information
- Access to information contained in system libraries and data bases
- Interchange of information with other users.

IBM's approach to office systems is to build on carefully planned architectures—sets of well-defined rules that, when implemented across a

variety of systems, workstations, and devices, allow these products to function together in a single network. Architectures useful in the office context are:

- SNA Distribution Services (SNADS)—Controls the distribution of information among systems in a multi-system network
- Document Interchange Architecture—Defines the rules for document distribution and library services for filing, searching, retrieving, and distributing various types of information
- Document Content Architecture—Defines the rules for specifying the form and meaning of a document. It provides for uniform interchange of information in the office environment, and is independent of the communication protocol used to carry the information.

Office systems comprise a set of applications that encompass the IBM product line from small to large systems. Figure 11 on page 48 lists some of the current office system products.

Type of System or Workstation	Office System Product
Host Systems:	
System/370—MVS and VSE	DISOSS/370 (Distributed Office Support System/370) Personal Services/370 Personal Services/PC DisplayWrite/370
System/370—VM	PROFS (Professional Office System) PROFS/PC[2] (Personal Computer Connection) DisplayWrite/370
System/36	DisplayWrite/36 Personal Services/36
System/38	Personal Services/38
Workstations:	
IBM Personal Computer family	Personal Services/PC DisplayWrite 1 Displaywrite 4 PROFS/PC[2]
General-purpose displays	Personal Services/370 PROFS
Text systems	DisplayWrite/370 DisplayWrite/36 DisplayWrite 1 and 3
Workstation Clusters:	IBM PC Network IBM Token-Ring Network

Figure 11. Some Examples of Office Systems Products

Descriptions of some of these office system products follow.

Distributed Office Support System

The Distributed Office Support System (DISOSS) is a program product that assists managers, professionals, secretaries, and support personnel in communicating, retrieving, and controlling job-related information. DISOSS is a host-based application that runs under MVS or VSE in the CICS environment and allows users to exchange information (text, image, and data) via electronic mail and central filing. Among the capabilities of DISOSS are:

- Library services—Allow users to electronically store, search for, and retrieve text documents, image documents, and data files in a central host library
- Distribution services—Allow users to send and receive information electronically
- Personal services—Assist professional users with mail management, mail processing, and access to other applications (such as calendar and image mail processing) via the products Personal Services/370, Personal Services/36, and Personal Services/PC
- Application program interface—Allows the user to interface DISOSS and user-written application programs.

Professional Office System (PROFS)

PROFS is a program product that assists managers, professionals, secretaries, and support personnel in creating, communicating, retrieving, and controlling job-related information. PROFS also allows users to access other electronic business tools such as graphics, engineering drawings, and spreadsheets. PROFS consists of a set of application programs that allow office functions to be performed on the same terminals used for interactive problem solving. Among the capabilities of PROFS are:

- Distribution services—Allow users to send and receive written communications (text, graphics, drawings) locally or over long distances electronically from an unlimited number of diversified workstations
- Library services—Allow users to store and retrieve notes, documents, and statistics electronically at the host for instant accessibility at the workstation
- Personal services—Assist users in scheduling appointments, maintaining personal and departmental calendars, and providing reminders and unlimited access to electronic telephone directories
- Integrated information system—Provides the user with an increased ability to manage information through improved communication channels
- Other facilities—Include the ability to exchange final-form and revisable-form documents with DISOSS users, and an integrated interface to DisplayWrite/370 as an additional document-preparation facility.

Personal Services Products

These products include Personal Services/370, Personal Services/36, Personal Services/38, and Personal Services/PC. The specific functions and features offered by these products vary, but in general they include:

- A document creation facility for informal communications
- Preformatted patterns to assist in creating interoffice memos
- Creating and maintaining distribution lists for document or message distribution
- Document distribution to other Personal Services, DisplayWrite, and DISOSS users via SNADS (SNA Distribution Services)
- Creation and maintenance of a mail log
- Sending and receiving mail
- Document library functions including:
  - Storage of documents
  - Addition of search terms to previously stored documents
  - Storage of references to external (nonsystem) documents
  - Search, retrieval, and deletion of documents in a host library
  - Display and printing of documents.
- Managing of calendar and schedule appointments for individuals and departments
- Automatic scheduling of jobs such as report printing
- Creating and maintaining directories of system users.

