GC38-0254-1
File No. S370-30

Advanced Communications Function for VTAM (ACF/VTAM)

Program Product

General Information

Program Numbers 5746-RC3 (DOS/VS)
5735-RC2 (OS/VS)

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Second Edition (August 1977)

This edition is a major revision of GC38-0254-0, which is now obsolete. Refer to the Summary of Amendments for a description of the changes made in this edition.

This edition applies to the initial DOS/VS version of ACF/VTAM (Program Number 5746-RC3) and to the initial OS/VS version of ACF/VTAM for OS/VS1, OS/VS2 SVS, and OS/VS2 MVS (Program Number 5735-RC2). Information about the optional Multisystem Networking Facility of ACF/VTAM is included. The information in this publication should be used for planning purposes until ACF/VTAM becomes available for your operating system.

The program product described in this manual, and all licensed materials available for it, are provided by IBM under terms of the Agreement for IBM Licensed Programs. Your branch office can advise you on the ordering procedures.

A form has been provided at the back of this publication for readers' comments. Address additional comments to IBM Corporation, Department 63T, Neighborhood Road, Kingston, New York 12401. Comments become the property of IBM.

Summary of Amendments (August 1977)
to GC38-0254-0 by Revision GC38-0254-1

ACF/VTAM for DOS/VS

New Program Features

New 3270 Terminal Products: ACF/VTAM supports the following new terminal products of the IBM 3270 Information Display System:

3274 Control Unit Models 1A, 1B, and 1C

3276 Control Unit Display Station Models 1, 2, 11, and 12

3277 Display Station Models 1 and 2

3278 Display Station Models 1 and 2

3284 Printer Models 1 and 2

3286 Printer Models 1 and 2

3287 Printer Models 1 and 2

3288 Printer Model 2

3289 Printer Models 1 and 2

These terminal products are included in Appendix A.

Changed Documentation

New Chapter: Chapter 8, "Summary of ACF/VTAM," summarizes major enhancements and operational considerations for both ACF/VTAM and the Multisystem Networking Facility.

Terminology: The text has been changed so that local 3270, BSC, and start-stop devices now are referred to as *non-SNA terminals*.

Format Change: The lists of terminal products in Appendix A have been changed to tables of SNA and non-SNA terminal products.

Preface

This publication describes generally the services provided by Advanced Communications Function for the Virtual Telecommunications Access Method (ACF/VTAM). It is directed primarily to data processing system planners who need an overview of ACF/VTAM. For more detailed information, see *ACF/VTAM Concepts and Planning,* GC38-0255.

ACF/VTAM is a program product that operates under DOS/VS and will be available under OS/VS1, OS/VS2 SVS, and OS/VS2 MVS. ACF/VTAM has the following enhancements:

- Ability to communicate between two application programs
- Message traffic pacing between application programs
- Message traffic pacing inbound from programmable terminals that support inbound pacing
- Additional network operator display capabilities
- Dynamic expansion and contraction of ACF/VTAM buffer pools
- Dynamic collection of statistics that can be used in adjusting ACF/VTAM's performance characteristics
- Additional tracing capabilities

An optional feature of ACF/VTAM is the multisystem networking facility which allows communication among network elements attached to different host computers.

Major topics in this publication are:

- Definition of an ACF/VTAM network
- Operation of an ACF/VTAM network
- ACF/VTAM macro instructions
- ACF/VTAM reliability, availability, and serviceability features

In addition, Chapters 1 and 2 introduce the reader to the concepts and major features of ACF/VTAM and the Multisystem Networking Facility. These chapters are particularly useful to users seeking information on ACF/VTAM. The rest of the book provides preliminary information for installation managers and system programmers who are evaluating and planning for ACF/VTAM.

The reader should be familiar with the basic concepts of data communications. These can be found in *Introduction to Data Communications,* SR20-4461. For a description of the relationship between ACF/VTAM and ACF/NCP/VS and ACF/TCAM, see *Introduction to Advanced Communications Function,* GC30-3033.

Throughout the book, when a particular service applies to OS/VS1, OS/VS2 SVS, and OS/VS2 MVS, these systems are referred to as *OS/VS. OS/VS2* is used as a common name whenever the discussion applies equally to OS/VS2 SVS and OS/VS2 MVS.

ACF/VTAM General Information is one of a number of ACF/VTAM publications. Figure P-1 shows the reading order of these publications for different users' needs.

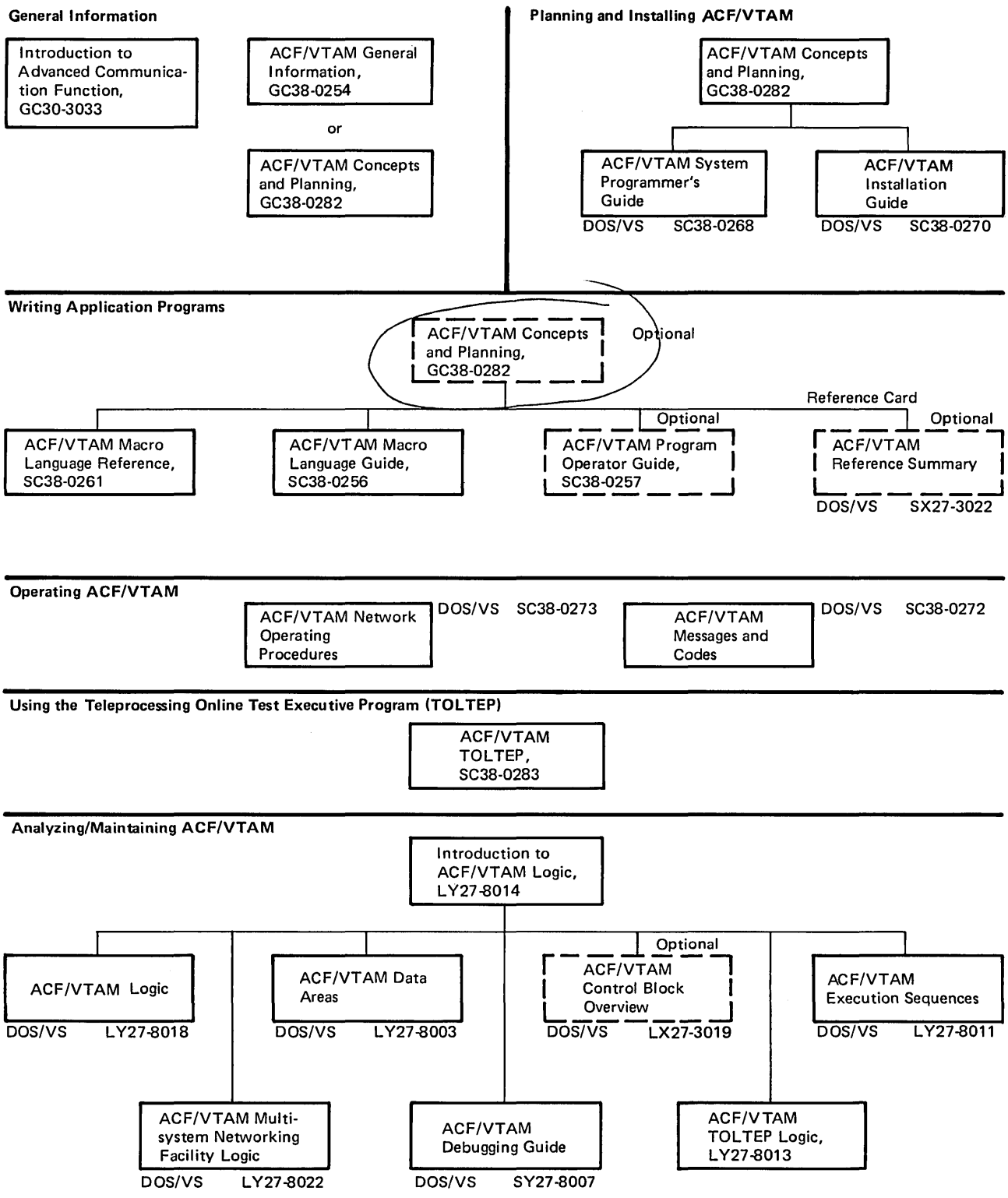


Figure P-1. ACF/VTAM Publications

Contents

Figures

Chapter 1. Introduction

Advanced Communications Function for the Virtual Telecommunications Access Method (ACF/VTAM) controls communication between elements in a single-host or a multiple-host communication system that is compatible with Systems Network Architecture (SNA). SNA is a total description of the logical structure, formats, protocols, and the operational sequences for transmitting information units through the data communication system. SNA:

- Provides a consistent and comprehensive structure for communication system growth
- Minimizes the effects of system changes
- Distributes network functions away from the host computer
- Allows sharing of network resources
- Supports many different kinds of communication devices
- Extends system functions conveniently and effectively to the user
- Minimizes the user's involvement in details of system operation

ACF/VTAM Services: To support communication within the network, ACF/VTAM:

- Permits the user to be unaware of the location of network resources
- Controls the allocation of resources
- Establishes, controls, and terminates access to points in the network
- Transfers data between points in the network
- Permits application programs to share resources in the network such as communication lines, communications controllers, and terminals
- Permits the operation of the network to be monitored and altered
- Permits the terminals of one 3705-II Communications Controller to be divided among as many as four host computers
- Permits the configuration of the network to be changed while the network is being used
- Attempts to detect and correct problems in the operation of the network

Multisystem Networking Facility Services: To support communication within a multiple-host network, ACF/VTAM in conjunction with the Multisystem Networking Facility provides the following services in addition to those listed above:

- Permits an application program in one host computer to communicate with application programs and terminals in other host computers
- Permits a terminal attached to one host computer to communicate with application programs in another host computer
- Establishes, controls, and terminates access to application programs and SNA terminals in other parts of the multiple-host network
- Permits the network operator to obtain information about resources in parts of the network not controlled by his or her host's ACF/VTAM
- Allows a communications controller of one host computer to be transferred to an adjacent host computer
- Permits the terminals of one 3705-II Communications Controller to be shared by up to four host computers

To provide these services, ACF/VTAM uses the facilities of the operating system, System/370 virtual storage, the IBM 3704 and 3705 Communications Controllers, and the IBM Virtual Storage Access Method (VSAM).

Systems Requirements for Using ACF/VTAM: ACF/VTAM requires DOS/VS Release 34, OS/VS1 Release 6, OS/VS2 Release 1.7 (SVS), and OS/VS2 Release 3.7 (MVS), or subsequent releases of these operating systems.

The System/370 instruction set must include the Compare and Swap and the Compare Double and Swap instructions. These instructions are part of a hardware feature available on System/370 host computers.

ACF/VTAM requires a 3704, 3705-I, or 3705-II Communications Controller in network control mode to support remote communications controllers and terminals. A 3705-I or 3705-II Communications Controller is required for multiple-host communications. Appendix A lists terminals that can be used with ACF/VTAM.

Chapter 2. Characteristics of ACF/VTAM

Data communications is the process of transmitting data over communication facilities such as telephone lines. In a computer-based data communication system, data is passed between points in the data communication network. In an ACF/VTAM system, data is passed between application programs and terminals in the network. To ACF/VTAM, a terminal is one end of a communication session. A terminal can be built-in logic or programming associated with a terminal subsystem or stand-alone device, an application program acting as a secondary end of session, or a supported non-SNA terminal (see Appendix A). In this manual, all of these are referred to as *terminals* unless a distinction is required for clarity.

ACF/VTAM directs the flow of data between the network elements. Application programs use ACF/VTAM to communicate with the terminals; the terminals respond through ACF/VTAM. This chapter describes the composition of an ACF/VTAM data communication network and the way in which the elements of the network are controlled and shared through ACF/VTAM.

The portion of a network that ACF/VTAM in a host computer controls is called a *domain*; any use of resources within that domain is controlled by ACF/VTAM. A domain consists of one host computer containing ACF/VTAM, and one or a combination of the following: IBM 3704 or 3705 Communications Controllers attached by channel (local) to the host computer, IBM 3704 or 3705 Communications Controllers attached to a local communications controller on SDLC links (remote), communication devices attached to local or remote communications controllers on SDLC, BSC, or start-stop lines, and communication devices attached by channels to the host computer. Appendix A lists terminal products supported by ACF/VTAM. Figure 2-1 illustrates a possible configuration for a single-domain network.

ACF/VTAM and the Multisystem Networking Facility permit communication among domains by allowing them to be interconnected with SDLC links between local communication controllers or using a shared communication controller. Figure 2-2 shows a configuration that has three domains. Each ACF/VTAM controls its own domain. Before a terminal in Domain A can communicate with a resource in Domain B, the ACF/VTAMs must exchange the information required to establish the desired connection.

ACF/VTAM provides support for communication within a single domain. Cross-domain communication requires the addition of the Multisystem Networking Facility to ACF/VTAM. Throughout this book, discussions of single-domain communication relate to ACF/VTAM while discussions of cross-domain communication assume ACF/VTAM with the Multisystem Networking Facility.

Two characteristics of ACF/VTAM are of primary importance: First, ACF/VTAM uses processing capabilities of the programmable communications controllers (3704 and 3705) and SNA terminals, allowing part of the telecommunication control to be moved out of the host computer and into the network. Second, ACF/VTAM treats the parts of the network as shareable resources. The lines, controllers, and terminals can be shared by all the application programs that use ACF/VTAM.

