GC27-0438-2
File No. 4300-30

Advanced Communications Function for VTAM Entry

General Information: Introduction

Program Product

Program Number: 5746-RC7

IBM

Third Edition (March 1981)

This is a major revision of GC27-0438-1 which is now obsolete. This edition applies to the Advanced Communication Function for VTAM Entry (ACF/VTAME), Program Number 5746-RC7. Changes are continually made to the information in IBM system publications. Before using this publication in connection with the operation of IBM systems, consult your IBM representative or the *IBM System/370 and 4300 Processors Bibliography* GC20-0001, to find out which editions are applicable and current.

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Readers whose ACF/VTAME will communicate with other ACF access methods may wish to have a general understanding of these access methods; these readers are referred to:

Introduction to Advanced Communications Function, GA30-3033

ACF/VTAM General Information, GC38-0254

ACF/VTAM General Information: Introduction, GC27-0462

ACF/TCAM General Information, GC30-2050

ACF/TCAM General Information: Introduction, GC30-3057

Readers who wish a general introduction to the VSE system with which ACF/VTAME runs are referred to:

Introduction to VSE, GC33-5370.

Note: *Throughout this book, the term VSE refers to the system control programming DOS/VSE with the program product VSE/Advanced Functions Release 1 or to the VSE system with VSE/Advanced Functions Release 2 or 3.*

For more information on the Network Communication Control Facility (NCCF), see:

NCCF General Information, GC27-0429.

For more information on the Network Problem Determination Application (NPDA), see:

NPDA General Information, GC34-2010.

For more information on the Downstream Load Utility (DSLU) program product, see:

DSLU Program Summary, GC33-6125

Readers who desire a more comprehensive glossary than is included in this publication are referred to the *IBM Data Processing Glossary,* GC20-1699.

Related ACF/VTAME Publications

ACF/VTAME General Information: Introduction is one of a number of ACF/VTAME publications. Figure P-1 shows these publications in an order related to different information needs. A summary of the information included in each publication is provided in Appendix B.

Summary of Amendments (March 31, 1981) to GC27-0438-1 by Revision GC27-0438-2

New Program Functions

ACF/VTAME now supports the Downstream Load Utility (DSLU) program product or an equivalent user-written application program. This program product supports the general load requirements of type 2 physical units, such as the IBM 3644 Automatic Data Unit and the IBM 8775 Display Terminal.

ACF/VTAME also supports the IBM 8775 Display Terminal (Models 11 and 12) on a switched or nonswitched SDLC line attached through the 4331 communication adapter.

Support has also been added for the 4331 Processor Loop Adapter features. The Loop Adapter features increase the number of terminal types that can be attached to the 4331 Processor. (To ACF/VTAME, loop-attached devices appear as channel-attached SNA devices.) With these features the following devices are supported:

- 3274 Control Unit Model 51C
  - 3277 Display Station
  - 3278 Display Station
  - 3279 Color Display Station
  - 3262 Line Printer
  - 3284 Printer
  - 3286 Printer
  - 3287 Printer
  - 3288 Printer
- 3276 Control Unit
  - 3278 Display Station
  - 3279 Color Display Station
  - 3262 Line Printer
  - 3287 Printer
  - 3289 Line Printer
- 3287 Printer Models 11 and 12
- 3640 Plant Data Communication Terminals
  - 3641 Reporting Terminal Models 1 and 2
  - 3642 Encoder Printer Models 1 and 2
  - 3643 Keyboard Display Models 3 and 4
  - 3644 Automatic Data Unit
  - 3645 Printer
  - 3646 Scanner Control Unit
  - 3647 Time and Attendence Terminal
- 3843 Loop Control Unit
- 8775 Display Terminal Models 1 and 2

Changed Documentation

Changes, additions, and improvements have been made throughout the text:

- Figure 1-1 has been revised to include the 4331 Processor Loop Adapter features.
- Two new topics have been added to the list of ACF/VTAME services in Chapter 1: the program operator interface and the communication network management interface.
- The Downstream Load Utility (DSLU) program product has been added to the list of related IBM application programs, in Chapter 2.
- The list of channel-attached terminal requirements has been expanded to include the 4331 Display/Printer Adapter and the 4331 Loop Adapters, in Chapter 2.
- The 8775 Display Terminal has been added to the list of SDLC Control Units that can be attached by the communication adapter.
- Loop-attached devices have been added to the list of network resource characteristics, in Chapter 3.
- Figure A-1 has been revised to include the 4331 Loop Adapters and the 8775 Display Terminal; this figure has been reorganized and should be reviewed in its entirety.
- The glossary and the index have been expanded to include entries for the DSLU program product and the 4331 Processor Loop Adapter features.

Summary of Amendments (April 28, 1980) to GC27-0438-0 by Revision GC27-0438-1

New Program Functions

ACF/VTAME's internal trace has been enhanced to trace channel I/O that flows between ACF/VTAME and the communications adapter lines.

An ACF/VTAME operator now may request a link level 2 test of a nonswitched SDLC line on which there is a physical unit controlled by ACF/VTAME. The MODIFY NET,LL2 command, issued by the operator, specifies the name of a physical unit on the line, the number of times the data is to be sent, and whether the test is to be run continuously, cancelled, or to be ended when the data has been echoed a sufficient number of times.