DisplayWrite Products

DisplayWrite products include DisplayWrite/370, DisplayWrite/36, and several DisplayWrite products for the IBM Personal Computer. These products provide word-processing functions for the professional. They include a full-screen text editor and formatter that provides basic and advanced text functions for creating and revising documents. The specific functions and features offered by these products vary, but in general they include:

- A full-screen interactive text editor and formatter that allow such editing and formatting functions as:
  - Continuous text entry with automatic word wraparound to the next line
  - Insert and replace modes
  - Move, copy, and delete text
  - Running headings and footings
  - Automatic insertion of date, time, page numbers, and document name
  - Use of conditional text
  - Generation of table of contents
  - Automatically numbered lists
  - Selectable typefonts within a document
  - Optional change symbols (revision markers)
  - The ability to create, revise, copy, view, paginate, print, and send documents.
- Easy-to-learn and easy-to-use operating characteristics
- Help and tutorial aids
- Menu-driven access to all functions
- A split-screen capability that allows the user to view two documents at once or different parts of a single document
- Support for pattern letters
- Multilanguage linguistic support for automatic hyphenation, spelling verification, spelling correction assistance, reading grade level analysis, and synonym lists
- Support of revisable-form-text and fixed-form-text document interchange with other DisplayWrite users and with Personal Services, DISOSS, and PROFS users.

Interactive Support Programs

Interactive support programs make a network efficient and easy to use by:

- Simplifying commands
- Enabling many people to share computing facilities
- Allowing systems to communicate with each other.

Time Sharing Option

Time Sharing Option (TSO) allows many people to use the facilities of a large system simultaneously. With TSO, data processing personnel can:

- Develop new application programs
- Maintain program libraries
- Use interactive programs
- Access an information center.

TSO is a component of the MVS operating system.

Remote Job Entry Subsystems

Distributed data processing allows users of a network to send data to a host processor from a remote location. The Remote Job Entry subsystems provide this benefit for an SNA network.

Job Entry Subsystems

The job entry subsystems (JES/RES, JES2, and JES3) are a group of similar program products that facilitate communication between a host processor and an operator at a remote workstation. The job entry subsystems allow an operator at a remote workstation to send jobs to a host processor, receive jobs from a host processor, and control network resources.

Information Distributor Workstation Support

The Information Distributor Workstation Support (IDWS) program product allows the IBM 6670 Information Distributor to accept jobs from remote workstations. Using IDWS, the 6670 can print and copy text from a workstation during the day and print output from a host processor at night. IDWS uses very simple commands that enable inexperienced people to use the 6670.

VSE/POWER

Priority Output Writers, Execution Processors, and Input Readers (POWER) allows many people to use the DOS/VSE operating system simultaneously. POWER temporarily stores input data until a processor is ready to accept it. This procedure is called spooling, and because it lessens the load on a processor, a network processes data efficiently. Using POWER, you can assign job priorities to have the most important jobs processed first.

DPPX Remote Job Entry Workstation Facility

The DPPX Remote Job Entry Workstation Facility allows 8100 processors to accept data from remote workstations. It runs under the control of the Distributed Processing Program Executive (DPPX), an operating system of the 8100 Information System.

Control Programs

The following program products are responsible for the physical management of a network. They allow a communication controller to perform network routing and error recovery functions that a host processor would otherwise have to do, enabling a host processor to process more information and serve more users.

ACF/Network Control Program

The Advanced Communications Function/Network Control Program (ACF/NCP) resides in the 3725, 3720, or 3705 Communication Controller. ACF/NCP provides the physical management of a network; it controls attached links and devices, routes data, and performs error recovery routines.

Network Routing Facility

When the exchange of information between two workstations does not require a host processor, the Network Routing Facility (NRF) routes data between workstations. NRF operates with the access method and the network control program to route data through a communication controller and reduce unnecessary data traffic through a host processor. Using NRF, systems (such as the Series/1 and the 3650 Programmable Store System) and workstations (such as the 3780 Data Communication Terminal) can send data to each other through communication controllers, rather than through a host processor.

SNA Application Program Interfaces

The following program products are examples of those that provide a programmable interface between application programs running in SNA components and the network. They allow the application program to communicate with the network without having to involve the user in the details of communication.

Advanced Program-to-Program Communication/Personal Computer

The Advanced Program-to-Program Communication/Personal Computer (APPC/PC) program lets application programs running on the IBM Personal Computer (PC) communicate directly with other application programs on other PCs, CICS, Series/1, System/36, or System/38. APPC provides the facilities to turn your IBM Personal Computer into an SNA node.

System/88 Advanced Program-to-Program Communication

IBM System/88 Advanced Program-to-Program Communication program lets application programs running on the IBM System/88 communicate directly with other application programs on other System/88s, IBM PCs, CICS, Series/1, System/36, or System/38. APPC provides the facilities to turn your System/88 into an SNA node.