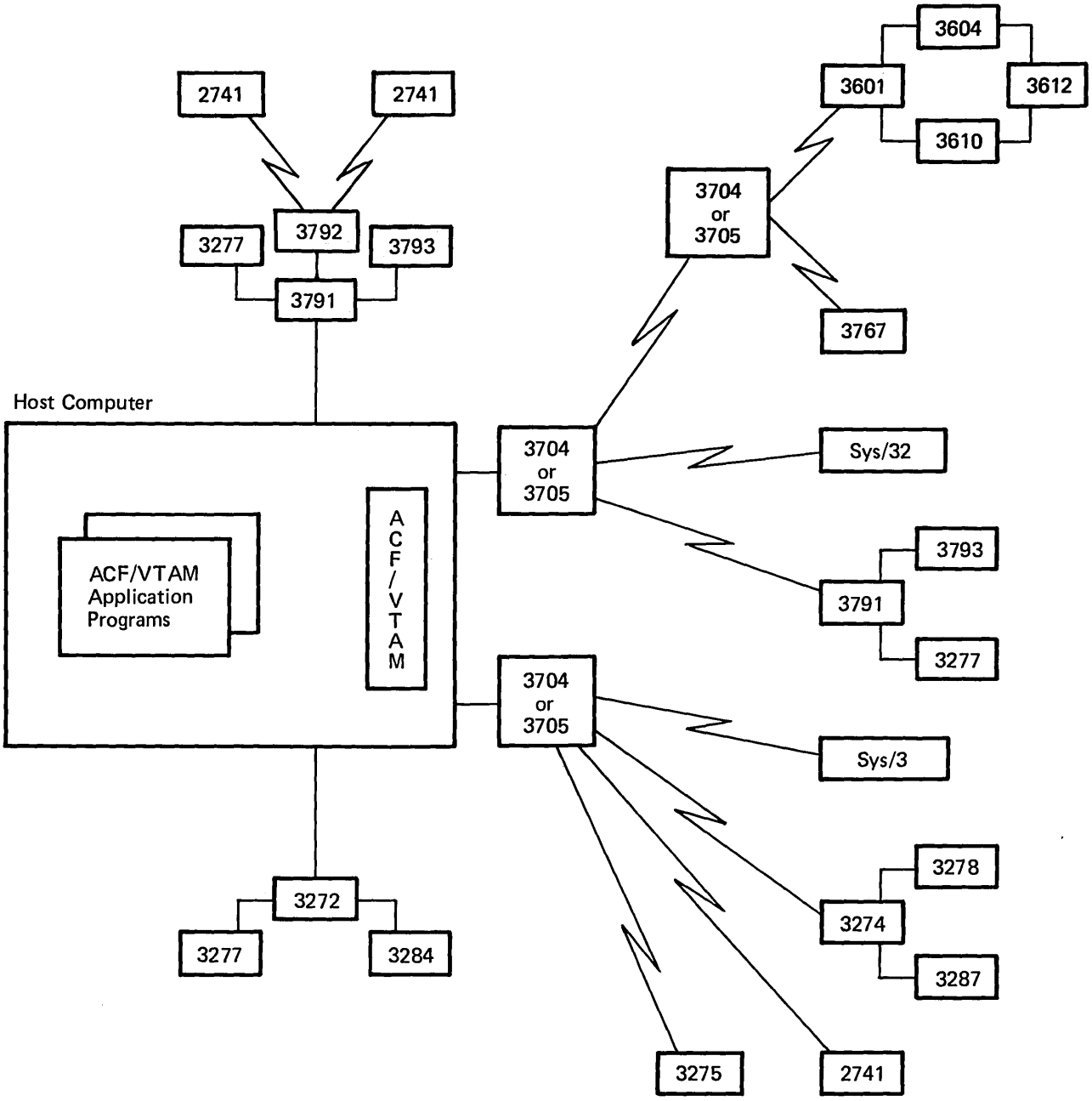


Figure 2-1. A Single-Domain ACF/VTAM Network

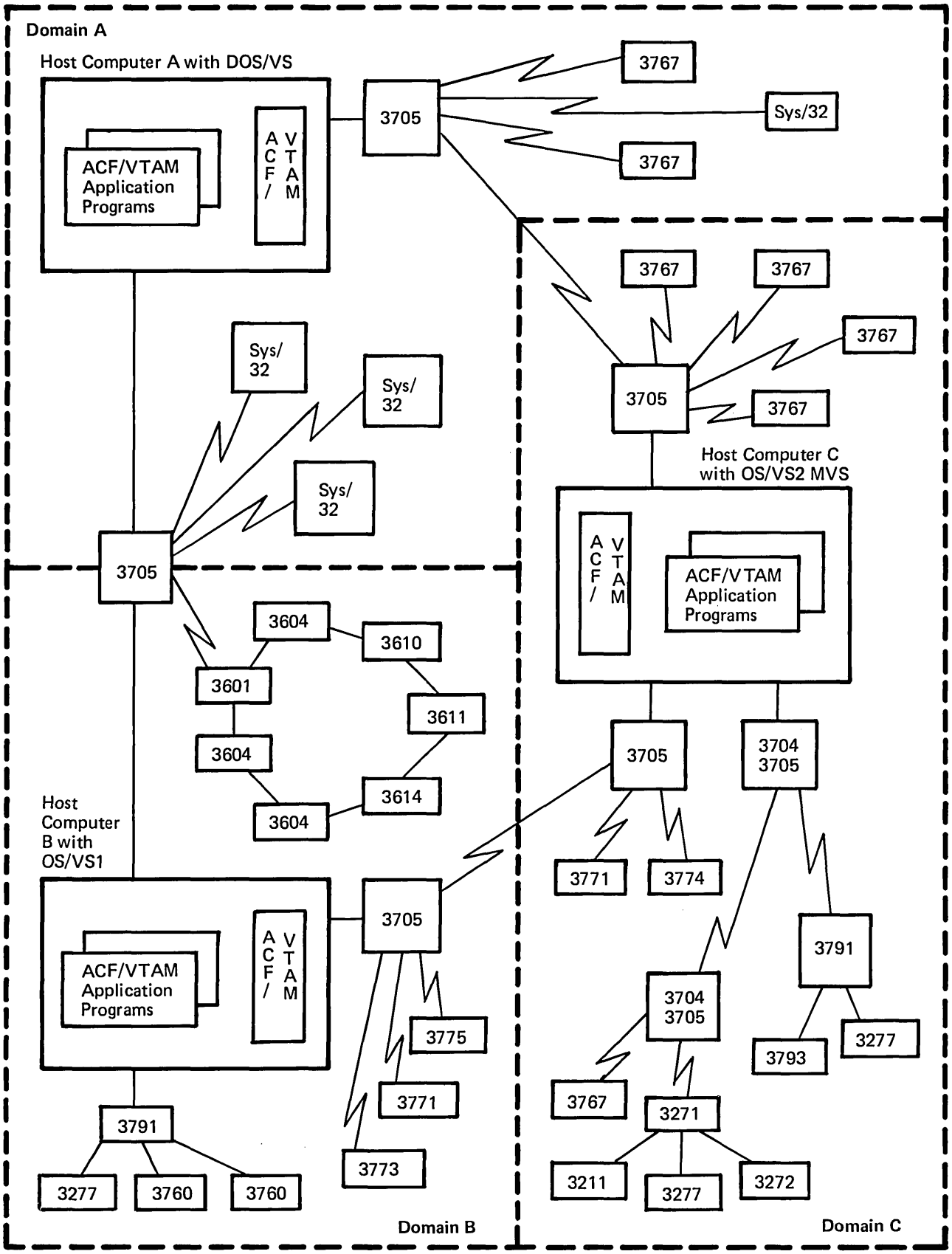


Figure 2-2. A Multiple-Domain ACF/VTAM Network

Communications Controllers

The IBM 3704 and 3705 Communications Controllers link ACF/VTAM with the remote portions of the network and control the flow of information between remote terminals and ACF/VTAM. In a multiple-domain network, local 3705 Communications Controllers connect domains (3704 Communications Controllers cannot be used for cross-domain communication). In Figure 2-2, Domain A and Domain C are connected by two local communications controllers and an SDLC link. Domain A and Domain B are connected by a shared communications controller.

A single communications controller can support up to 352 communication lines using a single subchannel address. Thus, the communications controllers permit large network configurations which require few subchannel addresses. The 3705 can be attached to either a byte-multiplexer channel, a block-multiplexer channel, or a selector channel, while the 3704 is attached to a byte-multiplexer channel.

A communications controller and its Network Control Program (NCP) support a variety of remote terminals attached to the controller. The NCP is generated from a series of user-specified macro instructions. An NCP can be generated to handle lines in either *network control mode*, or *emulation mode*, or both. An NCP that is generated with both kinds of functions is called an NCP with Partitioned Emulation Programming (PEP).

Two versions of the NCP can be used with ACF/VTAM. NCP/VS Version 5 can be used in a 3704 or 3705 Communications Controller for controlling communications within a domain. Advanced Communications Function for NCP (ACF/NCP/VS) can be used in a 3705-I or 3705-II Communications Controller for communications within a domain and must be used for cross-domain communications.

ACF/VTAM supports only the network control mode, either with or without PEP. (Emulation mode is used to emulate the IBM 2701 Data Adapter Unit and the IBM 2702 and 2703 Transmission Control Units and is not supported by ACF/VTAM.) In network control mode, the NCP allows some functions previously performed entirely by the access method to be performed primarily in the controller. Functions provided by a 3704 or 3705 include:

- Transmitting data between domains (3705 only)
- Controlling lines
- Controlling dynamic buffering
- Deleting and inserting communication control characters
- Detecting permanent line errors
- Gathering line statistics
- Activating and deactivating lines
- Closing down portions of the network
- Handling recoverable line errors
- Providing error statistics to ACF/VTAM

Additional functions provided only for start-stop and BSC terminals include:

- Translating character codes
- Date- and time-stamping

Terminals in an ACF/VTAM Network

An ACF/VTAM application program can communicate with two types of terminals: SNA terminals and non-SNA terminals. An *SNA terminal* is a terminal that has the capability to perform functions defined by Systems Network Architecture (SNA). SNA terminals send and receive data in a format defined by SNA. An SNA terminal is defined to ACF/VTAM as a *logical unit* (an addressable part of a data communication device). IBM terminal products that communicate over SDLC links and local SNA terminal products contain one or more logical units. These products also contain a *physical unit* that controls some of the interaction of the logical units with the rest of the network (for example, controlling dialing operations). In addition, an application program can act in the same host or in a cross-domain host like an SNA terminal when communicating with other application programs.

Non-SNA terminals do not have physical units and logical units and cannot use some of the services provided by ACF/VTAM. See Appendix A for a list of the SNA and non-SNA terminals supported by ACF/VTAM.

Distribution of Function

ACF/VTAM uses the processing capabilities of the 3704 and 3705 Communications Controllers and the SNA terminals so that many functions formerly performed in the host computer can be distributed among other network components. In general:

ACF/VTAM allocates resources within its domain.

The communications controllers control data flow in the network.

ACF/VTAM application programs process data and request communication services from ACF/VTAM.

The programmed logic of certain SNA terminals formats data and processes local transactions.

By performing these functions outside the host:

The host is relieved of minor requests.

Processing and error recovery are performed closer to the terminal and user.

Programmable SNA terminals can perform some remote processing when no connection to the host can be made.

Daily processing can be done by remote programmable SNA terminals and then sent to the host to update a central data base.

In addition, in a multiple-domain network, data processing functions can be distributed among resources in different domains. For example, a terminal in domain A can use an application program in domain B to process one type of data and an application program in domain C to process another type of data. Concurrent connections between a terminal and two application programs is not supported.

Sharing Resources

ACF/VTAM allows resources to be shared among users of the network. An application program can communicate with several terminals simultaneously and any terminal can communicate with any application program using ACF/VTAM. Once a terminal (with the exception of an application program acting as a terminal) is connected to an application

program, that terminal can communicate with only that application program until released by the program. An application program acting as a terminal, however, can communicate with more than one application program at one time.

Resources that make up the paths between application programs and terminals are also shared. ACF/VTAM uses path elements (such as communications controllers and lines) on behalf of an application program and terminal as needed to complete a specific data transfer request. For example, two terminals can be attached on the same line, and each terminal can be connected to a different application program. When either application program requests data transfer, the line is used. Thus, the line is shared among the terminals and application programs.

ACF/VTAM Application Programs

ACF/VTAM application programs use macro instructions to request connection and data-transfer services from ACF/VTAM. This section describes connection, data transfer, and use of exit routines. Chapter 5 describes application program concepts in more detail.

Connection

Connection is the process of making a network path available for communication between points in the network. A logical connection between an application program and a terminal or another application program is called a *session*. One end of a session is called the *primary* end, and the other end is called the *secondary* end. The primary end of a session is always an application program; the secondary end of a session can be a logical unit, a non-SNA terminal, or an application program. In general, the primary end of a session has more control over connection and communication; the secondary end of a session only can ask for connection and, in certain situations, only can react to communication commands from the primary end.

The primary end of a session may request that ACF/VTAM create a session between itself (the primary end) and a terminal. It can request the session on its own initiative or in response to a logon. A logon can be initiated by:

A terminal. A terminal can send a logon to an application program. An ACF/VTAM application program acting as the secondary end of a session can cause a logon to be sent to another application program.

ACF/VTAM (an automatic logon). A user can specify that a logon is to be generated on behalf of a logical unit or non-SNA terminal for a selected application program whenever it is not connected to another application program. Automatic logons cannot be defined for an application program acting as a terminal.

The network operator. The network operator can enter a logon on behalf of a logical unit or non-SNA terminal; however, the network operator cannot enter a logon on behalf of an application program acting as a terminal.

An ACF/VTAM application program itself (a simulated logon). A primary application program can request ACF/VTAM to create a logon for a terminal or secondary application program and to pass the logon back to the primary application program as though it had come from the terminal or secondary application program.

Transferring Data

Once an application program has been connected to terminals, it can communicate with them using macro instructions. ACF/VTAM provides two types of communication macro instructions: *basic mode* and *record mode*. See Appendix A to determine which supported devices use record mode macro instructions and which use basic mode macro instructions.

Record Mode: Record mode is designed for use with SNA terminals or application programs. All combinations of bits can be valid data. There is no required mapping of the data stream to accommodate path or link control. Using record mode, the application program can maintain simultaneous, independent input and output data flows. To the application program, there is a single address for both data flows. The application program can respond independently to input and output events without the need for complex polling or scanning techniques.

Basic Mode: Devices supported by basic mode must be specifically asked (solicited) to transmit data to the application program. The application program provides information to control the mechanical and formatting operations of the terminal, but does not provide communication control characters. ACF/VTAM, in conjunction with the communications controllers, provides the control characters needed to move the data through the data communication network.

Exit Routines

An application program can supply a comprehensive set of exit routines that ACF/VTAM invokes under the following conditions:

The primary application program receives a logon from a terminal or secondary application program.

The primary application program receives a request from a terminal or secondary application program to terminate the session.

Contact with a terminal or secondary application program is lost.

Use of a terminal connected to the primary application program is requested by another application program.

A session-control command is received by the primary application program.

The network operator starts ACF/VTAM shutdown procedures.

ACF/VTAM detects a logical error in an application program's request for an operation.

ACF/VTAM detects a physical error while attempting to perform an operation.

The primary application program receives a response or a priority command, and the application program specifies that it is to handle such matters in an exit routine.

The primary application program receives notification that a session it initiated cannot be established.

ACF/VTAM completes an operation requested by the primary application program, and the application program had requested notification of completion in an exit routine.

By using exit routines to handle certain events, an application program need not wait for completion of ACF/VTAM services or check periodically for special conditions.