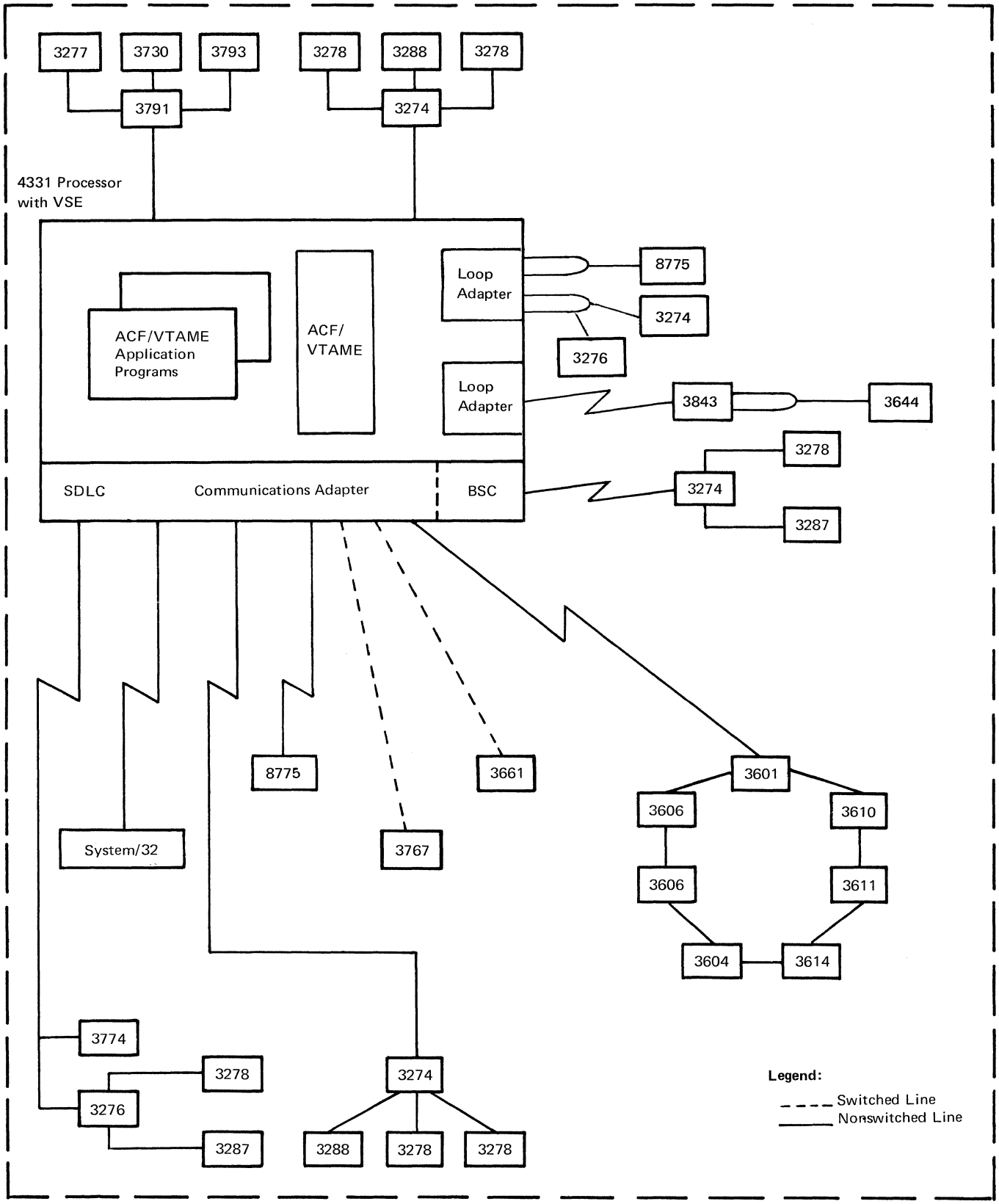

Figure 1-1. A Single-Domain ACF/VTAME Network

SNA Services

The Systems Network Architecture (SNA) is a logical structure within which a wide variety of network resources can communicate. SNA provides the rules by which such functions as data link control can be handled by the access method, rather than the user.

A major objective of the SNA structure is to provide for system growth in a way that minimizes the impact of future network growth. In addition, the structure allows network functions to be moved away from the host processor. For example, an SNA cluster controller itself can poll the terminals under its control. Also, SNA allows terminals with sufficient storage to accumulate information locally and to transmit the information to a central location at a nonpeak period.

Another SNA objective is to provide network services to a wide variety of terminals which may be interconnected to a host processor by channel attachment or across point-to-point or multipoint lines. This interconnection is made possible by defining data formats and data transmission protocols. Application programs and terminal systems that adhere to the SNA formats and protocols can share other application programs as well as network resources. SNA simplifies line and terminal sharing; this makes it possible for a terminal user to have access to an application program anywhere in the network as well as to obtain the storage and services that are needed by that application program.

SNA provides compatibility among SNA access methods. An ACF/VTAME application program (one that uses ACF/VTAME macro instructions) can request a session with an application program or terminal in a domain controlled by another SNA access method. Similarly, an ACF/VTAME terminal user (one whose terminal is controlled by ACF/VTAME) can request a session with an application program controlled by another SNA access method. By defining the operational sequences, SNA makes standard the requests, the responses, and the sequence in which the requests are processed. The application program or terminal user need not be concerned about the internal processing of these requests; as long as these standards are followed, the request may be sent to any SNA domain.

ACF/VTAME Services

ACF/VTAME controls access to application programs in ACF/VTAME's host processor and to terminals defined to ACF/VTAME. ACF/VTAME also provides communication with resources that are controlled by another SNA access method. For these network resources, ACF/VTAME provides the following services:

Permits the use of a network resource by name, without specific knowledge of its location or address: An application program or terminal user can request a session with a network resource by giving the resource's name. ACF/VTAME then provides session-establishment and session-termination services. ACF/VTAME provides these services for application programs that run in the host processor and that use ACF/VTAME macro instructions. ACF/VTAME also provides these services for SNA terminals (terminals that observe SNA data formats and data-transfer protocols) that are accessible across an SDLC line or are channel-attached to the host processor, and for SNA cluster controllers or non-SNA terminals that are attached to the host processor by a loop adapter.

Establishes, controls, and terminates access to resources physically connected to the host processor: The ACF/VTAME application programs in the host processor and the terminals physically connected by lines or channels to the host processor are controlled by ACF/VTAME. It establishes and terminates sessions and transfers data between these resources. As part of its session-establishment services, ACF/VTAME allows an application program to negotiate session parameters with selected application programs and terminals.

Also, ACF/VTAME can activate or deactivate terminals, lines, or sets of application programs. This facility is under ACF/VTAME operator control and can be used dynamically to change the network configuration according to installation needs. Activating a resource means that ACF/VTAME has a usable communication path and can establish communication sessions for that resource. Deactivating a resource means that the resource is made unavailable for session establishment.

In addition, the use of ACF/VTAME macro instructions allows an application program to maintain independent input and output data flows. The application program does not require complex polling and scanning procedures.

Permits sharing of such network resources as communication lines, cluster controllers, and terminals: A session between an application program and any active terminal under its control or between two application programs can be established by ACF/VTAME. The session's communications then are transmitted by ACF/VTAME over a defined communication path. The lines and control units that make up the path between session partners are shared. ACF/VTAME allocates the use of these shared resources only for the actual time that they are needed for communication. When not needed, these resources are available for use by the partners of one or more other sessions. In addition, application programs can be shared. An application program can have sessions with several terminals or application programs at once and can communicate within those sessions simultaneuosly. An application program also may have more than one concurrent session with another application program. However, a terminal can have only one session with an application program at a time.