SNA Application Monitor

The SNA Application Monitor (SAMON) lets end-user terminals connect to VTAM applications. SAMON also has functions to provide the end user with information about the network and the VTAM applications, to broadcast messages to other SAMON terminals, and to restrict access to the network.

Network Design and Analysis

The Network Design and Analysis (NETDA) program product is designed to assist users in defining, analyzing, and optimizing the performance of a SNA telecommunications network. The program performs four primary functions:

- Network definition
- Availability analysis
- Performance analysis
- Route selection.

NETDA can be used to design a new network or to modify the design of an existing network.

Protocol Conversion for Non-SNA Devices

Although the previously discussed SNA products can meet most of your communication requirements, you may want to connect non-SNA devices to an SNA network. The products described below allow you to do so.

3708 Network Conversion Unit

The IBM 3708 allows ASCII/asynchronous devices to communicate with an SNA host. Of the 10 communication ports on the 3708, up to two may be used for attachment to an SNA host, and up to nine may be used for attachment of ASCII devices or ASCII hosts. The 3708 can operate in three modes:

- Protocol conversion
- Protocol enveloping
- ASCII passthrough.

In the protocol conversion mode, the 3708 allows ASCII devices to emulate 3270 devices and supports file transfer to an SNA host. In the protocol enveloping mode, the 3708 allows ASCII devices to appear like Network Terminal Option (NTO)-attached devices and supports file transfer to an SNA host. In the ASCII passthrough mode, the 3708 allows ASCII devices to communicate with ASCII hosts.

7171 ASCII Device Attachment Control Unit

The IBM 7171 ASCII Device Attachment Control Unit can convert the protocols of up to 64 ASCII workstations and printers, to allow them to send and receive data over System/370 data channels.

7426 Terminal Interface Unit

The IBM 7426 Terminal Interface Unit allows ASCII/asynchronous devices to communicate with an SNA host over an SDLC link or loop attachment, such as the loop attachment on the IBM 8100 Information System. The IBM 7426 supports protocol conversion to emulate IBM 3270 devices.

Non-SNA Interconnection

The Non-SNA Interconnection (NSI) program product allows selected remote job entry devices to send binary synchronous communication (BSC) data over Synchronous Data Link Control (SDLC) links between communication controllers. NSI envelops the BSC data in an SDLC format and transmits it just like SNA data. When the data arrives at its destination, NSI removes the SNA headers and trailers, and the destination device receives the original BSC data.

Network Terminal Option

The Network Terminal Option (NTO) program product provides a connection to an SNA network for certain non-SNA terminals. NTO envelops the non-SNA data and sends the original data stream to the destination device; therefore, existing application programs require few or no changes. NTO supports connection of the following non-SNA terminals:

- IBM 2740 Model I Communications Terminal
- IBM 2741 Communications Terminal
- IBM 3101 Communications Terminal
- IBM 3780 Communications Terminal
- IBM Personal Computer with Asynchronous Communications Adapter
- World Trade teletypewriter terminals
- Western Union Teletypewriter Exchange Service (TWX Model 33/35).

X.25 NCP Packet Switching Interface

The X.25 Network Control Program Packet Switching Interface allows you to attach 3725, 3720, and 3705 Communication Controllers to data transmission services according to CCITT Recommendation X.25. With the NCP Packet Switching Interface, one network can share public communication links with other networks.

Abbreviations
Glossary
Index

List of Abbreviations

ACF/NCP	Advanced Communications Function/Network Control Program
ACF/VTAM	Advanced Communications Function/Virtual Telecommunications Access Method
ACP/TPF	Airline Control Program/Transaction Processing Facility
APPC/PC	Advanced Program-to-Program Communication/Personal Computer
BSC	Binary Synchronous Communication
CICS	Customer Information Control System
CICS/VS	Customer Information Control System/Virtual Storage
CMC	Communication Management Configuration
DIA	Document Interchange Architecture
DISOSS	Distributed Office Support System
DOS	Disk Operating System
DPCX	Distributed Processing Control Executive
DPPX	Distributed Processing Program Executive
DPPX/SP	Distributed Processing Program Executive/System Product
FTP	File Transfer Program
IDWS	Information Distributor Workstation Support
IMS	Information Management System
IMS/VS	Information Management System/Virtual Storage
JES	Job entry subsystem
LSI	Large Scale Integration
LU	logical unit
MVS	Multiple Virtual Storage
NCCF	Network Communications Control Facility
NLDM	Network Logical Data Manager
NPDA	Network Problem Determination Application
NPM	Network Performance Monitor
NRF	Network Routing Facility
NSI	Non-SNA Interconnection
NTO	Network Terminal Option
OCCF	Operator Communication Control Facility
POWER	Priority Output Writers, Execution Processors, and Input Readers
PU	physical unit
SDLC	Synchronous Data Link Control
SNA	Systems Network Architecture
SNADS	SNA Distribution Services
SNAP/SHOT	Systems Network Analysis Program/Simulated Host Overview Technique
SSCP	system services control point
TPNS	Teleprocessing Network Simulator
TSO	Time Sharing Option
VM	Virtual Machine
VM/SP	Virtual Machine/System Product
VSE	Virtual Storage Extended
VSPC	Virtual Storage Personal Computing