Chapter 3. Creating an ACF/VTAM Data Communication System

Defining an ACF/VTAM data communication system consists of defining one or more ACF/VTAM domains and coordinating the domain definitions. Five processes are involved in the creation of a domain:

Defining ACF/VTAM, local terminals, and local 3704 and 3705 Communications Controllers to the operating system

Generating the NCP(s)

Defining the domain to ACF/VTAM

Defining accounting, authorization, and logon-interpret exit routines

Defining ACF/VTAM start options

Defining ACF/VTAM, Local Terminals, and Local 3704 and 3705 Communications Controllers to the Operating System

During system generation, ACF/VTAM is specified as an operand of the SUPVR macro instruction in DOS/VS or with the ACSMETH operand of the DATAMGT macro instruction in OS/VS. At that time, local SNA and non-SNA terminals and local 3704 and 3705 Communications Controllers are defined to the operating system. Note that because only local terminals and communications controllers are defined to the operating system, the configuration of the remote network can be changed without regenerating the system.

Defining the Domain to ACF/VTAM

Defining the domain to ACF/VTAM includes the following:

Defining one or more network control programs (NCPs) for each 3704 or 3705 Communications Controller in the network

Defining local non-SNA terminals

Defining ACF/VTAM application programs and groups of ACF/VTAM application programs

Defining sets of terminals on switched lines

Defining local SNA terminals

Defining connection procedures

Defining cross-domain resource managers (ACF/VTAM facilities used to control cross-domain communication)

Defining resources in other domains that can be used for cross-domain communication

Defining path tables for cross-domain communication

Defining NCPs

NCP definition specifies the numbers, types, and configurations of terminals to be attached to a 3704 or 3705 Communications Controller. The NCP has its own generation language, which consists of macro instructions that:

Describe the 3704 or 3705 Communications Controller

Specify NCP options

Describe the interaction of the operating system with the NCP (such as buffers and block sizes)

Describe lines, line groups, and paths

Describe terminals

The NCP macro instructions are assembled, verified, and used to generate the NCP. The NCP-generation source statements are used again by ACF/VTAM during ACF/VTAM's definition of the NCP.

At least one NCP must be generated for each local or remote 3704 or 3705 Communications Controller. A communications controller may have more than one NCP generated for it; which NCP is used is determined by which NCP is activated by the network operator. Each NCP must have a different symbolic name. Multiple NCPs for a communications controller are useful for installations that have varying data communication network requirements. Using different NCPs for different requirements allows the user to alter terminal configurations as demands on application programs change and may make processing more efficient.

Defining Local Non-SNA Terminals

ACF/VTAM provides connection and data-transfer services to certain non-SNA terminals (see Appendix A), which can be attached locally (through a channel) to the host computer. When attached in this way, the terminal is defined to ACF/VTAM with LBUILD and LOCAL definition statements.

Defining Application Programs

An application program is defined using the APPL definition statement. Each application program is given a unique symbolic name, and may be defined by itself or as one of a group of application programs. For example, a university might set aside a portion of each day's computing time for student use and would want to have a group of student-oriented application programs in the system during that period. The operator could identify these application programs to the system in one step by defining them in one group with the VBUILD statement.

Defining Sets of Terminals on Switched Lines

Each set of SNA terminals on switched (dial) lines is defined to ACF/VTAM using VBUILD, PU, LU, and PATH definition statements. These define the general characteristics of the terminals and their method of connection (manual dial-out, automatic dial-out, dial-in, and the telephone numbers to be used).

Defining Local SNA Terminals

ACF/VTAM provides connection and data transfer services to certain SNA terminals (see Appendix A) attached locally (through a channel) to the host computer. Terminals attached in this way are defined using VBUILD, PU, and LU definition statements.

Defining Cross-Domain Resource Managers

In a multiple-domain network, the user must define the ACF/VTAM facilities that control cross-domain connection, called *cross-domain resource managers.* Cross-domain resource managers are defined using the VBUILD and CDRM definition statements.

Defining Cross-Domain Resources

In a multiple-domain network, the user must define, within a domain, resources in other domains that can be used for cross-domain communication. These resources are defined using the VBUILD and CDRSC definition statements.

Defining Path Tables

In a multiple-domain network, the user must define tables that describe the paths to be used by ACF/VTAM for cross-domain communication. These tables are called *path tables.* Path tables are defined using the PATH definition statement.

Defining Connection Procedures

A logical unit can initiate connection and disconnection by sending a command to ACF/VTAM in one of two forms:

A *field-formatted command.* This form of command may be used by *logical units* in programmable devices. SNA defines the format of the field-formatted commands; no user action is needed to define these commands.

A *character-coded command.* This form of command is used by programmable and non-programmable devices. An installation using this form of command can use either the IBM-defined format of character-coded logon or logoff commands, or, by building a definition table, can define alternate forms of the commands. The character-coded command is converted to a field-formatted command by ACF/VTAM before processing.

Figure 3-1 illustrates the processing of connection and disconnection requests from logical units.

During the connection process the primary and secondary ends of a session establish a set of rules to be followed when communicating. These rules are called *session parameters.* Session parameters generally correspond to modes of application operation, such as batch or interactive operation. These session parameters can specify:

Whether operation is half-duplex or full-duplex

Who has error-recovery responsibility

Whether data can be chained

Who can speak first

A set of session parameters can be associated with a symbolic name called a *logon mode name.* Each logon mode name is defined in a *logon mode table*, which associates each logon mode name with a set of session parameters. The user can build one or more logon mode tables to define a set of logon mode names and session parameters or can use the IBM-supplied logon mode table.

Non-SNA terminals initiate connection by sending a character sequence to ACF/VTAM. The character sequence is interpreted by ACF/VTAM using a user-defined *interpret table* and then routed to the application program specified by the table. The interpret table is defined using the INTAB and LOGCHAR macro instructions. ACF/VTAM provides no facilities for terminal-initiated disconnection for non-SNA terminals.

Defining Accounting, Authorization, and Logon-Interpret Exit Routines

The user can code exit routines that may be included as part of ACF/VTAM. These exit routines are automatically invoked by ACF/VTAM whenever an event occurs that is supervised by the routine. These exit routines are executed as part of ACF/VTAM and are not under the control of the application programs.

The following exit routines may be included by the user as part of ACF/VTAM:

An *authorization exit routine.* To validate connection requests.

An *accounting exit routine.* To collect accounting information.

A *logon-interpret exit routine.* To determine the appropriate application program to receive a logon. This facility is intended for use primarily with non-SNA terminals using an interpret table. (Interpret tables are described in "Defining Connection Procedures," above.)

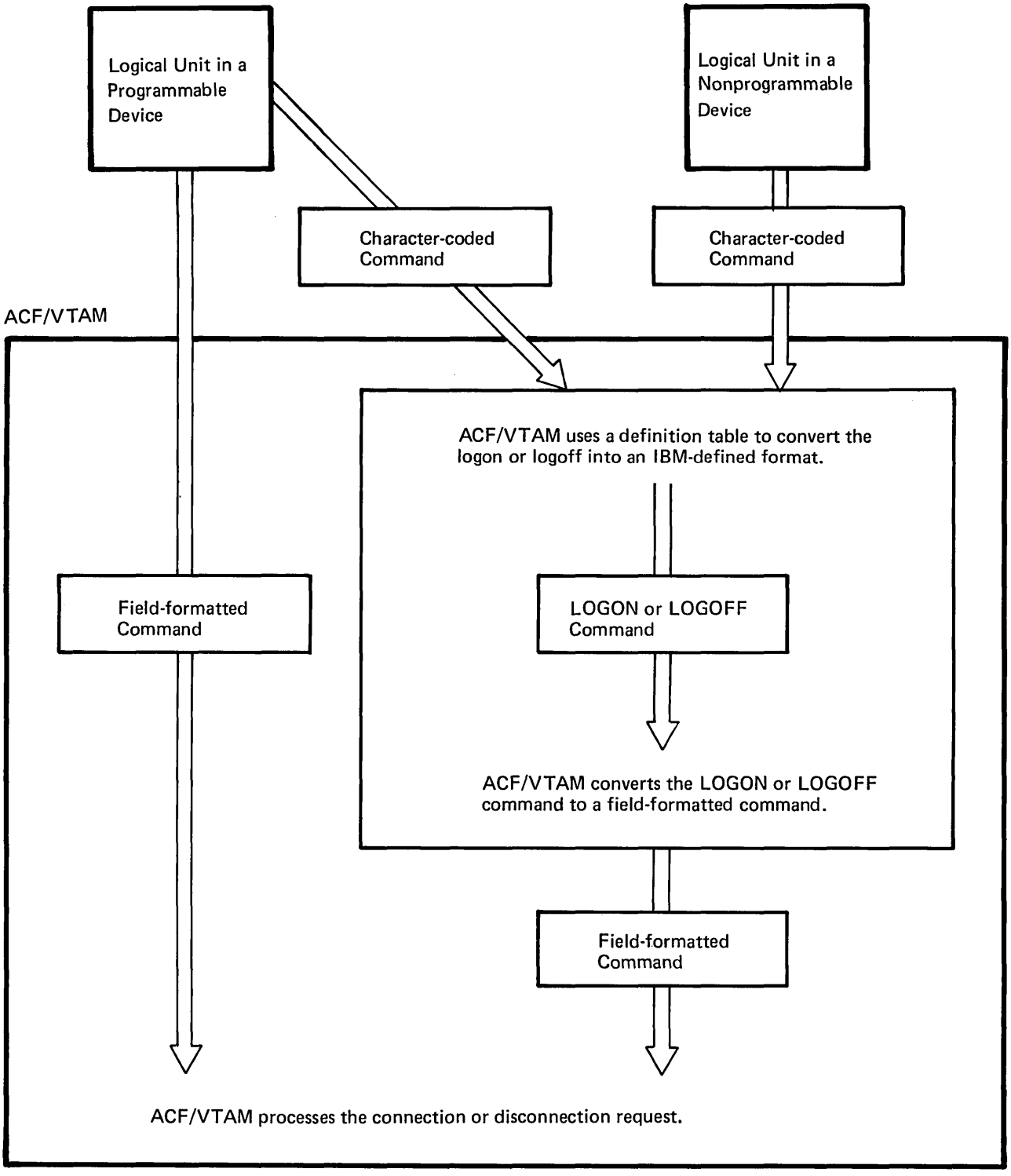


Figure 3-1. Processing Connection and Disconnection Requests from Logical Units

Defining ACF/VTAM Start Options

When the network operator starts ACF/VTAM, options can be specified to define facilities according to user requirements. These options can be entered individually by the network operator or may be predefined in the ACF/VTAM definition library. The following start information can be specified:

Which components within a domain are to be traced by the ACF/VTAM trace facility

Which components within a domain are to be activated when ACF/VTAM is started

The size and characteristics of ACF/VTAM buffer pools

Whether certain network operator messages are to be suppressed

The maximum number of certain elements in the domain that can be active at any one time

Whether ACF/VTAM is to collect tuning statistics

The ACF/VTAM's identification number

Whether the logon monitor facility for non-SNA terminals (called the *network solicitor*) is to be active initially

Whether, when the network is activated, ACF/VTAM should return network components to their initial state or to the state they were in just prior to the previous deactivation or failure, using VSAM configuration restart data sets to obtain the required status information

Chapter 4. Controlling the ACF/VTAM Network

ACF/VTAM provides network operator functions for controlling the data communication devices and application programs. Using a subset of the operating system commands, a network operator can:

- Assist in increasing the efficiency of the network
- Alter the network in response to fluctuating requirements of the user
- Minimize the impact on the network if a network component fails
- Start and stop ACF/VTAM

More specifically, the commands enable the operator to:

- Activate and deactivate terminals in the domain
- Initiate requests for connection between terminals and application programs
- Dynamically redefine the domain configuration
- Halt communication activities in an orderly manner
- Monitor the network
- Control some debugging programs
- Monitor application program status and each application program's use of resources
- Control which domains can be used for cross-domain communication by activating and deactivating cross-domain resource managers
- Activate paths to be used for cross-domain communication
- Control which terminals and application programs in other domains can be used for cross-domain communication

For a multiple-domain network, some of these functions may require that the network operators in different domains coordinate their actions.

ACF/VTAM provides the following network operator functions:

DISPLAY: Displays the status of network resources, such as application programs, terminals, links, 3704 and 3705 Communications Controllers, and ACF/VTAM buffers.

MODIFY: Enables the network operator to change the operating characteristics of ACF/VTAM and of the 3704 or 3705 Communications Controllers. Specifically, MODIFY allows the operator to:

- Start or stop ACF/VTAM trace facilities
- Request a dump of the NCP
- Change the polling delay, the negative response to polling, the session limit, and the device transmission limit on a polled, nonswitched, start-stop or BSC line
- Start or stop the online testing programs
- Start and stop the recording of tuning statistics
- Modify the level at which messages are to be suppressed
- Change the owning cross-domain resource manager of cross-domain resources

VARY: Enables the network operator to:

- Redefine the domain (that is, to activate or deactivate terminals, lines, 3704 or 3705 Communications Controllers, cross-domain resources, and cross-domain resource managers)

Switch lines, attached to a communications controller executing with PEP, between emulation mode and network control mode

Load or deactivate NCPs

Activate paths to be used for cross-domain communication

Request connection to an application program on behalf of a terminal

Acquire and release resources

START: Starts ACF/VTAM. The network operator can specify start options to define some ACF/VTAM facilities. See "Defining ACF/VTAM Start Options" in Chapter 3 for a description of start options.

HALT: Shuts down the domain and stops ACF/VTAM.

REPLY: Enables a program operator to respond to an ACF/VTAM message that requires a reply. The REPLY command can be used by a program operator in a DOS/VS system as well as in an OS/VS system.

Network operator commands can be sent to ACF/VTAM from the system console or from an application program that has been authorized to use the SENDCMD and RCVCMD macro instructions. SENDCMD is used to send network operator commands (except START and HALT) to ACF/VTAM; RCVCMD is used to receive messages from ACF/VTAM. With this facility, an application program can monitor and control the network. Such an application program is called a *program operator.*

ACF/VTAM network operator commands (except for some DISPLAY options) are effective only for the domain in which they are entered. A program operator in one domain, however, can communicate with a program operator in another domain to request information and changes.