Permits distribution of resources among two or more domains: Session-establishment, termination, and data-transfer services also are provided for sessions between resources controlled by ACF/VTAME and resources controlled by another SNA access method. This means that an application program in one domain can communicate with an application program or a terminal in any other interconnected domain and that a terminal can log on to an application program in any other interconnected domain. The restrictions on multiple-domain communication are similar to those of single-domain communication. Session partners must be capable of cross-domain communication in both domains. One partner of a communication session must be an application program, although both partners may be. In addition, both session partners must be known and active in *both* domains.

Manages access to resources in other parts of a multiple-domain network: To ACF/VTAME an application program or a terminal exists only as a set of definition statements in a resource definition file. The set of definition statements contains information about the characteristics and the status of the resource. For resources in other domains, ACF/VTAME requires a set of definition statements that names the resource and that identifies its cross-domain resource manager. It

Monitors network operation and domain resources; permits the ACF/VTAME operator to obtain information about resources in other domains: In addition to traces provided by the VSE operating system, ACF/VTAME provides traces of I/O events, buffer usage, buffer contents, and its own internal processing. The I/O and buffer trace records can be printed by a utility program, TPRINT, which can be either attached as an ACF/VTAME subtask or run as an independent task. Other trace records can be obtained by a VSE dump program.

By using the DISPLAY command, the ACF/VTAME operator can obtain the current status of any buffer, cluster controller, terminal, line, or application program under ACF/VTAME's control. The operator also may obtain some information about resources controlled by another SNA access method. For example, for a particular cross-domain resource known to ACF/VTAME, the operator can obtain the status of its domain definition, the name of its cross-domain resource manager, and the number of active sessions and session requests it has; the display also will give the names of each domain session partner, each session's status, and some information about each session.

Permits the operation of the network to be altered and the configuration of the network to be changed while the network is being used: Use of the MODIFY command allows the ACF/VTAME operator to: start or stop ACF/VTAME trace facilities, attach or detach programs as subtasks of ACF/VTAME, start or stop the Teleprocessing Online Test Executive Program (TOLTEP), start or stop the link level 2 test, and control the kinds of ACF/VTAME operator messages that are issued. Another operator command (VARY) permits the operator to alter the network configuration in response to operational considerations. The HALT command lets the operator shut down ACF/VTAME's processing.

These changes may be effected to meet fluctuating user requirements, to minimize the impact of a terminal or line failure, or to control session establishment for application programs and terminals.

Provides a program operator interface: The IBM Network Operation Support Program (NOSP), the IBM Network Communications Control Facility (NCCF), or a user-written program operator may be used to assist an ACF/VTAME operator in controlling network resources. The ACF/VTAME program operator interface (POI) allows NCCF and NOSP to receive ACF/VTAME messages and to send ACF/VTAME operator commands (DISPLAY, MODIFY, and VARY) to ACF/VTAME. However, NCCF and NOSP cannot start ACF/VTAME or issue the HALT command.

Provides a communication network management interface: ACF/VTAME also supports the communication network management (CNM) interface. This interface allows ACF/VTAME to exchange data with communication network management (CNM) application programs, such as the Network Problem Determination Application (NPDA) program product, and with designated application programs, such as the Downstream Load Utility (DSLU) program product. For example, the CNM interface allows the NPDA program to receive error detection data from ACF/VTAME (through NCCF). Similarly, ACF/VTAME can transfer load requests to the DSLU program product across the CNM interface.

User-Written Application Programs: Application programs that use record mode ACF/VTAM macro instructions and ACF/VTAM's control block interface will operate on ACF/VTAME without change or recompilation, provided that these programs are not dependent upon the internal processing characteristics of ACF/VTAM.

Storage Requirements

The *estimated* minimum storage requirement for all ACF/VTAME phases (load modules) and ACF/VTAME control blocks needed to support a communication path in a network is 62K bytes (where K equals 1024) of real storage, plus additional storage for logical-unit-related control blocks. This minimum assumes that the path and all terminals are activated and error free, and that an opened application program is in session with its terminals. However, this minimum does vary with the number of terminals or application programs in a network. Refer to the *ACF/VTAME Installation* manual for the calculations necessary to estimate buffer storage requirements. In addition to other VSE storage requirements, the VSE operating system needs approximately 4.6K bytes of fixed storage to support ACF/VTAME.

Terminal Requirements

Channel-Attached Terminal Requirements

Cluster controller models of both the IBM 3270 Information Display System and the IBM 3790 Communication System may be used with ACF/VTAME. The following cluster controller models may be used with ACF/VTAME:

IBM 3270 Information Display System: Models 3272-1, 3272-2, 3274-1A, 3274-1B, and 3274-1D

IBM 3790 Communication System (including 3730 and 3760 systems): Models 3791-1, 3791-2, 3791-11, and 3791-12

IBM 4331 Display/Printer Adapter

IBM 4331 Loop Adapter

Terminals that are supported by these cluster controllers may communicate through ACF/VTAME.

Terminals Attached across a Line

ACF/VTAME can control terminals across a communication line only when they are attached through a communication adapter. The following list contains the control unit models with which ACF/VTAME can communicate; the list has two sections, one for control units attached to the communication adapter with SDLC lines and one for control units attached to the communication adapter with BSC lines.

The system console is used by ACF/VTAME but is not allocated to ACF/VTAME. The domain operator enters ACF/VTAME commands through this console, and ACF/VTAME transmits messages to the domain operator at this console. (A special application program, called a *program operator*, also can enter most ACF/VTAME commands and can receive ACF/VTAME messages.)

Defining Network Resources to ACF/VTAME

All of the network resources and special facilities that are in the ACF/VTAME domain must be defined to ACF/VTAME.