Glossary

This glossary defines terms and abbreviations used in this book. Consult the *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems*, GC20-1699, and the index of this book for terms that you do not find in this glossary.

A

access method. A software component in a processor for controlling the flow of information through a network.

adjacent nodes. Nodes that are connected to a given node by one or more links with no intervening nodes.

B

boundary function. A capability of a subarea node to provide protocol support for attached peripheral nodes.

C

class of service. A designation of the path control network characteristics, such as path security, transmission priority, and bandwidth, that apply to a particular session.

communication controller node. A subarea node that contains a network control program.

configuration. The arrangement of a computer system or network as defined by the nature, number, and chief characteristics of its functional units.

D

data channel. A device that connects a processor and main storage with I/O control units.

data link control protocol. Specifications for interpreting control data and transmitting data across a link.

directory services. Services for resolving user identifications of network components to network routing information.

domain. An SSCP and the resources that it can control.

E

end user. The ultimate source or destination of data flowing through an SNA network. An end user can be an application program or a workstation operator.

explicit route. One or more transmission groups that connect two subarea nodes.

H

host node. A subarea node that contains a system services control point.

L

layer. A grouping of related functions that are logically separate from the functions in other layers; the implementation of the functions in one layer can be changed without affecting functions in other layers.

link. A transmission medium and data link control component that together transmit data between adjacent nodes.

logical unit. A type of network addressable unit that enables end users to communicate with each other and gain access to network resources.

M

management services. In SNA, functions distributed among network components to operate, manage, and control the network.

N

network addressable unit. A logical unit, physical unit, or system services control point.

node. An end point of a link, or a junction common to two or more links in a network. Nodes can be

processors, controllers, or workstations. Nodes can vary in routing and other functional capabilities.

P

pacing. A technique by which a receiving component controls the rate of transmission by a sending component to prevent overrun or congestion.

peripheral node. A node that uses local addresses and therefore is not affected by changes in network addresses. A peripheral node requires boundary function assistance from an adjacent subarea node.

physical unit. The component that manages and monitors the resources of a node, as requested by a system services control point.

protocol. The meaning of, and the sequencing rules for, requests and responses used for managing a network, transferring data, and synchronizing the states of network components.

S

session. A logical connection that enables two network addressable units to communicate with each other.

subarea. A portion of an SNA network that consists of a subarea node, and any attached links and peripheral nodes.

Synchronous Data Link Control. A discipline for managing synchronous, code-transparent, serial-by-bit, information transfer over a link. SDLC conforms to subsets of the Advanced Data Communication Control Procedures (ADCCP) of the American National Standards Institute and High-level Data Link Control (HDLC) of the International Standards Organization.

system services control point. A focal point within an SNA network for managing the configuration, coordinating network operator and problem determination requests, and providing directory services and other session services for end users of a network. Multiple SSCPs, cooperating as peers with one another, can divide the network into domains of control, with each SSCP having a hierarchical control relationship to the physical units and logical units within its own domain.

Systems Network Architecture. The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through and controlling the configuration and operation of networks.

T

telecommunication link. A physical medium, such as a wire or microwave beam, that is used to transmit data.

transmission group. A group of links between adjacent nodes appearing as a single logical link for routing messages. A transmission group may consist of one or more SDLC links or of a single S/370 data channel.

transmission media. The physical means of transmitting data in a network, such as telephone lines.

V

virtual route. A logical connection between two subarea nodes that is physically realized as a particular explicit route.

Index

S

T

U

V

W

X

Numerics

Systems
Network
Architecture

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File No. GENL-30 (SNA)
SLSS No. 5743-SNA

GC30-3072-3

Printed in USA.