The process of controlling a complex, multiple-domain network can be simplified by the addition of an IBM program product, the Network Operation Support Program. This program:

Routes commands (ACF/VTAM and system) to the proper domain for execution and routes the responses from that domain to the issuing operator

Provides for multiple network operators, each with unique responsibilities, at various locations in the network

Permits user-written programs that react to data traffic or to user-written operands and commands

Permits operator-to-operator communication

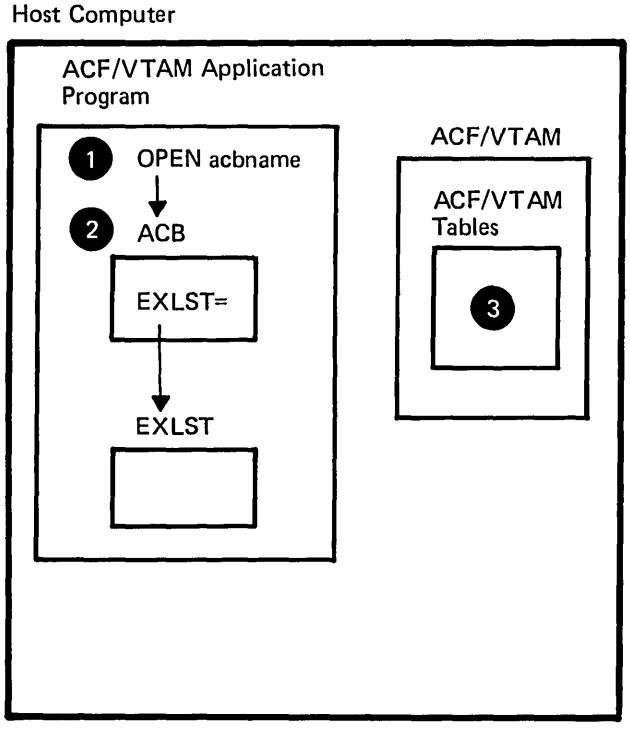
Chapter 5. ACF/VTAM Application Programs

ACF/VTAM provides macro instructions that establish and terminate sessions and that send or receive data. The application program must set up control blocks that contain information used to direct these operations. ACF/VTAM provides two methods of creating control blocks. An application program can create control blocks during assembly or during program execution. If control blocks are generated during program execution, the application program need not be reassembled if the format of a control block is changed. Control blocks can be modified and examined using macro instructions provided for this purpose.

Control blocks are modified when connection and data-transfer requests are made. Each request can change fields that apply for that operation. ACF/VTAM modifies the control blocks to provide information about the processing of the request.

Identifying the Application Program to ACF/VTAM

During execution, an application program must identify itself to ACF/VTAM before it uses any ACF/VTAM facilities. The program identifies itself by using an *access method control block* (*ACB*) that indicates its symbolic name, a password for authorization, and a list of exit routines to be scheduled when certain events occur (such as a terminal logging on). An OPEN macro instruction must be issued to make the application program known to ACF/VTAM. Figure 5-1 shows the process of identifying an application program to ACF/VTAM.



1. The OPEN macro instruction specifies an access method control block (ACB).
2. The ACB contains information about the application program and can specify a set of user-written exit routines to be invoked when specific events occur.
3. ACF/VTAM updates its internal tables to indicate that the application program is active and that the EXLST exit routines are eligible for scheduling.

Figure 5-1. Identifying an Application Program to ACF/VTAM

Establishing a Session (Connection)

An application program can be the primary or secondary end of a session. The connection procedures used by the application program depend on whether it is the primary or secondary end of the session.

The Primary Role in Connection

An application program acting as the primary end of a session can establish connection to a terminal for which there is a pending logon. When a logon is received, ACF/VTAM notifies the application program by scheduling its LOGON exit routine or by completing an OPNDST macro instruction. This procedure automatically defines the application program as the primary end of that session and the terminal as the secondary end. Acting as the primary end of the session, the application program issues the OPNDST macro instruction to accept the logon or a CLSDST macro instruction to reject the logon. The OPNDST macro instruction indicates a request parameter list (RPL) which points to a node initialization block (NIB). When the terminal is connected, ACF/VTAM modifies the NIB so that the control block contains current information about this session.

An application program acting as a primary end of a session also can acquire a terminal when needed. To acquire a terminal, the primary end of the session issues an OPNDST macro instruction that indicates a request parameter list (RPL). The RPL is modified by the OPNDST macro instruction to describe the request (including the ACQUIRE option). The RPL specifies another control block, a *node initialization block* (NIB), that tells ACF/VTAM which terminal is to be acquired. When the terminal is connected, ACF/VTAM changes fields in the RPL to indicate information about the connection (such as ACF/VTAM's communication identifier for the terminal). Figure 5-2 illustrates the use of control blocks for acquiring terminals.

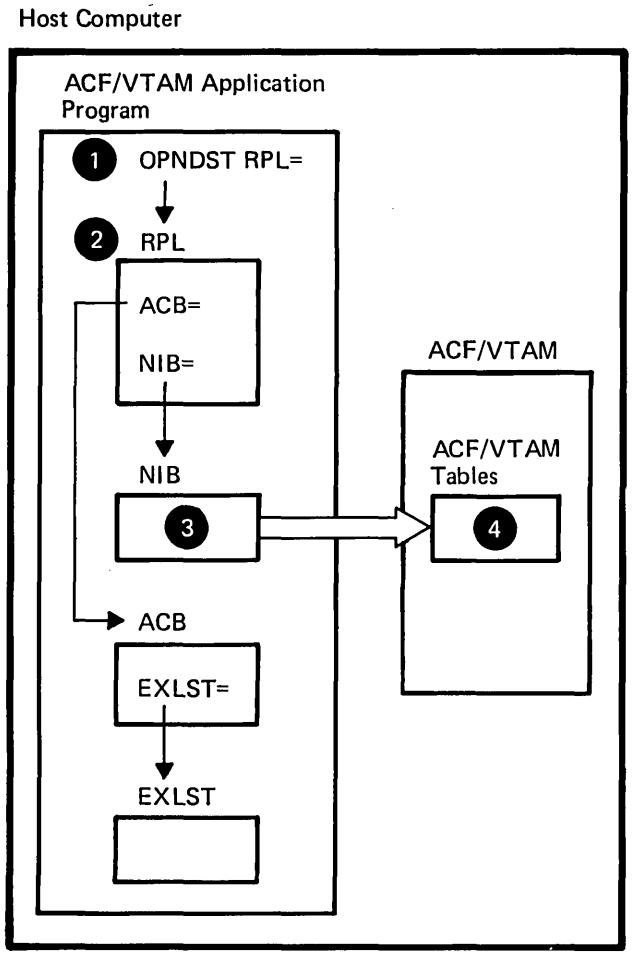
The Secondary Role in Connection

An application program acting as the secondary end of a session sends a request for connection to another application program by issuing a REQSESS macro instruction. To the requested application program, this request looks like a logon from a logical unit. When the primary end of the session accepts the logon (using an OPNDST macro instruction), the secondary end of the session issues an OPNSEC macro instruction to accept the connection or issues a SESSIONC macro instruction to reject the connection. Figure 5-3 shows the process of connecting two application programs.

Requesting Data Transfer

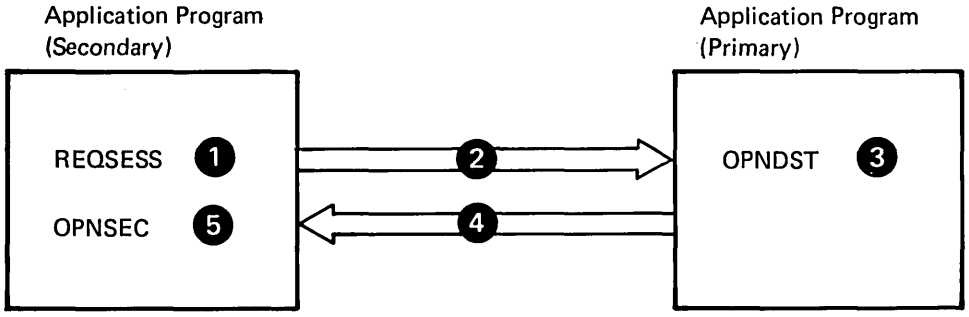
ACF/VTAM provides two types of data transfer macro instructions. Record-mode macro instructions are used for communication between application programs and logical units or 3270 terminals, or between two application programs. Basic-mode macro instructions are used for communication between application programs and non-SNA terminals which do not support record mode. Note that an application program can communicate with some local 3270 and remote BSC 3270 terminals using either type of macro instructions.

When using record mode, an application program acting as the primary end of the session must request that the flow of data between itself and the terminal to which it is connected be enabled. This is done either at the time of connection, using the OPNDST macro instruction, or after the connection has been made, using the SESSIONC macro instruction. The session type, agreed upon in the session protocol, determines details of the data flow. When connection is established and the flow of data is enabled, data transfer can be initiated by either end of the session. An application program (whether acting as the primary or secondary end of a session) issues a SEND macro instruction to



1. The OPNDST macro instruction specifies a request parameter list (RPL).
2. The RPL describes the request for connection and specifies one or more node initialization blocks (NIBs).
3. Each NIB describes the terminal to be connected.
4. When ACF/VTAM completes the connection request, the terminal information from the NIBs is moved into internal ACF/VTAM tables. ACF/VTAM notifies the application program by posting an ECB or scheduling an RPL exit routine.

Figure 5-2. Establishing a Session with a Terminal



1. The application program acting as the secondary end of the session issues a REQSESS macro instruction to request connection to an application program acting as the primary end of the session.
2. ACF/VTAM notifies the primary end of the session that a request for connection has been received. To the application program, the request for connection looks like a logon.
3. The primary end of the session issues an OPNDST macro instruction to accept the logon and to establish the session.
4. ACF/VTAM notifies the secondary end of the session that the request has been accepted.
5. The secondary end of the session issues an OPNSEC macro instruction to complete the connection.

Figure 5-3. Connecting Application Programs

transfer data to ACF/VTAM buffers. An application program issues a RECEIVE macro instruction to transfer data from ACF/VTAM buffers to the application program's data area.

When using basic mode, data transfer can begin as soon as connection is established. Data transfer is initiated by soliciting data from the terminals connected to the application program with the SOLICIT and READ macro instructions. If general network soliciting is used (that is, if all connected terminals are to be solicited), the SOLICIT macro instruction is issued to move data from any of the solicited terminals into ACF/VTAM buffers. The data from the first responding terminal is moved into the application program's input/output area when a subsequent READ macro instruction is issued. Meanwhile, ACF/VTAM continues soliciting data from the other terminals. At the completion of the read operation, another SOLICIT macro instruction is issued for the terminal whose data was just read. General network soliciting allows ACF/VTAM to *read-ahead* of the user's immediate request for data to reduce delays in reading data. If reading ahead or general network polling is not desired, a READ macro instruction is used to both solicit and read the data. When writing to a terminal, the WRITE macro instruction transfers the data from the application program to ACF/VTAM buffers and then to the terminal. Incomplete data-transfer requests can be canceled at any time by means of the RESET macro instruction.

Terminating a Session (Disconnection)

Disconnection can be initiated by a terminal, by either a primary or secondary application program, or by the network operator.

Disconnection Initiated by a Terminal

An SNA terminal can request conditional or unconditional disconnection from an application program. When conditional disconnection is requested, ACF/VTAM notifies the application program of the request by invoking its LOSTERM exit routine. The program then has the option of disconnecting the terminal or ignoring the request. When unconditional disconnection is requested, ACF/VTAM notifies the application program that the terminal must be disconnected.

Non-SNA terminals can request disconnection only by sending a message to the application program as part of the normal data flow. The application program must examine each message for such a request.

Disconnection Initiated by an Application Program

Primary End of Session: When an application program acting as the primary end of a session wishes to end a session with a terminal, it can disconnect the terminal by issuing a CLSDST macro instruction. This type of disconnection might be the normal procedure for terminating a batch output operation.

Secondary End of Session: When an application program acting as the secondary end of a session wishes to end a session with a primary application program, it can request disconnection by issuing a TERMSESS macro instruction. The primary application program is notified in the same manner as when a terminal requests disconnection.

Disconnection Initiated by the Network Operator

The network operator can cause disconnection by using the VARY command to deactivate one or both ends of the session. If a terminal or a cross-domain resource acting as the secondary end of a session is deactivated, the application program acting as the primary end of the session is notified in an exit routine.

Releasing and Passing a Terminal

When an application program acting as the primary end of a session issues a CLSDST macro instruction to complete a disconnection, it specifies whether the secondary end of session is to be released or passed. When a terminal is released, it is free to be connected to another application program. When it is passed, a logon to a specified application program is generated. This type of CLSDST is useful when a terminal uses a sequence of primary application programs.

Chapter 6. Other Telecommunication Access Methods

ACF/VTAM can coexist with QTAM and BTAM under DOS/VS and with BTAM and TCAM under OS/VS. QTAM programs, BTAM programs, and TCAM programs can be executed concurrently in the same host computer as long as they have separate communication networks.

ACF/VTAM and Other Access Methods under DOS/VS

In a DOS/VS system, QTAM, BTAM, and ACF/VTAM can operate concurrently. QTAM and BTAM programs do not interact with ACF/VTAM. QTAM programs use QTAM, and BTAM programs use BTAM, to communicate with terminals attached to transmission control units, terminals attached to 3704 and 3705 Communications Controllers in emulation mode, or local terminals (BTAM only).

ACF/VTAM application programs use ACF/VTAM to communicate with local systems and terminals attached to 3704 and 3705 Communications Controllers in network control mode.

Lines attached to 3704 or 3705 Communications Controllers using Partitioned Emulation Programming (PEP) may be used in either network control mode or emulation mode with an appropriate access method.

Figure 6-1 illustrates concurrent use of QTAM, BTAM, and ACF/VTAM in DOS/VS.