The person defining the network and services to ACF/VTAME must know what the network configuration is to be and what characteristics the network resources will have. To this end, that person needs to know:

- What SNA cluster controllers or non-SNA terminals will be channel-attached
- What SNA cluster controllers or non-SNA terminals will be loop-attached
- What cluster controllers and terminals will be attached through the communication adapter
- Whether the communication adapter-attached units use SDLC or BSC line controls
- Whether an SDLC line is switched or nonswitched
- Which resources controlled by another access method (cross-domain resources) can communicate with resources controlled by this ACF/VTAME
- How many and which cross-domain resource managers will control access to cross-domain resources
- What paths can be used for communication with resources in other domains
- What ACF/VTAME application programs reside in the host processor
- What operational sequences will be used for starting ACF/VTAME
- What special information is needed for industry control unit programming support
- What terminal-unique information must be included for support of particular terminals

After the definition statements have been completed, they should be reviewed and evaluated with respect to the installation's objectives. In particular, the operands that can affect storage and performance specifications, as well as options for the predefined ACF/VTAME start procedure, should be evaluated before this information is filed in the appropriate source statement sublibrary.

Preparation of ACF/VTAME Application Programs

An ACF/VTAME application program is one that uses ACF/VTAME macro instructions to engage ACF/VTAME services. These services enable the application program to request session establishment with other application programs or terminals and to request the transfer of data between the session partners. The application program can request most ACF/VTAME services either synchronously (the program waits while ACF/VTAME performs the requested operation) or asynchronously (the program continues execution and is interrupted when ACF/VTAME completes the operation).

responses to a terminal or another application program. The SESSIONC macro instruction may be used to request ACF/VTAME to start or prevent further transmission of data, or to assist in synchronizing data-transfer sequence numbers. The RESETSR macro instruction can be used to change procedures for receiving data or to cancel outstanding requests for data transfer from a specified terminal.

Control block macro instructions: Two types of control block macro instructions are provided. Declarative macro instructions (ACB, EXLST, NIB, and RPL) create control blocks during the application program's assembly. Manipulative macro instructions (GENCB, MODCB, SHOWCB, and TESTCB) create or change ACB, EXLST, NIB, and RPL control blocks during program execution. Different forms of the manipulative macro instructions are available and can be used to make the application program reenterable and easier to maintain. Instead of using the manipulative macro instructions, an application program may choose to manipulate values in control blocks by using DSECT and other assembler language instructions.

Network-control macro instructions: These macro instructions (RCVCMD and SENDCMD) allow an authorized ACF/VTAME application program (called a program operator), the Network Operation Support Program (NOSP), or the Network Communications Control Facility (NCCF) to issue ACF/VTAME operator commands (except HALT), to issue the system REPLY command, and to receive operator messages from ACF/VTAME.

Additional macro instructions: ACF/VTAME provides these additional macro instructions to support session-establishment and data-transfer activities. The SETLOGON and SIMLOGON macro instructions provide the application program with added control over the scheduling and generation of logons. The CHECK and EXECRPL macro instructions let the application program check the progress of processing or reexecute a particular request. The INQUIRE and INTRPRET macro instructions provide the application program with information from control blocks or from interpret tables.

ACF/VTAME Application Program Coding Considerations

An application program whose design follows the conventions and coding sequences described in this section will execute more smoothly and will require little or no change (and recompilation) if ACF/VTAME internal processing sequences or control block formats change. User-defined conventions also should be followed for how the application program interacts with the rest of the system. Such conventions might include passing terminals at the completion of a communication session, setting up authorization procedures to restrict ACF/VTAME services and to protect sensitive data, and creating standard procedures for reacting to ACF/VTAME and system closedown.

Controls should be established to ensure that only authorized users can gain access to ACF/VTAME resources. ACF/VTAME facilities can be used to control sessions between application programs and other application programs or terminals. Facilities are also available to restrict the use of certain ACF/VTAME services to authorized users and to protect confidential data. Application programs can request ACF/VTAME services synchronously (and wait for the completion of the requested service) or asynchronously (and continue executing while ACF/VTAME performs the requested service). Programs that use asynchronous request handling will execute more efficiently and handle errors more quickly.

application program to have ACF/VTAME start a session.) Besides coming from a terminal, a logon can come from other sources:

- It can come from ACF/VTAME initialization (if automatic logon was specified in a terminal's definition statement).
- It can come from the domain operator (if automatic logon is specified in an ACF/VTAME command).
- It can come from another application program that has passed the terminal to the new program.

Regardless of the source of the logon, the session is not established unless the application program *accepts* the logon by issuing a request to ACF/VTAME to set up the session. Once the session has been established, the application program and terminal can begin to communicate with each other.

In other cases, the initiative to establish the session can come from the application program itself, either as a request to ACF/VTAME to *acquire* a session with the terminal or as a request that ACF/VTAME create a logon and make the logon appear as though it came from the terminal. In either case, if the terminal is available and is willing to accept the session, the session is established.

Sessions also can be established between two application programs. In this case, one program (which will function as the secondary partner) requests that the other application program (which will function as the primary partner) establish a session. The secondary program's request reaches the primary program in the form of a logon. As with a logon for a terminal, the primary application program can either accept the logon or reject it. If the primary program accepts the logon, a set of session protocols, called *session parameters,* are sent to the secondary partner. The secondary partner may accept these session parameters, change them to a new set, or reject the session. If the session parameters are changed, the session is established with the new set of parameters in effect. However, the primary partner can look at the new set of parameters and, if the set is not acceptable, terminate the session.

An application program uses ACF/VTAME macro instructions to send and receive data. When the program sends data to a terminal, ACF/VTAME moves the data from the application program's output area to ACF/VTAME buffers, where it is held until ACF/VTAME can issue the I/O instructions that transmit the data. ACF/VTAME then sends the data to the terminal, either directly across a channel (if the terminal is channel-attached) or through the communication adapter (if the terminal is attached across an SDLC or BSC line).

Input from a terminal travels a similar (but reverse) route. The input moves from the terminal to ACF/VTAME through a channel (if the terminal is channel-attached) or through the communication adapter (if the terminal is attached to the communication adapter across an SDLC or BSC line). The input is stored in ACF/VTAME buffers until the application program asks for it, at which time it is moved to the application program's input area.

When data is being transmitted from one application program to another, the data is moved from the sending program's output area to ACF/VTAME buffers. For application programs in the same domain, ACF/VTAME then moves the data to the receiving program's input area as the receiving program requests it.

program operator in another domain to request control across domain boundaries. However, a program operator cannot start or halt ACF/VTAME, ACF/VTAM, or ACF/TCAM. A program operator may be provided by the user. Alternatively, the IBM program product Network Operation Support Program (NOSP) or Network Communications Control Facility (NCCF) can be used to fulfill this function.