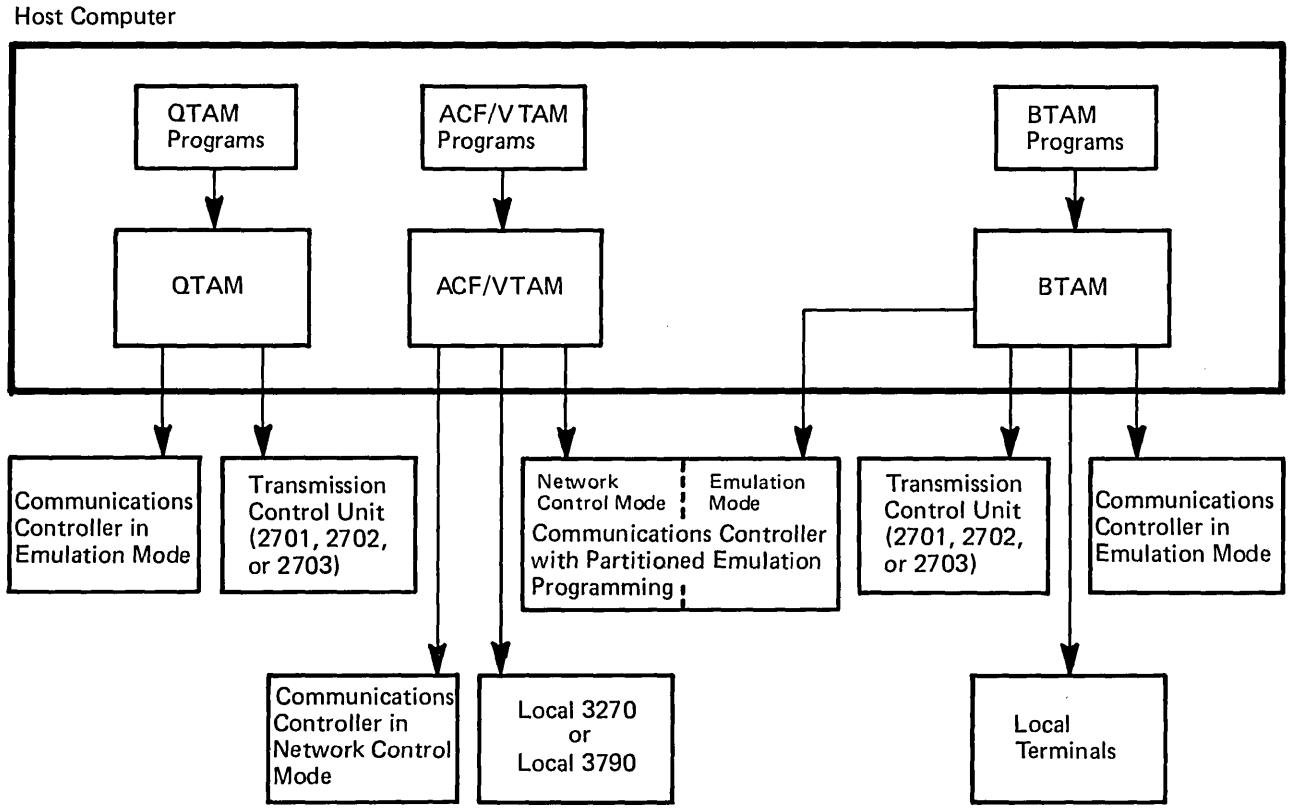


Figure 6-1. ACF/VTAM with Other Telecommunications Access Methods in DOS/VS

With concurrent execution of access methods, a single application program may use both BTAM and ACF/VTAM to communicate with separate networks, provided that all requirements of both access methods are met.

ACF/VTAM and Other Access Methods under OS/VS

In an OS/VS system, BTAM, ACF/TCAM, and ACF/VTAM can operate concurrently. BTAM application programs use BTAM to communicate with terminals attached to transmission control units, terminals attached to 3704 and 3705 Communications Controllers in emulation mode, or local non-SNA terminals.

ACF/TCAM application programs use ACF/TCAM to communicate with terminals attached to 3704 and 3705 Communications Controllers in network control mode, terminals attached to 3704 and 3705 Communications Controllers in emulation mode, terminals attached to transmission control units, or local non-SNA terminals.

ACF/VTAM application programs use ACF/VTAM to communicate with terminals attached to 3704 and 3705 Communications Controllers in network control mode, and local SNA or non-SNA Systems (see Appendix A).

Lines attached to 3704 or 3705 Communications Controllers using PEP may be used in either network control mode or emulation mode with an appropriate access method.

Figure 6-2 illustrates concurrent use of BTAM, ACF/TCAM, and ACF/VTAM in OS/VS.

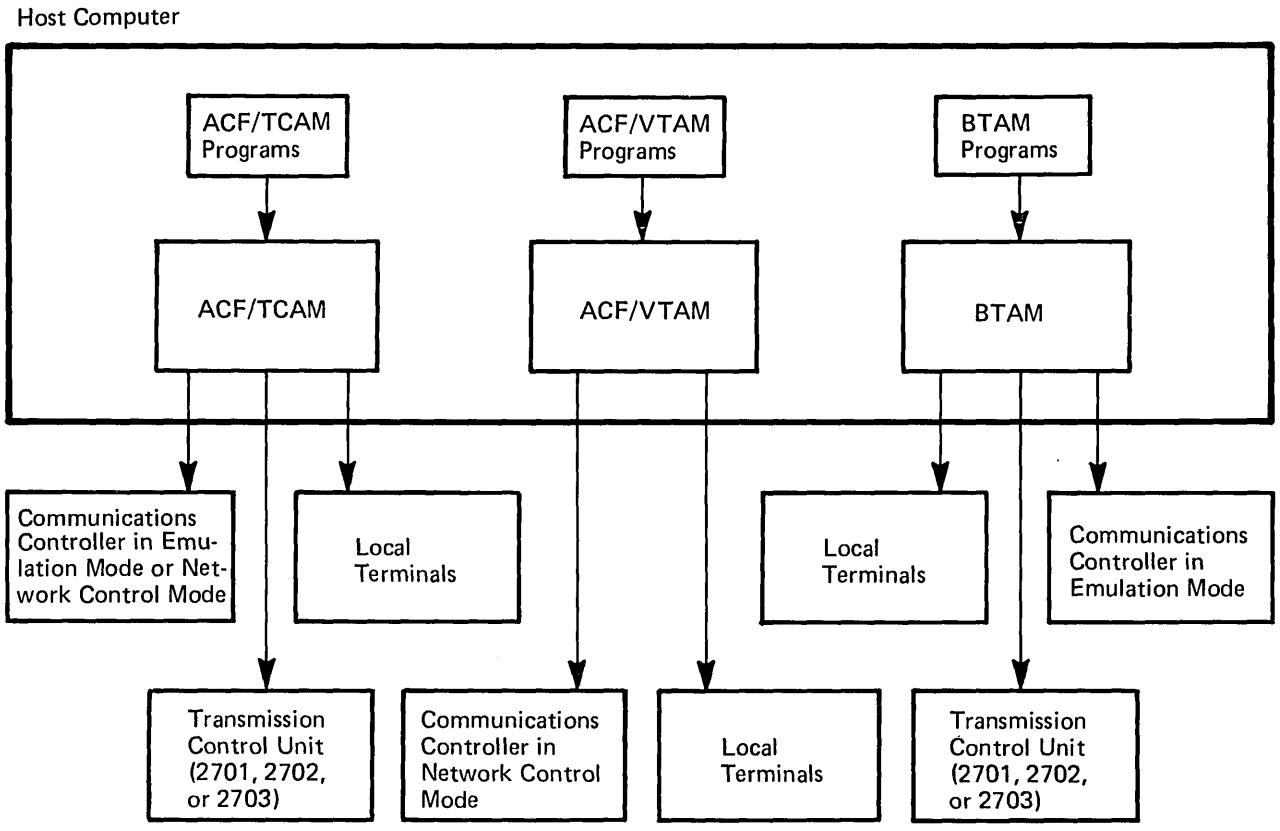


Figure 6-2. ACF/VTAM with Other Telecommunications Access Methods in OS/VS

With concurrent execution of access methods, a single application program may use ACF/TCAM, BTAM, and ACF/VTAM to communicate with separate networks, provided that all requirements of the access methods are met.

ACF/VTAM and Other Access Methods in a Multiple-Domain Network

In a multiple-domain network, resources in an ACF/VTAM domain can communicate with resources in an ACF/TCAM domain, whether in the same host or different hosts, and provided that all requirements for cross-domain communication of both access methods are met. Figure 6-3 illustrates use of ACF/VTAM and ACF/TCAM in a multiple-domain network. In addition, other access methods can operate in each host computer as described above. See *An Introduction to Advanced Communications Function*, GC30-3033, for more information about ACF/TCAM and ACF/VTAM in a multiple-domain network.

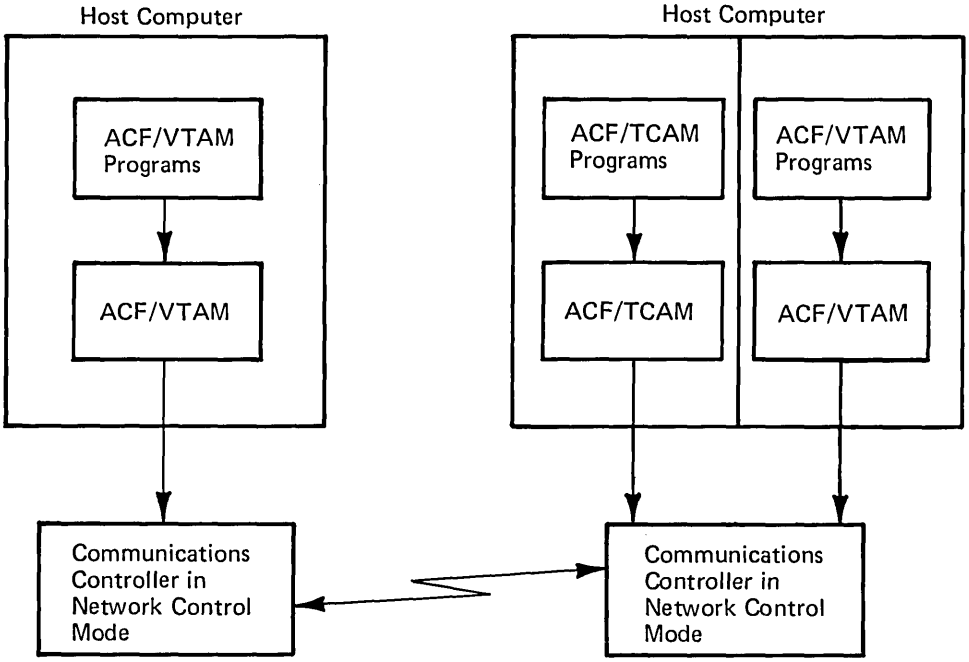


Figure 6-3. ACF/VTAM with Other Telecommunications Access Methods in a Multiple-Domain Network

Chapter 7. Reliability, Availability, Serviceability

ACF/VTAM, in conjunction with DOS/VS, OS/VS1, OS/VS2 SVS, and OS/VS2 MVS, provides a comprehensive set of reliability, availability, and serviceability (RAS) aids to maintain the performance of the data communication network. RAS aids may be divided into diagnostic aids and recovery aids. Diagnostic aids include operating system traces and dumps, and the device diagnostic program TOLTEP (the teleprocessing online test executive program). ACF/VTAM processes the output from these facilities to make the results easier for users to interpret. Recovery aids include operating-system hardware and software error-recovery programs, as well as 3704 and 3705 recovery aids.

Diagnostic Aids

Traces

DOS/VS and OS/VS provide traces that help the user to determine whether a problem is the result of a user error or system error and, in the latter case, which system component caused the error.

DOS/VS: Trace facilities for DOS/VS are known as problem determination aids and serviceability aids (PDAIDs). They monitor fetch/load, input/output, supervisor call instructions (SVCs), QTAM, and ACF/VTAM. Data collected by the PDAIDs provides a chronological record of certain ACF/VTAM activities and shows conditions that existed when an error occurred. The DOS/VS utility PDLIST can be used to print trace data.

OS/VS: The generalized trace facility (GTF) is the trace mechanism employed by OS/VS. This feature traces input/output, supervisor call instructions (SVCs), program-controlled interruptions (PCIs), and external interruptions, and the dispatching of tasks in the operating system as well as in ACF/VTAM. In addition, GTF records the ACF/VTAM trace data. The ACF/VTAM traces may be started or stopped any time GTF is active. The PRDMP utility is used to print GTF information. PRDMP can be used to print only ACF/VTAM information.

ACF/VTAM: In addition to the system traces, ACF/VTAM provides its own traces to record input and output activity, buffer information, activity on lines attached to the NCPs, and internal ACF/VTAM activity. These traces may be started or stopped at any time using operands of the START procedure and MODIFY command, and they may be executed concurrently. In DOS/VS the trace data is stored in a trace file and printed using an ACF/VTAM trace print utility. In OS/VS the trace data is collected by the generalized trace facility and printed using the PRDMP utility.

ACF/VTAM also records statistics about the I/O interface between ACF/VTAM and either a channel-attached communications controller or a channel-attached 3790. Collection of these statistics can be started or stopped, as can the display of these statistics at the system console, through the use of the MODIFY command.

The ACF/VTAM internal trace keeps a record of ACF/VTAM's resources and flow of control. Information is recorded on a trace table in fixed storage. The internal trace can be started or stopped with the MODIFY command. This command also can be used to define the trace options.

Formatted Dumps

Three formatted dump programs are available to ACF/VTAM users through OS/VS. They are ABDUMP, SDUMP, and a service-aids dump.

ABDUMP: ABDUMP is called with the operating system's ABEND or SNAP macro instruction. The dump consists of the major control blocks of the terminated task, its subtasks, and its direct callers, as well as any pages within the failing partition or region that were referred to during execution and are still allocated. Dumps of programs using ACF/VTAM are formatted by the ACF/VTAM formatted-dump programs. The formatted-dump program examines ACF/VTAM control blocks and prints diagnostic messages if control block chains are broken or invalid addresses are present.

SDUMP: If an error occurs while an ACF/VTAM request is being processed, and if the user has provided an SYS1.DUMP data set, an unformatted SVC dump (SDUMP) is taken. When an SDUMP is printed by the PRDUMP utility, the ACF/VTAM formatted-dump program formats the control blocks associated with ACF/VTAM. In OS/VS2, the system operator can request an SVC dump from the system console.

Service-Aids Dump: Stand-alone service aids in OS/VS are provided to dump the contents of main storage to printer or tape. The utilities are HMDSADMP in OS/VS1 and AMDSADMP in OS/VS2. These utilities do not produce formatted control blocks. For dumps that are printed by PRDUMP, however, the ACF/VTAM formatted-dump program may be invoked to format control blocks associated with ACF/VTAM application programs from the original dump.

TOLTEP

The teleprocessing online test executive program (TOLTEP) is a test program that oversees the execution of online testing of data communication devices. TOLTEP allows online tests to run while the data communication network continues normal operations. The online tests perform diagnostic procedures on and verify the operation of devices. More than one online test may be run at a time. TOLTEP is included in the system when ACF/VTAM is generated and is started and stopped with ACF/VTAM. For more information on TOLTEP, see *ACF/VTAM TOLTEP*, SC38-0283.

Error Recording

Hardware Errors: ACF/VTAM uses its own error-recovery procedures to compile statistical information on I/O errors. These procedures interface with the operating system's recording facilities to format and write the error records to a direct-access device. In DOS/VS the recovery management support recorder is used to record errors that occur on both local and remote terminals. In OS/VS the outboard recorder is used to record errors that occur on local terminals, while the miscellaneous data recorder is used to record errors on remote terminals.

For local terminals, two types of error records are written: permanent-error records and counter-overflow/end-of-day error records. A permanent-error record is written when the error-recovery procedures either encounter an undefined or unanticipated error, or are unsuccessful in retrying the I/O operation. A counter-overflow/end-of-day error record is written when one of the counters updated by ACF/VTAM is ready to overflow, or when an end-of-day situation occurs. Two counters are maintained in ACF/VTAM; one counter saves the count of temporary errors (errors corrected by the error-recovery procedures), and the other saves the count of Start I/O commands issued. Other counters are maintained in the operating-system device statistics table of unit check errors by error type for each local terminal. All of the counters appear in each record, and after the record is written, the counters are reset to 0.

I/O errors on remote terminals attached to a local communications controller are processed by routines in the network control program in the communications controller. Information on the cause of the error is passed to ACF/VTAM for forwarding to the operating system's recording facilities.

Software Errors (OS/VS only): The software error recording facility (SRF) is used by ACF/VTAM. Special routines receive control on abend conditions, machine checks, and unanticipated program checks. Control is then passed to SRF routines for error recording and then to retry routines.

Printing Error Records

The operating system's error recording edit and print program (EREP) can be used to select, format, and print the error records.

Recovery Aids

Error-Recovery Procedures

Hardware Errors: When an I/O error interruption occurs for a local terminal, ACF/VTAM error-recovery procedures determine the type of error from the CSW and sense information and then attempt to recover from the error. The method used to attempt recovery is device dependent and is described in the functional characteristics manual for each terminal.

Error-recovery procedures for terminals, control units, and lines attached to the 3704 or 3705 in network control mode are provided by the NCP.

Software Errors (OS/VS only): Software error-recovery procedures are closely connected with the error exit routines established by the STAE or ESTAE macro instruction. These routines are system dependent.

The general approach to software error recovery is to attempt isolation of the error and to limit its effect on other parts of the system. In certain instances, ACF/VTAM attempts to reinitialize a failing module in order to maintain the function. In other instances, ACF/VTAM terminates a failing application program, or deactivates a failing network component to allow the remaining components to continue. Where possible, ACF/VTAM reallocates resources no longer in use.

Restart/Recovery

The restart and recovery facilities safeguard the operating system and 3704 or 3705 Communications Controller environments. The facilities allow a 3704 or 3705 Communications Controller to be restarted and allow reestablishment of the network configuration.

Configuration Restart: ACF/VTAM provides the capability to restore the domain after a failure occurs. An *immediate configuration restart* occurs as soon as an error is detected. ACF/VTAM automatically attempts to restore the status of an SNA terminal that has lost contact with ACF/VTAM or the status of a failed NCP that requires reloading.

A *delayed configuration restart* is caused by an operator command and is applicable after:

An ACF/VTAM failure

A host operating system or host computer failure

A communication controller or an NCP failure from which ACF/VTAM did not immediately recover

Deactivation of the domain (or any part of it) by the network operator

When restarting ACF/VTAM and its domain, the network operator can specify whether parts of the domain, are to be activated to their status prior to deactivation or failure (a *warm* restart) or their status as specified when they were defined to ACF/VTAM (a *cold* restart).

Integrity of Application Program Data: The ACF/VTAM posting facilities, which use the CHECK macro instruction, help provide data integrity in case ACF/VTAM or an NCP fails. An application program can request notification when a message has been completely transmitted. If the transmission was not successful, the application program is informed. The application program is assumed to be holding the message buffer until notified of a complete transmission. If ACF/VTAM fails, application programs can disconnect from ACF/VTAM operations and continue with other processing until ACF/VTAM is restarted. If the 3704 or 3705 has encountered a temporary error, the application reissues its request. On a 3704 or 3705 permanent error, the application program should disconnect terminals attached to that 3704 or 3705, but may continue execution using other terminals.

Resource Takeover

ACF/VTAM has network definition options and network operator commands that allow the user to change the configuration of the network to avoid problems in specific elements. The user can:

Use a switched line to back up a nonswitched line

Use one host computer to back up another host computer

Chapter 8. Summary of ACF/VTAM

ACF/VTAM for Single-Domain Networks

ACF/VTAM is a data communication access method compatible with Systems Network Architecture (SNA). It controls communication among terminals and application programs in a single-domain network. A single-domain network has a System/370 host computer, which contains ACF/VTAM, and all the terminals and application programs controlled by that ACF/VTAM. ACF/VTAM provides the following new features, in addition to those provided by VTAM Level 2:

The ability to communicate between two application programs

Message traffic pacing between application programs

Message traffic pacing inbound from programmable terminals that support inbound pacing

The dynamic expansion and contraction of ACF/VTAM buffer pools

The division of terminals controlled by a multiple-channel-attached 3705 Communications Controller among as many as four host computers

The dynamic collection of statistics that can be used in adjusting ACF/VTAM's performance

Additional tracing capabilities

An optional feature, the Multisystem Networking Facility, which is described in the latter part of this chapter

Programming Systems

ACF/VTAM operates as a dynamically startable task under DOS/VS Release 34, OS/VS1 Release 6, OS/VS2 Release 1.7 (SVS), and OS/VS2 Release 3.7 (MVS), or a subsequent release of these operating systems. In a single-domain environment, ACF/VTAM operates with NCP/VS Version 5 or with ACF/NCP/VS. It requires the level of Virtual Storage Access Method (VSAM) that is current at the time ACF/VTAM becomes available.

Machine Requirements

ACF/VTAM requires a host computer instruction set that includes the Compare and Swap and the Compare Double and Swap instructions. The instructions are part of a hardware feature available on host computers.

Storage Requirements (DOS/VS)

The following samples give *estimated* DOS/VS storage requirements for all ACF/VTAM modules needed to support a path through a single-domain network where ACF/VTAM is the access method and record mode is used for data transfer. These storage requirements assume that the path and all involved physical and logical units are activated and error free, and that an opened application program is in session with its logical units. These requirements do not vary with the number of terminals or logical units in a single-domain network. However, installation-unique ACF/VTAM buffer requirements (dependent upon the number of installation-defined terminals, application programs, and so on) must be added to these storage requirements. Refer to the *ACF/VTAM System Programmer's Guide* for DOS/VS, SC38-0268, for the calculations necessary to estimate buffer storage requirements.

Sample 1: Remote SNA devices in a single domain:

Fixed	16K (where K = 1024 bytes)
Pageable	22K
Total	38K

Sample 2: A single-domain mixture of remote SNA devices, remote 3270 BSC devices, and local 3270 devices:

Fixed	22K (where K = 1024 bytes)
Pageable	28K
Total	50K

In addition to these requirements, approximately 4.6K of fixed storage is needed by the DOS/VS operating system to support ACF/VTAM.

Communications Controllers Supported: ACF/VTAM operates with the following communications controllers:

3704 Communications Controller with NCP/VS Version 5

3705-I Communications Controller with either NCP/VS Version 5 or ACF/NCP/VS

3705-II Communications Controller with either NCP/VS Version 5 or ACF/NCP/VS

A 3704, 3705-I, or 3705-II may be channel-attached to two hosts in order to share a network control program and its associated terminals.

A single communications controller with a single subchannel address can support up to 352 communication lines. Thus, the communications controllers permit large domain configurations which require a few subchannel addresses. Either model of the 3705 can be attached to a byte-multiplexer channel, a block-multiplexer channel, or a selector channel. A 3704 can be attached to a byte-multiplexer channel.

Note: *The addition of the Multisystem Networking Feature requires either a 3705-I with ACF/NCP/VS or a 3705-II with ACF/NCP/VS.*

Terminals Supported: See Appendix A for a listing of the terminals supported by ACF/VTAM.

Compatibility

ACF/VTAM operates with NCP/VS Version 5 (for same domain communications) and with ACF/NCP/VS (for same-domain or cross-domain communication).

Functions supported by the current levels of VTAM and NCP/VS are supported by ACF/VTAM.

Related IBM programs such as CICS/VS, IMS/VS, POWER/VS, JES1/RES, JES2/RJE, TSO, VSPC, BTP, and SSS that are compatible with VTAM Level 2 are compatible with ACF/VTAM on the appropriate operating system release. Recompilation of these programs is not required.

Existing user-written application programs are compatible with ACF/VTAM if they employ the macro language and control block interface of VTAM Level 2. However, an existing program may have to be modified if it depends on internal processing characteristics of VTAM. Existing programs also may require changes to make use of the Multisystem Networking Facility.

TCAM through VTAM is not provided with ACF/VTAM. However, ACF/TCAM can exist in the same host computer as ACF/VTAM.

Conversion

ACF/VTAM will operate with NCP/VS Version 5 in a 3704, 3705-I, or 3705-II Communications Controller. This permits the concurrent or subsequent installation of ACF/NCP/VS in a 3705-I or 3705-II Communications Controller. However, multiple line

tracing and multiple-channel attachment of a 3705-II are not available until the system includes ACF/NCP/VS. User-written application programs that use the macro language and control block interface of VTAM Level 2 will continue to operate without change and without recompilation, provided that these programs are not dependent upon the internal processing characteristics of VTAM Level 2.

ACF/VTAM Multisystem Networking Facility for Multiple-Domain Networks

The ACF/VTAM Multisystem Networking Facility is an optional feature that allows the creation of a multiple-domain network with cross-domain communication. An ACF/VTAM multiple-domain network can consist of two or more System/370 host computers together with their application programs, communications controllers, and terminal products interconnected by links between local communications controllers or by sharing a local communications controller. Each host computer may contain ACF/VTAM or ACF/TCAM, or both. The ACF/VTAM and the resources defined under its control represent one domain of a multiple-domain network. A multiple-domain network also can consist of a single host computer with more than one ACF/VTAM or ACF/VTAM with ACF/TCAM, each with its own network. An ACF/VTAM multiple-domain network that includes the Multisystem Networking Facility provides for the following:

- The opportunity to define a variety of multiple-domain network configurations
- The establishment, control, and termination of sessions between ACF/VTAM application programs in one domain and ACF/VTAM or ACF/TCAM terminals in another domain
- The transfer of data between either IBM or user-written ACF/VTAM application programs in one domain and terminals in another domain
- The ability for the network operator to monitor the status of resources within his ACF/VTAM domain and to get limited information about resources known to his domain, but residing in other domains
- The capability to take over a local 3705 Communications Controller in an adjacent domain along with that controller's terminals

Programming Systems

The Multisystem Networking Facility requires the use of ACF/VTAM (or ACF/TCAM) and ACF/NCP/VS within each domain of the multiple-domain network. The new facility is complemented by a related program product, Network Operation Support Program (Program Number 5735-XX2).

System Requirements

A multiple-domain network may include any combination of individual domains, each with either DOS/VS, OS/VS1, OS/VS2 SVS, or OS/VS2 MVS as the host computer's operating system.

The ACF/VTAM Multisystem Networking Facility requires the use of a 3705-I or 3705-II Communications Controller with ACF/NCP/VS. Communications controllers being used for cross-domain communication must be connected to other domains through a multiple-channel attachment or over a nonswitched line to a local 3705. No other channel-attached terminal products can participate in cross-domain communication.

A 3705 Communications Controller can be channel attached to one, two, three, or four host computers. The Multisystem Networking Facility allows terminals under this controller to communicate with application programs in any of the domains to which the

controller is attached. (One of these host computers may contain VTAM Level 2, but the terminals and application programs owned by this VTAM cannot participate in cross-domain communication.)

The ACF/VTAM Multisystem Networking Facility supports all SNA SDLC terminals for cross-domain communication. Specially defined, remote BSC 3275, 3277, 3284, and 3286 terminals are the only non-SNA devices that can be used for cross-domain communication. Record mode must be used to transfer data.

In a multisystem network with both ACF/VTAM and ACF/TCAM, ACF/VTAM's ability to access device characteristics of terminals controlled by ACF/TCAM is limited to those indicators defined and maintained by ACF/TCAM. In particular, ACF/VTAM cannot determine and, therefore, cannot provide for the application program the physical device address (used in the copy function) of an SDLC 3270 device controlled by ACF/TCAM.

Machine requirements are the same as those for ACF/VTAM without the Multisystem Networking Facility.

The addition of the Multisystem Networking Facility to ACF/VTAM requires additional pageable storage. Refer to the *ACF/VTAM System Programmer's Guide* for DOS/VS, SC38-0268, for the calculations needed to estimate this storage.

Compatibility

The ACF/VTAM Multisystem Networking Facility used in one domain of a multiple-domain network will operate with another ACF/VTAM Multisystem Networking Facility or an ACF/TCAM Multisystem Networking Facility in another domain.

The ACF/VTAM Multisystem Networking Facility will not operate with the current levels of VTAM or TCAM. Although the ACF/VTAM Multisystem Networking Facility can coexist with NCP/VS Version 5, those functions that depend on ACF/NCP/VS are not available.

Conversion to ACF/VTAM Multisystem Networking Facility

Initially, host computers that are to participate in a multiple-domain network can install ACF/VTAM and the Multisystem Networking Facility within single-domain networks, and the networks can be interconnected later with links between local communications controllers or by multiple-channel-attached communications controllers. This permits an existing network to continue in operation while the multiple-domain network is being developed. It should be noted that once a feature such as the Multisystem Networking Facility has been installed, it is very difficult to remove. Removing a feature requires regenerating the system and reapplying all the features that you wish to retain.

Reference Material

For more information on ACF/VTAM, refer to the *Introduction to Advanced Communications Function*, GC30-3033, and *ACF/VTAM Concepts and Planning*, GC38-0282.

For more information on ACF/TCAM, refer to the *Program Product Design Objectives for ACF/TCAM*, GC30-9500, and to *Advanced Communications Function for TCAM: General Information*, GC30-2050.

Appendix A. Supported Terminal Products

This appendix lists the terminal products supported by ACF/VTAM. These products are grouped as:

- SNA terminal products, in turn grouped as:
  - –Local SNA terminal products
  - –Remote SNA terminal products
- Non-SNA terminals, in turn grouped as:
  - –Start-stop terminals
  - –BSC terminals
  - –Local 3270 terminals

Terminals that are functionally equivalent to those specifically supported by ACF/VTAM may also function satisfactorily with ACF/VTAM; the user is responsible for establishing equivalency.

Where one of the tables below states that a terminal is "supported as" as another terminal, it means that these terminals are defined to ACF/VTAM and use ACF/VTAM facilities in the same manner. This does not mean that the terminals have similar processing capabilities or physical characteristics. For example, a 3274 Model 1A is supported as a local 3791 Controller. However, the data exchanged between an application program and the 3274 and the disposition of the data after it reaches the 3274 is not necessarily the same as for a 3791.