Starting ACF/VTAME

The system operator starts ACF/VTAME by first starting the partition in which ACF/VTAME is to be executed and then invoking the ACF/VTAME cataloged procedure. When the operator is prompted and responds, the options entered by the operator override those in the predefined list. (No option can be entered at the console if NOPRMPT is specified in the start option list.)

Halting ACF/VTAME

ACF/VTAME can be stopped by a HALT command issued by the ACF/VTAME operator. Closedown may be normal and orderly or, if specified by the operator, quick. Under normal, planned closedown, ACF/VTAME allows established communication sessions to continue to their normal conclusion. A quick closedown is designed for emergency situations in which it is necessary to notify the application programs of the closedown and to prevent any further communication between session partners.

Monitoring ACF/VTAME

ACF/VTAME's DISPLAY command enables a ACF/VTAME operator (or program operator) to request status information and to verify network changes resulting from an error, from a previous operator command, or from the start procedure. The DISPLAY command can be used to display the status of a particular resource or of all resources in a particular category such as all terminals, all application programs, or all application programs or terminals with outstanding session-establishment or session-termination I/O.

Activating and Deactivating Domain Resources

Sets of domain resources may be activated (made available for session-establishment services) when ACF/VTAME is started or they may be explicitly activated by the domain operator VARY command. Such domain-resource sets include:

- Sets of cluster controllers and terminals attached through the communication adapter on nonswitched lines
- Sets of cluster controllers and terminals to be attached through the communication adapter across switched lines
- Sets of channel-attached SNA cluster controllers and terminals
- Sets of channel-attached non-SNA terminals
- Sets of application programs
- Sets of cross-domain resources
- Sets of managers of cross-domain resources
- Tables of cross-domain paths

Once the resource set is active (with the exception of a table of cross-domain paths), it can be deactivated, that is, made unavailable for further session-establishment services. Only one table of cross-domain paths can be

In addition to these measures, terminal operation procedures should be defined. These procedures would extend basic procedures so that the requirements of the installation are met. Such requirements include accounting, authorization, and information security practices defined and used by the individual installation.

Controls should be established to ensure that only authorized users can gain access to ACF/VTAME resources. ACF/VTAME facilities can be used to control sessions between application programs and other application programs or terminals. Facilities are also available to restrict the use of certain ACF/VTAME services to authorized users and to protect confidential data.

For each terminal, a set of instructions for its use should be written. This set should encompass the particular logon and logoff instructions that are appropriate for that terminal as well as any installation-unique requirements for its use.

2. Examine error records: Error records pertaining to ACF/VTAME or its domain may identify the problem and its cause.
3. Examine dumps and traces: Dumps and traces can be used to find the problem itself or to identify the area in which the error occurred.
4. Re-create the problem: ACF/VTAME's DISPLAY command, trace facilities, and RAS facilities can provide valuable information when the problem is re-created.

Reliability and Availability Support

The purpose of ACF/VTAME's reliability and availability support is to maintain the operation of the network. This support attempts to prevent problems and, if that is not possible, to minimize the impact of the problems. ACF/VTAME's reliability and availability support includes:

Error Detection and Feedback: Before attempting to act upon any request, ACF/VTAME analyzes it for erroneous information. If an error is detected, ACF/VTAME either returns the request along with an indication of the error or sends the operator a message indicating that the request is processed, but without the erroneous operand(s).

Storage Management: ACF/VTAME controls the allocation of much of the storage required for its operation. Using this control, ACF/VTAME permits the queuing of requests and attempts to avoid insufficient storage conditions. (An insufficient storage condition is one in which so much of ACF/VTAME storage has been devoted to the initiation of request processing that there is not enough left to process the request.)

Hardware Error Recovery: Using the facilities of the operating system, ACF/VTAME attempts to recover from some hardware errors. If recovery is not possible, ACF/VTAME records a permanent error and attempts to reallocate resources in order to reduce the impact of the failure. If recovery is possible, processing continues, but a count is maintained of the temporary errors.

Software Error Recovery: ACF/VTAME tries to recover from some software errors. If recovery is not possible, ACF/VTAME first attempts to isolate the problem and continue processing. If ACF/VTAME cannot continue processing, it attempts an orderly closedown of the domain so as not to affect other jobs executing in the host processor.

Network Error Notificaton: When communication with a major area of the network (such as a host processor with its application programs and terminals) is lost, a report is passed from adjacent areas to other areas of the network. This action makes it possible to notify any network resource that is affected by the loss of communication.

Error Recording Facilities: Recording hardware errors is a function of the error recovery procedures of ACF/VTAME. A record is written whenever there is a permanent hardware error, that is, an error from which recovery was not possible either because the error is undefined or because the recovery attempt was unsuccessful. Records are also written whenever ACF/VTAME deactivates a terminal, whenever ACF/VTAME is halted, and whenever any counters maintained by ACF/VTAME are about to overflow.

The data on hardware errors collected by ACF/VTAME is placed in the VSE error-record data file, SYSREC, that is an extension of the VSE recovery management support recorder. Information in this data file can be formatted and printed by the environmental recording, editing and printing (EREP) program. Additional details about communication-adapter-related errors are recorded by and can be displayed with the service functions of the host processor.

Link Level 2 Test: The link level 2 test is a diagnostic tool that checks the accuracy of data transmission to a specific station without disrupting other stations on the same line. The operator uses a MODIFY NET,LL2 command to initiate the test to a station on an SDLC nonswitched line. The results of the link level 2 test are displayed on the operator's console.

TOLTEP: The Teleprocessing Online Test Executive Program (TOLTEP) is an ACF/VTAME component that controls the selection, loading, and execution of Online tests (OLTs) within an ACF/VTAME environment. TOLTEP provides the interface between the OLTs and ACF/VTAME, and the interface between the OLTs and VSE through ACF/VTAME. It allows the ACF/VTAME operator or an IBM field engineer to run OLTs while other programs continue processing within ACF/VTAME and within VSE. An Online test is a specific device test that can be used as a tool for diagnosing a hardware difficulty or for verifying the usability of a control unit. OLTs for local devices and OLTs that use the record-mode application-program interface can be used. The service functions of the host procesor also provide testing facilities.

NPDA: The Network Problem Determination Application (NPDA) is a separately orderable IBM program product that executes under the Network Communication Control Facility (NCCF). NPDA records errors recovered from SDLC and BSC lines and stations attached through the communication adapter on a 4300 processor. NPDA also records error conditions reported by a BSC 3270 sense/status message.

Device or Terminal System Name	Controlling Device-Model	PU Type	Switched	Non-Switched	Major Node in which Device is Defined
Channel-Attached SNA					
3270 Information Display System	3274-1A	2	–	–	Local SNA
3790 Communication System	3791-1, 2, 11, 12	2	–	–	Local SNA
3730 Distributed Office Communication System	3791	2	–	–	Local SNA
4331 Loop Adapter	Loop Adapter[6]	2	–	–	Local SNA
Attached Across an SDLC Line					
3270 Information Display System	3274-1C	2	–	X	CA[7]
	3274-51C	2	X	X	CA or Switched
	3276-1, 2, 3, 4[1]	2	–	X	CA
	3276-11, 12, 13, 14	2	X	X	CA or Switched
3600 Finance Communication System	3601, 3602	2	X	X	CA or Switched
	3614, 3624	2	–	X	CA
3630 Plant Communication System	3631, 3632	2	–	X	CA
3650 Retail Store System	3651-A50, B50, 25, 75	2	X	X	CA or Switched
3660 Supermarket System	3651-A60, B60	2	X	–	Switched
	3661	2	X	–	Switched
3680 Programmable Store System	3684-1, 2	2	X	X	CA or Switched
3730 Distributed Office Communication System	3791	2	X	X	CA or Switched
3767 Communication Terminal	3767-1, 2, 3	1	X	X	CA or Switched
3770 Data Communication System	3771, -1, 2, 3	2	X	X	CA or Switched
	3773-1, 2, 3, P1, P2, P3	2	X	X	CA or Switched
	3774-1, 2, P1, P2	2	X	X	CA or Switched
	3775-1, P1	2	X	X	CA or Switched
	3776-1, 2, 3, 4	2	X	X	CA or Switched
	3777-1, 3	2	X	X	CA or Switched
3790 Communication System	3791-1, 2, 11, 12	2	X	X	CA or Switched
8100 Information System (DPCX)	8130, 8140	2	X	X	CA or Switched
8100 Information System (DPPX)	8130, 8140	2		X	CA
8775 Display Terminal	8775-11, 12	2	X	X	CA or Switched
System/32	System/32	2	X	X	CA or Switched
System/34	System/34	2	X	X	CA or Switched
System/38	System/38	2	X	X	CA or Switched
Channel-Attached Non-SNA					
3270 Information Display System	3272-1, 2	–	–	–	Local Non-SNA
	3274-1B[3], 1D[3]	–	–	–	Local Non-SNA
4331 Display/Printer Adapter	Display/Printer Adapter[3]	–	–	–	Local Non-SNA
Attached Across a BSC Line					
3270 Information Display System	3271-1, 2[2]	–	–	X	CA
	3274-1C[4], 51C[4]	–	–	X	CA
	3275-1, 2[2]	–	–	X	CA
	3276-1[4], 2[4], 3[4], 4[4]	–	–	X	CA
5275 Direct Numerical Control Station	5275[5]	–	–	X	CA
5937-501 Industrial Terminal	5937[4]	–	–	X	CA
8100 Information System (DPPX)	8130[4], 8140[4]	–	–	X	CA

[1] With feature #6315.
[2] Supported as a PU-T1 3270 by functions provided by ACF/VTAME.
[3] Supported as a 3272-1, 2.
[4] Supported as a 3271-1, 2.
[5] Supported as a 3275-1, 2.
[6] Devices attached to the loop adapter are supported as PU-T2s, by functions provided by the loop adapter, or by the device itself.
[7] Communication adapter.

Figure A-1. Terminals Supported by ACF/VTAME

ACF/VTAME Installation, SC27-0439: This publication describes the ACF/VTAME definition statements and their use. The definition statements are used to install, tailor, and service ACF/VTAME in a data communication network.

Operation

This category contains information that can assist installation personnel in defining operational procedures for installation use on a daily basis.

ACF/VTAME Messages and Codes, SC27-0444: This publication contains, in alphanumeric order, all the messages and codes issued by ACF/VTAME. The messages include all operator messages, all TOLTEP messages, and all messages issued for the terminal operator by the unformatted system services (USS) portion of ACF/VTAME. The codes referenced by these messages also are explained in this manual.

ACF/VTAME Operation, SC27-0443: Detailed information about commands used to run an ACF/VTAME domain is included in this publication. It may be used as a reference manual for domain operators as well as a guide for system programmers who provide detailed information needed to run the domain.

Writing ACF/VTAME Application Programs

Information in this category is needed by people who write application programs that use ACF/VTAME.

ACF/VTAME Programming, SC27-0442: This manual contains information about how to write application programs that contain ACF/VTAME macro instructions. This manual provides instructions in detail on how to code ACF/VTAME macro instructions.

ACF/VTAME Reference Summary, SX27-3032: The contents of this booklet include, in summary form, the ACF/VTAME operator commands, the ACF/VTAME macro instructions, various macro-instruction return codes, and SNA protocols as implemented by ACF/VTAME.

Detecting, Diagnosing, and Fixing Problems

Information needed to detect, diagnose, and fix ACF/VTAME malfunctions may be found in the manuals listed in this category.

ACF/VTAME Data Areas, LY38-3016: This manual provides descriptions and diagrams of ACF/VTAME data areas. It should be used in conjunction with the *ACF/VTAME Logic* and *ACF/VTAME Diagnostic Techniques* manuals.

ACF/VTAME Diagnostic Techniques, SY38-3012: Information in this manual enables the reader to use the ACF/VTAME diagnostic tools to determine the cause of a problem. It also summarizes some of the serviceability aids that are available to ACF/VTAME users, but that are described in other publications. The final appendix contains an easily removed control block overview, which illustrates how frequently-used ACF/VTAME control blocks relate to one another.

Note: *For a major node, this makes the node and its minor nodes known to ACF/VTAME. For a minor node, this generally results in the execution of an SNA protocol to make the minor node usable by the network. For an LU minor node, this indicates that the network operator has given permission for the LU to participate in an LU-LU session.*

adjacent domains. In SNA, domains sharing a common subarea node (for example, a communication controller) or two domains connected by a cross-domain link. See *domain.*

adjacent nodes. In SNA, two nodes that are connected by one or more data links with no intervening nodes.