Communications Controllers

ACF/VTAM supports the IBM 3704, 3705-I, and 3705-II Communications Controllers with a network control program (NCP) in network control mode either alone or with partitioned emulation programming (PEP). The communications controllers can be attached locally (by channels) or remotely (through a local 3704 or 3705 Communications Controller). ACF/VTAM does not support either the 2701, 2702, or 2703, or the emulation mode functions of the NCP, alone or with PEP.

Domains can be connected with 3705 Communications Controllers. The connection must be (1) a link between two local 3705 Communications Controllers or (2) a 3705 Communications Controller locally attached to both domains' host computer. Cross-domain communication also requires that the communications controllers contain ACF/NCP/VS.

SNA Terminal Products

SNA terminal products consist of local and remote terminal products. Local terminal products are attached directly to the host computer on a channel. Remote terminal products are attached on SDLC links to either a local or a remote communication controller. Only remote SNA terminal products can be used for cross-domain communication. Figure A-1 summarizes the supported SNA terminal products.

Device Name	Controlling Device-Model	PU Type	Switched	Nonswitched	Major Node in Which Device is Defined
Local					
3270 Information Display System	3274-1A[1]	2			Local SNA
3790 Communication System	3791	2			Local SNA
Remote (SDLC)					
3270 Information Display System	3271-11, 12	1		X	NCP
	3274-1C	2	X	X	NCP or Switched SNA
	3275-11, 12	1		X	NCP
	3276-11, 12, 13, 14	2	X	X	NCP or Switched SNA
3600 Finance Communication System	3601	2		X	NCP
	3614	2		X	NCP
3650 Retail Store System	3651-A50, B50	2	X	X	NCP or Switched SNA
3660 Supermarket System	3651-60	2	X		Switched SNA
3767 Communication Terminal	3767	1	X	X	NCP or Switched SNA
3770 Data Communication System	3771	2	X	X	NCP or Switched SNA
	3773	2	X	X	NCP or Switched SNA
	3774	2	X	X	NCP or Switched SNA
	3775	2	X	X	NCP or Switched SNA
	3776	2	X	X	NCP or Switched SNA
	3777	2	X	X	NCP or Switched SNA
3790 Communication System	3791	2	X	X	NCP or Switched SNA
5937-S01 Industrial Terminal	5937[2]	1		X	NCP
System/32 Batch Work Station	System/32[3]	2	X	X	NCP or Switched SNA

[1]Supported as a 3791
[2]Supported as a 3275-11 or 12
[3]Supported as a 3770

Figure A-1. SNA Terminal Products Supported by ACF/VTAM (Record Mode Only)

Non-SNA Terminals

Start-stop and BSC terminals can be attached to either a local or remote communications controller in network control mode. Local 3270 terminals are attached by a channel to the host computer. ACF/VTAM supports start-stop and BSC terminals using the basic-mode macro instructions. The BSC 3270 and local 3270 terminals are supported using either the basic-mode or record-mode macro instructions. Non-SNA terminals (except remote BSC 3275, 3277, 3284, and 3286 terminals) cannot be used for cross-domain communication; BSC 3270s used in record mode can be used for cross-domain communication. Figure A-2 summarizes the non-SNA terminals.

Device Name	Controlling Device-Model	PU Type	Switched	Nonswitched	Major Node in Which Device is Defined
Local — Record or Basic Mode					
3270 Information Display System	3272-1, 2				Local Non-SNA
	3274-1B[1]				Local Non-SNA
Remote Start-Stop — Basic Mode Only					
1050 Data Communication System	1051-1, 2		X	X	NCP
2740 Communication Terminal	2740-1		X	X	NCP
	2740-2			X	NCP
2741 Communication Terminal	2741-1		X	X	NCP
3767 Communication Terminal	3767-1, 2[2]		X	X	NCP
5100 Portable Computer	5100[3]		X	X	NCP
Communicating Magnetic Card SELECTRIC ® Typewriter	Comm. Mag. Card Selectric Type[3]		X		NCP
System/7 Processor Station	System/7[4]				
World Trade Telegraph	W. T. Tel.			X	NCP
AT & T 83B3 Selective Calling Station	AT & T 83B3			X	NCP
Western Union Plan 115A	W. U. Plan 115A			X	NCP
CPT-TWX Terminal	CPT-TWX-33, 35		X		NCP
Remote BSC — Record or Basic Mode					
3270 Information Display System	3271-1, 2			X	NCP
	3274-1C[5]			X	NCP
	3275-1, 2			X	NCP
	3276-1, 2, 3, 4[5]			X	NCP
Remote BSC — Basic Mode Only					
2770 Data Communication System	2772		X	X	NCP
2780 Data Transmission Terminal	2780		X	X	NCP
2980 General Banking Terminal System (US only)	2972			X	NCP
3735 Programmable Buffered Terminal	3735		X	X	NCP
3740 Data Entry System	3741-2[6]		X	X	NCP
3750 Switching System	3751			X	NCP
3770 Data Communication System	3771-1, 2[7]		X	X	NCP
	3773-1[7]		X	X	NCP
	3774-1[7]		X	X	NCP
	3775-1[7]		X	X	NCP
	3776-1[8]		X	X	NCP
3780 Data Communications Terminal	3780[9]		X	X	NCP
5275 Direct Numerical Control Station (US only)	5275-1[10]			X	NCP
5937-S01 Industrial Terminal	5937[10]			X	NCP
System/3 Central Processing Unit	System/3		X	X	NCP
System/7 Processor Station	System/7[6]		X	X	NCP
System/32 Batch Work Station	System/32[6]		X	X	NCP
System/370	System/370 (115-168)		X	X	NCP

[1] Supported as a 3272-1, 2
[2] Supported as a 2740-1, 2, or 2741
[3] Supported as a 2741
[4] Supported as a 2740-1
[5] Supported as a 3271-1, 2
[6] Supported as a System/3
[7] Supported as a 2772
[8] Supported as a 2772 or 3780
[9] Supported as a 2770
[10] Supported as a 3275-1, 2

Figure A-2. Non-SNA Terminal Products Supported by ACF/VTAM

Glossary

This glossary defines terms and abbreviations that are important in this book. It does not include terms previously established for IBM operating systems and IBM products used with ACF/VTAM. Additional terms can be found by referring to the index, to prerequisite and corequisite books, and to the *IBM Data Processing Glossary*, GC20-1699.

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The symbol *SC1* at the beginning of a definition indicates that it is reprinted from an early working document of ISO Technical Committee 97/Subcommittee 1 and that final agreement has not yet been reached among its participating members.

A

ACB. Access method control block.

accept. In ACF/VTAM, to connect a terminal to a primary application program as the result of a logon. The logon may be originated by the terminal, the network operator, another primary application program, or ACF/VTAM. Contrast with *acquire (1).*

access method control block (ACB). A control block that links an application program to VSAM or ACF/VTAM.

accounting exit routine. In ACF/VTAM, an optional, user-written routine that collects statistics about connections and disconnections in the communication network.

ACF. Advanced Communications Function.

ACF/VTAM. Advanced Communications Function for the Virtual Telecommunications Access Method.

ACF/VTAM application program. A program that has opened an ACB to identify itself to ACF/VTAM. It can now issue ACF/VTAM macro instructions.

ACF/VTAM definition. The process of defining the communication network to ACF/VTAM (which is called "network definition") and modifying IBM-defined characteristics to suit the needs of the user.

ACF/VTAM system. The resources defined to and controlled by ACF/VTAM.

acquire. (1) In relation to an ACF/VTAM application program, to connect a terminal to the application program in the absence of a logon. The connection occurs at the primary application program's initiative. Contrast with *accept.* (2) In relation to ACF/VTAM resource control, to take over resources (communications controllers or physical units) that were formerly controlled by a data communication access method in another domain, or to assume control of resources that were controlled by this domain but released. Contrast with *release*. See also *resource takeover.*

active. Pertaining to a major node that has been made known to ACF/VTAM by operator command and is available for use or pertaining to a minor node that is connected to, or available for connection to, an ACF/VTAM application program. Contrast with *inactive.*

adjacent domain. A domain that is physically connected to another domain by a single cross-domain link or by a shared local communications controller.

Advanced Communications Function (ACF). A group of program products for users of DOS/VS and OS/VS that can provide improved single-domain and, optionally, multidomain data communication capability.

Advanced Communications Function for the Virtual Telecommunications Access Method (ACF/VTAM). A program product that provides improved single-domain data communication capability and, optionally, multidomain capability.

application program identification. The symbolic name by which an application program is identified to ACF/VTAM. It is specified in the APPLID parameter of the ACTS macro instruction. It corresponds to the ACBNAME parameter in the APPL statement or, if the ACBNAME is defaulted, to the name of the APPL statement.

asynchronous operation. In ACF/VTAM, an operation such as connection or data transfer in which the application program is allowed to continue execution while ACF/VTAM performs the operation. ACF/VTAM interrupts the program as soon as the operation is completed.

asynchronous request. In ACF/VTAM, a request for an asynchronous operation.

authorization exit routine. In ACF/VTAM, an optional, user-written routine that approves or disapproves requests for connection and disconnection.

authorized path. In ACF/VTAM for OS/VS2 MVS, a facility that enables an authorized application program to specify that a data transfer or related operation be carried out in a faster manner than usual.

automatic logon. A process by which ACF/VTAM creates a logon for a terminal or logical unit to a designated application program whenever the terminal or logical unit is not connected to another program. Specifications for the automatic logon can be made when the terminal or logical unit is defined or can be made by the network operator in the VARY LOGON command. See also *controlling application program.*

available. In ACF/VTAM: (1) Pertaining to a terminal that supports only one session, is active, is not connected to an application program, and for which there is no pending logon. (2) Pertaining to an exit routine that has been specified by an application program and that is not being executed.

B

basic mode. In ACF/VTAM, a mode of data transfer in which the application program can communicate with non-SNA terminals. Contrast with *record mode.*

C

cancel closedown. A closedown in which ACF/VTAM is abnormally terminated as the result of an operator command.

CDRSC. Cross-domain resource.

CDRM. Cross-domain resource manager.

character-coded. In ACF/VTAM, pertaining to a logon or logoff command usually entered by a terminal operator from a keyboard and sent by a logical unit in character (unformatted) form. Contrast with *field-formatted.*

CID. Communication identifier.

closedown. The deactivation of a device, program, or system. See also *cancel closedown, orderly closedown,* and *quick closedown.*

cluster controller. See *cluster control unit* and *SDLC cluster controller.*

cluster control unit. A device that can control the input/output operations of more than one device. A remote cluster control unit is attached to a host computer only through a communications controller. A local cluster control unit is attached through a channel. A cluster control unit may be controlled by a program stored and executed in the unit; for example, the IBM 3601 Finance Communication Controller. Or it may be controlled entirely by hardware; for example, the IBM 2972 Station Control Unit. See also *communications controller* and *SDLC cluster controller.*

command. (1) A request from a terminal for the performance of an operation or the execution of a particular program. (2) In SNA, a request unit initiating an action or beginning a protocol; it is used in contrast with reply, which is a request unit (not a response) that is sent in reaction to a command. For example: Quiesce (a data flow control request), is a command, while Quiesce Complete is the reply. (3) In SNA, a data flow control or session control request that may be sent or received by an application program using record mode.

communication identifier (CID). In ACF/VTAM, a key for locating the control blocks that represent an active session. The key is created during the session establishment procedure and deleted when the session ends.

communication line. Any physical link, such as a wire or a telephone circuit, that connects one or more remote terminals to a communication control unit, or connects one communication control unit with another.

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

configuration restart. In ACF/VTAM, the facility for immediate recovery after a failure in the NCP or communications controller or after a loss of contact with a physical unit or logical unit, or for delayed recovery after a failure or deactivation of a major node, ACF/VTAM, or the host computer. Recovery may include reloading the NCP or restoring the network by means of a checkpoint. Restarting by means of a checkpoint requires the user to specify one or more VSAM data sets in which ACF/VTAM records changes to initial configuration data.

connection. (1) In ACF/VTAM, the linking of control blocks in such a way that an application program is in session with a terminal. Connection includes establishing and preparing the network path between the program and the terminal. (2) A physical capability of communicating between two end points. Also called *physical connection.* See also *queued for connection.*

controlling application program. An application program to which a terminal (other than a secondary application program) is automatically logged on whenever the terminal is active and available. See also *automatic logon.*

cross-domain. Pertaining to control or resources involving more than one domain.

cross-domain link. A data communication line physically connecting two domains. See also *local-to-local link.*

cross-domain resource (CDRSC). A resource owned by another domain but known in this domain by name and associated cross-domain resource manager.

cross-domain resource manager (CDRM). The portion of the system services control point (SSCP) that controls cross-domain sessions.

D

data communication. The transmission, reception, and validation of data.

data flow. In SNA, any of four flows in a given session, characterized as either primary-to-secondary or secondary-to-primary, each of which may be normal or expedited.

data transfer. In data communication, the sending of data from one point in a communication network and the receiving of the data at another point in the network.

data transmission. The sending of data from one point in a communication network for reception elsewhere.

definition statement. In ACF/VTAM, the means of describing an element of the communication network.

disconnection. (1) In ACF/VTAM, the dissociation of control blocks in such a way as to end a session between an application program and a connected terminal. The disconnection process includes suspending the use of the network path between the program and the terminal. (2) A physical dissociation between two end points.

domain. In a data communication system, the portion of the total network that is controlled by the SSCP in one telecommunication access method.

E

emulation mode. A function of the network control program that enables a 3704 or 3705 Communications Controller to perform activities equivalent to those performed by an IBM 2701 Data Adapter Unit or an IBM 2702 or 2703 Transmission Control Unit. See also *network control mode.*

exit list (EXLST). In VSAM or ACF/VTAM, a control block that contains the addresses of user-written routines that receive control when specified events occur during execution; for example, routines that process logons or I/O errors.

exit routine. In ACF/VTAM, any of several types of special-purpose user-written routines. See *accounting exit routine, authorization exit routine, EXLST exit routine, logon-interpret routine,* and *RPL exit routine.*

EXLST exit routine. In ACF/VTAM, a type of user-written routine whose address has been placed in an exit list (EXLST) control block. See also *RPL exit routine.*

expedited flow. In SNA, a data flow that is independent of and controls the normal flow. Data flow is split into normal and expedited flows. Requests and responses on a given flow (normal or expedited) are usually processed sequentially within the path, but the expedited flow traffic may be moved ahead of the normal flow traffic within the path. Contrast with *normal flow.*

external domain. A domain controlled by a different system services control point (SSCP).