Advanced Communications Function (ACF). A group of IBM program products (principally ACF/TCAM, ACF/VTAM, ACF/VTAME, and ACF/NCP/VS) that use the concepts of Systems Network Architecture (SNA), including distribution of function and resource sharing.

Note: *ACF/VTAME and the Multisystem Networking Facility of ACF/TCAM, ACF/VTAM, and ACF/NCP/VS allow the interconnection of two or more domains into one consolidated and coordinated multiple-domain network.*

Advanced Communication Functions for the Network Control Program (ACF/NCP). A program product that provides communications controller support for single-domain and multiple-domain data communication.

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

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

Advanced Communications Function for the Virtual Telecommunication Access Method Entry (ACF/VTAME). A program product that provides single-domain and multiple-domain data communication capability for systems that have a communications adapter.

application program identification. The symbolic name by which an application program is identified to ACF/VTAME. It is specified in the APPLID parameter of the ACB 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.

application program major node. In ACF/VTAME, a book of the ACF/VTAME definition library that contains one or more APPL statements, each representing an application program.

asynchronous operation. In ACF/VTAME, an operation such as a request for session establishment or data transfer in which the application program is allowed to continue execution while ACF/VTAME performs the operation. ACF/VTAME informs the program after the operation is completed.

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

authorization exit routine. In ACF/VTAME, an optional, user-written routine that approves or disapproves requests for session initiation.

automatic logon. A process by which ACF/VTAME creates a session-initiation request (logon) for a session between a secondary logical unit (other than a secondary application program) and a designated primary logical unit whenever the secondary logical unit is not in session with, or queued for a session with, another primary logical unit. See also *controlling application program.*

Note: *Specifications for the automatic logon can be made when the secondary logical unit is defined or can be made by the network operator in the VARY NET,LOGON command.*

available. In ACF/VTAME, pertaining to a logical unit that is active, connected, enabled, and not at its session limit.

B

basic information unit (BIU). In SNA, the unit of data and control information that is passed between connection point managers. It consists of a request/response header (RH) followed by a request/response unit (RU).

basic transmission unit (BTU). In SNA, the unit of data and control information passed between path control components. The BTU can consist of one or more path information units (PIUs), depending on whether blocking is done by the path control that builds the BTU.

boundary function. In SNA: (1) a general term used for any one of several capabilities of a subarea node: (a) transforming a network address to a local address, and vice versa, for attached peripheral nodes; (b) performing sequence numbering for attached, low-function peripheral nodes within its subarea; and (c) providing pacing of the data flows for peripheral LUs within a subarea. (2) The programming component and node that perform the above capabilities.

bracket. In SNA, an uninterruptible unit of work, consisting of one or more chains of request units and their responses exchanged between two logical units in a session. Examples are data base inquiries/responses, update transactions, remote job entry output sequences to work stations, and similar applications.

bracket protocol. In SNA, a data flow control (DFC) protocol in which exchanges between logical units (LUs) in a session are achieved through the use of brackets, with one LU designated at session initiation as the first speaker, and the other LU as the bidder. The bracket protocol involves bracket initiation and termination rules.

C

CDRM. Cross-domain resource manager.

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

data flow control protocol. In SNA, the sequencing rules for requests and responses by which network addressable units in a session coordinate and control data transfer and other operations. For example, see *bracket protocol.*

data link. In SNA, the physical connection and the connection protocols between the network nodes; for example, a communication line under control of SDLC or a data channel and its associated protocols.

Note: *A communication line is the physical medium; for example, a telephone wire, a microwave beam. A data link includes the physical medium of transmission, the protocol, and associated communication devices and programming. It is both logical and physical.*

data link control protocol. A set of rules used by two nodes on a data link to accomplish an orderly exchange of information. Synonymous with *line control.*

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

device-type logical unit. In ACF/VTAME, a logical unit that has a session limit of one and can act only as the secondary end of a session. It is typically an SNA terminal (such as a logical unit for a 3270 terminal or a logical unit for the 3790 application program). See also *peripheral node.*

disconnection. The termination of a physical connection.

DLC. Data link control.

domain. In SNA, the network resources controlled by one system services control point.

domain operator. In a multiple-domain network, the person or program that controls the operation of the resources controlled by one access method. Contrast with *network operator (3).*

Downstream Load Utility (DSLU). A program product that uses the communication network management (CNM) interface to support the load requirements of certain type 2 physical units, such as the IBM 3644 Automatic Data Unit and the IBM 8775 Display Terminal.

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

E

end user. In SNA, the ultimate source or destination of information flowing through a network: an end user may be an application program, an operator (such as a terminal user or a network operator), or a data medium (such as cards or tapes).

exit list (EXLST). A control block that contains the addresses of routines that receive control when specified events occur during execution; for example, routines that handle session-establishment request processing or I/O errors.

exit routine. Any of several types of special-purpose user-written routines. See *accounting exit routine, authorization exit routine, logon-interpret routine, EXLST exit routine,* and *RPL exit routine.*

EXLST exit routine. A type of user-written routine whose address has been placed in an exit list (EXLST) control block. See *RPL exit routine.*

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

F

FID. Format identification (field).

field-formatted. Pertaining to a request or response that is encoded into fields, each having a specified format such as binary codes, bit-significant flags, and symbolic names. Contrast with *unformatted.*

format identification (FID) field. In SNA, a field in a transmission header (TH) that defines the subsequent format of the header and the type of TH fields involved with a transmission.

formatted system services. A portion of ACF/VTAME that provides certain system services as a result of receiving a field-formatted command, such as an Initiate or Terminate command. Contrast with *unformatted system services (USS).* See also *field-formatted.*

function management (FM). In SNA, the functions performed by the NAU services manager layer and the function management data interpreter layer.

function management data (FMD) services. In SNA, the component of function management responsible for request/response units marked as "function management data." This includes presentation services and logical unit services (within the logical unit), physical unit services (within the physical unit), and network services (within the system services control point).

H

half duplex. *(1) In In data communication, pertaining to an alternate, one way at a time, independent transmission. (2) Contrast with *duplex.*

host processor. In a data communication system, the processing unit in which the data communication access method resides.

I

inactive. In ACF/VTAME, pertaining to a major or minor node that has not been activated or for which the network operator has issued VARY NET,INACT. Contrast with *active.*

multipoint line. A line or circuit interconnecting two or more link stations. Contrast with *point-to-point line.*

Multisystem Networking Facility. An optional feature of ACF/TCAM and ACF/VTAM that permits these access methods, together with ACF/NCP/VS, to control a multiple-domain network.

multithread application program. An ACF/VTAME application program that processes many requests from more than one session concurrently. Contrast with *single-thread application program.*

N

NAU. Network addressable unit.

NCP. Network control program.

negative response. In SNA, a response indicating that a request did not arrive successfully or was not processed successfully by the receiver in a session. Contrast with *positive response.*

negotiable BIND. In SNA, a capability that allows two logical units to negotiate the parameters of a session when the session is being established.

network. In data processing, a user application network. See *path control network, public network, SNA network,* and *user application network.*

network address. In SNA, the address, consisting of subarea and element subfields, that uniquely identifies a link, a link station, or a network addressable unit. The conversion from a local address to a network address, or vice versa, is accomplished as part of the boundary function in the subarea node to which a peripheral node is attached. See *local address.* See also *network name.*

network addressable unit (NAU). In SNA, a logical unit, a physical unit, or a system services control point. It is the origin or the destination of information transmitted by the path control network. See also *network name, network address,* and *path control network.*

Note: *Each NAU has a network address that represents it to the path control network (LUs may have multiple addresses). The path control network and the NAUs collectively constitute the SNA network.*

network name. (1) In SNA, the symbolic identifier by which end users refer to a network addressable unit, a link station, or a link. See also *network address.* (2) In a multiple-domain network, the name of the APPL statement defining an ACF/VTAM application program is its network name and it must be unique across domains. Contrast with *ACB name.*

network operator. (1) A person responsible for controlling the operation of a network. (2) An ACF/VTAME application program authorized to issue ACF/VTAME operator commands. (3) In SNA, the person or program that controls all the domains in a multiple-domain network. Contrast with *domain operator.*

network operator command. A command used to monitor or control the 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 session-initiation request 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) In SNA, a junction point in a network, represented by a physical unit. A node contains network addressable units and path control and data link control components. (2) In ACF/VTAME, a point in a network defined by a symbolic name. See also *major node* and *minor node.*

node initialization block (NIB). In ACF/VTAME, a control block associated with a particular node or session that contains information used by the application program to identify the node or session and indicate how communication requests on a session are to be handled by ACF/VTAME.

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

non-SNA terminal. A terminal that does not use SNA protocols.

O

orderly closedown. The orderly deactivation of ACF/VTAME and its domain. An orderly closedown does not complete until all application programs have closed their ACBs. Until then, all RPL-based operations continue; however, no new sessions can be established and no new ACBs can be opened. Contrast with *quick closedown.*

P

pacing. In data communication, a technique by which a receiving component controls the rate of transmission of a sending component to prevent overrun.

parallel sessions. In SNA, two or more concurrently active sessions between the same two logical units. Each session can have a different function management profile, and a different transmission subsystem profile, and each has independent session control.

path. (1) In SNA, the series of nodes, data links, and path control network components (path control and data link control) that form the complete course traversed by the information exchanged between two network addressable units in session. (2) In defining a switched major node, a potential dial-out port that be used to reach a physical unit.

path control (PC) layer. In SNA, the layer that manages the sharing of data link resources of the path control network and routes basic information units (BIUs) through it. Path control is aware of the location of NAUs in the network and of the

for data transfer, for establishing or ending a session, or for some other operation.

request/response header (RH). In SNA, a control field, attached to a request/response unit (RU), that specifies the type of RU being transmitted–request or response–and contains control information associated with that RU. See also *request/response unit.*

request/response unit (RU). In SNA, the basic unit of information entering and exiting the transmission subsystem. It may contain data, acknowledgment of data, commands that control the flow of data through the network, or responses to commands.

request unit. See *request/response unit.*

resource definition table (RDT). In ACF/VTAME, a table that describes the characteristics of each node available to ACF/VTAME and associates each node with a network address. This is the main ACF/VTAME network configuration table.

response. See *request/response unit.*

response header. See *request/response header.*

response unit. In SNA, the request/response unit following a response header; it is sent in response to a request unit. Synonymous with *response.* See *request/response unit.*

RH. Request/response header.

RPL. Request parameter list.

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

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

RU. Request/response unit.

S

SDLC. Synchronous Data Link Control.

secondary application program. An application program acting as the secondary end of an LU-LU session.

secondary end of a session. That end of a session that uses secondary protocols. For an LU-LU session, the secondary end of the session is the secondary logical unit. Contrast with *primary end of a session.* See also *secondary logical unit.*

secondary logical unit (SLU). In SNA, the logical unit that acts as the secondary end of an LU-LU session. Contrast with *primary logical unit.*

session. In SNA, a logical connection between two network addressable units (NAUs) to allow 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. See *LU-LU session, SSCP-LU session, SSCP-PU session,* and *SSCP-SSCP session.*

session control. In SNA, one of the components of transmission control. It is responsible for purging data flowing in a session if an unrecoverable error occurs and for resynchronizing the data flow after such an error.

session limit. In SNA, the maximum number of concurrently active LU-LU sessions a particular network addressable unit can support.

session parameters. In SNA, the parameters that specify the protocols (such as bracket protocol and pacing) for a session between two network addressable units. See also *logon mode.*

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

simulated logon. A session-initiation request generated when an ACF/VTAM application program issues a SIMLOGON macro instruction. The request specifies an LU with which the application program wants a session in which the requesting application program will act as the PLU.

single-thread application program. An ACF/VTAME application program that processes requests for multiple sessions one at a time. Such a program usually requests synchronous operations from ACF/VTAME, waiting until each operation is completed before proceeding. Contrast with *multithread application program.*

SLU. Secondary logical unit.

SNA. Systems Network Architecture.

SNA network. The part of the user application network, excluding the end users, that conforms to Systems Network Architecute. The SNA network comprises network addressable units and the path control network. See *path control network* and *user application network.* See also *network addressable unit.*

SNA terminal. A terminal that supports Systems Network Architecture protocols.

SSCP. System services control point.

SSCP ID. An identifying number associated with an SSCP (that must be unique in a multidomain system) that enables a physical unit (especially a dial-in device) to identify an SSCP at a particular location and enables another SSCP to identify this SSCP when establishing a session with it.

SSCP-LU session. In SNA, a session between a logical unit (LU) and the system services control point (SSCP). It is used to support logical unit-related control and use of the SNA network. Each logical unit in the network participates in a

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