F

field-formatted. In ACF/VTAM, pertaining to a logon or logoff command that is encoded into fields, each having a specified format such as binary codes, bit-significant flags, and symbolic names. Contrast with *character-coded.*

H

host computer. (1) The primary or controlling computer in a multiple computer operation. (2) A computer used to prepare programs for use on another computer or on another data processing system; for example, a computer used to compile, link-edit, or test programs to be used on another system. (3) In a data processing system that includes ACF/VTAM or ACF/TCAM, the computer in which ACF/VTAM or ACF/TCAM resides.

host system. (1) A data processing system that is used to prepare programs and the operating environments for use on another computer or controller. (2) The data-processing system to which a communication system is connected and with which the system can communicate.

I

inactive. In ACF/VTAM, pertaining to a major node that has not been made known to ACF/VTAM and is unavailable for use, or pertaining to a minor node that is not connected to nor available for connection to an application program. Contrast with *active.*

interpret table. In ACF/VTAM, a user-defined correlation list that translates an argument into a string of eight characters. Interpret tables can be used to translate logon data into the name of an application program for which the logon is intended.

L

line. See *communication line.*

line control. The scheme of operating procedures and control signals by which a communication network is controlled.

local. (1) Pertaining to the attachment of devices directly by I/O channels to a host computer. Contrast with *remote.* (2) In data communication, pertaining to devices that are attached to a controlling unit by cables, rather than by data links.

local NCP. An NCP that is channel-attached to a host computer. Contrast with *remote NCP.*

local non-SNA major node. In ACF/VTAM, a major node whose minor nodes are locally attached non-SNA terminals.

local SNA major node. In ACF/VTAM, a major node whose minor nodes are locally attached physical and logical units.

local 3270 major node. See *local non-SNA major node.*

logical unit. In SNA, one of three types of network addressable units (NAUs). It is the port through which an end user accesses function management in order to communicate with another end user. It is also the port through which the end user accesses the services provided by the system services control point (SSCP). It must be capable of supporting at least two sessions – one with the SSCP, and one with another logical unit. It may be capable of supporting many sessions with other logical units. ACF/VTAM application programs must communicate with logical units in record mode. See also *physical unit, system services control point.*

log off. In ACF/VTAM, to request that a terminal be disconnected from an application program.

logoff. In ACF/VTAM, a request that a terminal be disconnected from an application program.

log on. In ACF/VTAM, to request that a terminal be connected to an application program.

logon. In ACF/VTAM, a request that a terminal be connected to an application program. See also *automatic logon* and *simulated logon.*

logon data. In ACF/VTAM: (1) The data portion of a field-formatted or character-coded logon from an SNA terminal or from a non-SNA 3270 terminal for which PU=YES has been specified. (2) The entire logon sequence or message from a non-SNA terminal.

logon-interpret routine. In ACF/VTAM, a user-written exit routine associated with a logon-interpret table entry that translates logon data. It may also verify the logon. Synonymous with *APPLID routine.*

logon message. Synonym for *logon data.*

logon mode. In ACF/VTAM, the communication protocols that govern a session between a logical unit and a ACF/VTAM application program or between two application programs. Synonymous with *session parameters.*

logon mode name. In ACF/VTAM, the symbolic representation of a logon mode.

logon mode table. In ACF/VTAM, a set of macro-generated constants making up one or more logon modes. Each logon mode is associated with a logon mode name.

LU-LU session. In SNA, a session between two logical units in the network. It allows communication between two end users, each associated with one of the logical units.

M

major node. In ACF/VTAM, a set of minor nodes that is filed as a member or book of a definition data set and that can be activated and deactivated as a group. See also *minor node.*

message. (1) *An arbitrary amount of information whose beginning and end are defined or implied. (2) For BSC devices, the data unit from the beginning of a transmission to the first ETX character, or between two ETX characters. For start/stop devices "message" and "transmission" have the same meaning. (3) (SC1) A sequence of characters used to convey data. The sequence usually consists of three parts: the heading, the text, and one or more characters used for control or error-detection purposes. (4) A combination of characters and symbols transmitted from one point to another. (5) In SNA, a request/response header and its associated request/response unit. In some ACF/VTAM publications, a distinction is made between messages, responses, and commands, where "message" is used to mean a data request.

minor node. In ACF/VTAM, a uniquely-defined resource within a major node that can be activated or deactivated by the VARY command. Synonymous with *specific node.* See also *major node.*

multiple-channel-attached communications controller. A communications controller that can be channel-attached to more than one host computer.

Multisystem Networking Facility. In ACF/VTAM, a feature that supports communication among multiple host computers operating with DOS/VS, OS/VS1, and OS/VS2 (SVS and MVS).

N

NCP. Network control program.

NCP major node. In ACF/VTAM, a major node defined through NCP generation.

network. (1) (SC1) The assembly of equipment through which physical connections are made between terminal installations. (2) In data communication, a configuration in which two or more locations are physically connected for the purpose of exchanging data.

network control mode. The functions of a network control program that enable it to direct a communications controller to perform activities such as polling, device addressing, dialing, and answering. See also *emulation mode.*

network control program (NCP). A program, generated by the user from a library of IBM-supplied modules, that controls the operation of a communications controller.

network definition. In ACF/VTAM, the process of defining the identities and characteristics of each node in the network and the arrangement of the nodes. Network definition is part of ACF/VTAM definition.

network operator. (1) A person responsible for controlling the operation of a communication network. (2) An ACF/VTAM application program authorized to issue network operator commands.

network operator command. A command used to monitor or control the communication network.

network operator console. A system console or terminal in the network from which a network operator controls a communication network.

network operator logon. A logon requested on behalf of a terminal by means of a network operator command.

NIB. Node initialization block.

NIB list. A series of contiguous node initialization blocks.

node. (1) An addressable point in a data communication network. (2) In ACF/VTAM, a point in a communication network defined by a symbolic name. See also *major node* and *minor node.*

node initialization block (NIB). In ACF/VTAM, a control block associated with a particular terminal that contains information used by the application program to identify the terminal and indicate how communication requests directed at the terminal are to be processed.

node name. In ACF/VTAM, the symbolic name assigned to a specific major or minor node during network definition.

non-SNA terminal. A terminal supported by ACF/VTAM that uses start-stop or BSC protocol or that is part of a local non-SNA 3270 Information Display System.

normal flow. In SNA, a data flow that is used for most requests and responses. Data flow is split into normal and expedited flows. The expedited flow is independent of and used to control the normal flow. Requests and responses on a given flow (normal or expedited) are usually processed sequentially within the path, but the expedited flow traffic may be moved ahead of the normal flow traffic within the path. Contrast with *expedited flow.*

O

orderly closedown. The orderly deactivation of ACF/VTAM and the communication network. An orderly closedown does not take effect until all application programs have been disconnected from ACF/VTAM. Until then, all data transfer operations continue. Contrast with *cancel closedown* and *quick closedown.*

P

partitioned emulation programming (PEP). A feature of the network control program, versions 2 and later, that allows a local 3704 or 3705 controller to operate as an IBM 2701, 2702, or 2703 control unit (or any combination of the three) for certain data links, while performing network control functions for other links in the communication network.

path. (1) In ACF/VTAM, the intervening nodes and data links connecting a terminal and an application program in the host computer. (2) In defining a switched SNA major node, a potential dial-out port that can be used to reach a physical unit. (3) In defining ACF/VTAM or ACF/NCP routing tables, a route through an adjacent subarea to one or more destination subareas. (4) In SNA, the series of nodes, data links, and common network components (path control and data link control) that form the complete route traversed by the information exchanged between two network addressable units in session.

PEP. Partitioned emulation programming.

physical unit. (1) The control unit or cluster controller of an SNA terminal. (2) The part of the control unit or cluster controller that fulfills the role of a physical unit as defined by systems network architecture.

primary application program. In a session, an application program that adheres to predefined primary protocols. Contrast with *secondary application program.*

primary end of a session. A network addressable unit (for example, a primary application program) that adheres to predefined primary protocols.

program operator. An ACF/VTAM application program that is authorized to issue network operator commands and receive ACF/VTAM network operator awareness messages. Also see *solicited messages* and *unsolicited messages.*

Q

queued for connection. In ACF/VTAM, the state of a terminal that has logged on to an application program but has not yet been accepted by that application program. See also *connection.*

quick closedown. In ACF/VTAM, a closedown in which current data-transfer operations are completed, while new connection and data-transfer requests are canceled. Contrast with *cancel closedown* and *orderly closedown.*

R

record mode. In ACF/VTAM, a mode of data transfer in which the application program can communicate with logical units or with local and remote non-SNA Information Display Systems. Contrast with *basic mode.*

release. In ACF/VTAM resource control, to relinquish control of resources (communications controllers or physical units). See also *resource takeover.* Contrast with *acquire (2).*

remote. In ACF/VTAM, pertaining to devices that are physically connected through a communications controller.

remote NCP. An NCP that is not attached directly through a channel, but is attached through a data link to a local NCP that is channel-attached. Contrast with *local NCP* and *peer NCP.*

reply. In SNA, a request unit sent in reaction to a previously received request unit (command). See also *command (2).*

request. (1) A directive that causes a data transfer or related operation to be performed. Contrast with *response.* (2) In SNA, synonym for *request unit.*

request parameter list (RPL). In ACF/VTAM, a control block that contains the parameters necessary for processing a request for data transfer, for connecting or disconnecting a terminal, or for some other operation.

resource takeover. In ACF/VTAM, the action of a network operator to transfer control of resources from one domain to another. See also *acquire (2)* and *release.*

response. (1) An answer to an inquiry. (2) The unit of information that is exchanged between ACF/VTAM or an ACF/VTAM application program and an SNA terminal to describe how a request arrived. (3) In SNA, synonym for *response unit.* (4) Contrast with *request.*

RPL. Request parameter list.

RPL-based macro instruction. In ACF/VTAM, a macro instruction whose parameters are specified by the user in a request parameter list.

RPL exit routine. In ACF/VTAM, a user-written routine whose address has been placed in the EXIT field of a request parameter list. ACF/VTAM invokes the routine to indicate that an asynchronous request has been completed. See also *EXLST exit routine.*

S

SDLC. Synchronous data link control.

SDLC cluster controller. A cluster control unit for a teleprocessing subsystem.

secondary application program. In a session, an application program that adheres to secondary session protocols. Contrast with *primary application program.*

secondary end of a session. A logical unit, secondary application program, or non-SNA terminal.

sequence number. A numerical identifier assigned by ACF/VTAM to each message exchanged between two nodes.

session. (1) The period of time during which a user of a terminal can communicate with an interactive system; usually, the elapsed time from when a terminal user logs on the system until the user logs off the system. (2) The period of time during which programs or devices can communicate with each other. (3) In SNA, a logical connection, established between two network addressable units (NAUs), that allows them to communicate. The session is uniquely identified by a pair of network addresses, identifying the origin and destination NAUs of any transmissions exchanged during the session. (4) In the NCP, a line-scheduling period. See *LU-LU session, SSCP-LU session, SSCP-PU session.*

session parameters. Synonym for *logon mode.*

shared. Pertaining to the availability of a resource to more than one user at the same time.

simulated logon. A logon generated for a terminal by ACF/VTAM at the primary application program's request. The primary application program accepts or rejects the terminal as if it had logged on.

single-channel-attached communications controller. A communications controller that is channel-attached to only one host computer.

SNA. Systems network architecture.

SNA terminal. In ACF/VTAM: (1) A physical unit, logical unit, or secondary application program. (2) A terminal that is compatible with systems network architecture.

solicit. In ACF/VTAM, to obtain data from a BSC or start-stop terminal or from a local non-SNA 3270 terminal and move the data into ACF/VTAM buffers.

solicited message. A response from ACF/VTAM to a network operator command entered by a program operator. Contrast with *unsolicited message.*

SSCP. System services control point.

SSCP-LU session. A session during which ACF/VTAM (the system services control point, SSCP) and a logical unit (LU) can communicate.

SSCP-PU session. A session during which ACF/VTAM (the system services control point, SSCP) and a physical unit (PU) can communicate.

start options. In ACF/VTAM, the user-specified or IBM-supplied options that determine certain conditions that are to exist during the time an ACF/VTAM system is operating. For example: the size of ACF/VTAM buffer pools, which major and minor nodes are to be traced by the ACF/VTAM trace facility, and which major nodes are to be initially active. Start options can be predefined or specified by the network operator when ACF/VTAM is started.

subarea. A group of addressable elements in the network that have the same subarea ID.

subarea ID. A subfield of network address.

switched network backup (SNBU). An optional facility that allows a user to specify, for certain types of stations, a switched line to be used as an alternate path (backup) if the primary line becomes unavailable or unusable.

switched SNA major node. In ACF/VTAM, a major node whose minor nodes are physical and logical units attached by switched SDLC links.

system services control point (SSCP). In SNA, a network addressable unit that provides services via a set of command processors (network services) supporting physical units and logical units. The SSCP must be in session with each logical unit and each physical unit for which it provides services. It also provides services for the network operators or administrators who control the configuration. The SSCP is commonly located at a host node.

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.

T

teleprocessing subsystem. In ACF/VTAM, a secondary or subordinate network and set of programs that are part of a larger teleprocessing system; for example, the combination consisting of an SDLC cluster controller, its stored programs, and its attached terminals.

teleprocessing system. A data processing system in combination with data communication facilities.

terminal. (1) A device, usually equipped with a keyboard and some kind of display, capable of sending and receiving information over a communication channel. (2) In ACF/VTAM, the secondary end of a session; that is, a logical unit, a start-stop or BSC device, a local non-SNA 3270 device, or an application program.

terminal component. A separately addressable part of a terminal that performs an input or output function, such as the display component of a keyboard-display device or a printer component of a keyboard-printer device.

transmission control unit (TCU). A communication control unit whose operations are controlled solely by programmed instructions from the computing system to which the unit is attached; no program is stored or executed in the unit. Contrast with *communications controller.*

U

unformatted system services (USS). A portion of ACF/VTAM that translates a character-coded command, such as a logon or logoff command, into a field-formatted command for processing by formatted system services (FSS). Constrast with *formatted system services (FSS)* and *character-coded.*

unsolicited message. A network operator message, from ACF/VTAM to a program operator, that is unrelated to any command entered by the program operator. Contrast with *solicited message.*

user logon data. Synonymous with *logon data (1).*

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Advanced Communications
Function for VTAM
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General Information

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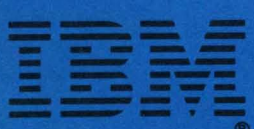

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